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Much has changed here at the Medical Student Journal of Australia (MSJA) since Volume 4 Issue 2. In 2013, the Editorial Board underwent a massive expansion; from a small group of six final year students to a professional committee of 25 members, with representation from every year group. The Board has benefited greatly from a new hierarchical structure, including the introduction of several levels of management and subject-specific subcommittees.

With our new structure in place, the MSJA is now equipped to grow into the world-class journal we have always strived to be. To this end, senior members of the MSJA Board travelled to the Sydney offices of the Medical Journal of Australia (MJA) in July to meet with Professor Stephen Leeder, Editor-in-Chief of the MJA. This meeting cemented the ongoing mentorship relationship between the two journals, and inspired us to strive for the spirit of excellence and professionalism always upheld at Australia’s premier general medical journal.

Begun as a research journal for students at the Australian National University (ANU), the MSJA has become so much more than a publication solely for Australian medical students. This year, we received submissions from all across the Asia-Pacific region, including from the University of Otago (New Zealand) and the Cebu Institute of Medicine (the Philippines). In addition, authors from a wide range of the allied health professions contributed manuscripts, including students of dentistry, pharmacy, health law, and the Doctor of Philosophy (PhD) in Epidemiology and Population Health.

While the journal has traditionally only published written manuscripts, with a strong foundation in research, the Editorial Board has been working hard throughout 2013 to establish a new Images and Artworks category. To celebrate this, Frances Wild, Acting Manager of Access and Services at the NGA will be contributing an article to the next issue of the MSJA; Volume 5 Issue 1. The MSJA sought visual submissions for Volume 5 Issue 1, and was overwhelmed by the response. It is with pleasure that we launch the new category with four outstanding submissions by Kellie Hillsley, Jade Lee (cover), Megan O’Moore and Shrikar Tummala.

During the collection of manuscripts in 2013, the Board found, as always, that some of the most compelling submissions came from experts in the field. As students, we have so much to learn from the selfless and inspiring careers of the medical greats, like Professor John Murtagh AM and Dr Catherine Hamlin AC, who have both contributed pieces to Volume 5 Issue 1.

Professor Murtagh is the author of the much acclaimed John Murtagh’s General Practice, and was awarded the Member of the Order of Australia in 1995 for his services to medical education, research and publishing. Dr Hamlin is the co-founder of the Addis Ababa Fistula Hospital, which has treated well over 35,000 patients with obstetric fistulae, free of charge, since it opened in 1974. Dr Hamlin was appointed as a Member of the Order of Australia in 1983, and in 1999 she was nominated for the Nobel Peace Prize. The MSJA is very grateful to them both for donating their time and their wisdom to us.

It has been such a privilege to be a part of this wonderful, hard-working team, and we can’t wait to get started on Volume 5 Issue 2.

Megan Hickie and Michael Bennett
Editors-in-Chief
I guess that I always harboured an inkling that I wanted to be a family doctor. I was impressed with two outstanding role models – two ‘Dr Bills’ (1). One was our family doctor in our small country town who seemed to manage any contingency with skill and humanity. The bottom line was that I was attracted to emergency medicine and human behaviour. I enjoyed interacting with people and was fascinated by their different personalities and idiosyncrasies. This interest was reinforced by my original occupation as a secondary school teacher when I was most interested by the behaviour of children, adolescents (in particular) and families. In medical school I was consumed with curiosity and was fascinated by every aspect of the medical course – from acne to zoonoses. I must admit to a procedural predilection and found that surgery, obstetrics, and emergency medicine were special interests.

Following graduation I commenced a surgical training program as a surgical registrar and after working in a country base hospital realised that rural practice focused around a hospital (like Dr Bill Tonkin of Coleraine) would be ideal as it allowed comprehensive management with the great attraction of continuity of care which is the essence of general practice. Continuity is that marvelous process which allows one to follow patients and learn intimately about management outcomes over long periods of time. The World Health Organisation has confirmed that there is evidence that continuity of care in general practice/family medicine leads to better outcomes; lower all-cause morbidity, less re-hospitalisation, less specialist care, less use of emergency services and better detection of adverse effects of medication interventions (2).

Apart from continuity the hallmarks that make general practice different from hospital or specialist-based medical practices and most attractive include:

- first contact
- early diagnosis of life threatening and serious disease
- personalised care
- care of acute and chronic illness
- domiciliary care
- emergency care (prompt treatment at home or in the community)
- family care
- aged care
- palliative care (at home)
- preventive care and scope for health promotion
- holistic approach to management
- advocacy and co-ordination of health

Fortunately my partner, Dr Jill Rosenblatt, shared a similar vocational outlook so we took over a solo rural practice that included sole responsibility for a bush nursing hospital with the added ‘carrot’ of inpatient rights at the base hospital. Happily we were able to practice obstetrics, paediatrics, limited surgery, psychiatry, anaesthetics, emergency care and all facets of the special senses. Of course there were difficult problems for doctors learning on the job but being able to refer to excellent consultants meant that we continued to learn how to handle more complex problems and the need to refer diminished with time.

The existence of the Royal Australian College of General Practitioners was reassuring as we could undertake continuing study towards the fellowship examination and we had the opportunity to publish through the ever burgeoning publications. I was particularly concerned about the lack of textbooks and other resources targeting grass-roots general practice. I was very interested in minor procedures or ‘tricks of the trade’ and writing education handout sheets for our patients, The College warmed to this initiative and eventually I had written sufficient material and case histories to produce the original textbooks “Practice tips”, ‘Patient education’ and
‘Cautionary tales’

The general practice environment provided great opportunities for research and teaching and consequently we accepted students from the medical schools for long and short terms of exposure to community medicine in all its raw and challenging forms.

Flexibility of practice is a feature and the opportunities to develop special interests and skills within the continuum of general practice are endless. Special interests of mine, aided by short courses, included physical spinal therapy, pain management, hypnotherapy, acupuncture, and sports medicine.

General practice is truly fascinating and a privilege to be so close to people and their fascinating problems. An exciting responsibility is first contact with the challenge of reaching a quick diagnosis and identifying life threatening conditions. Home visits are a special learning experience and a goldmine of information as we see first hand the living environment of our patients. There are optimal chances for life time learning with care from the ‘cradle to grave’, ‘womb to tomb’ or, as one colleague put it ‘from the erection to the resurrection’.

2. Murtagh J E. Paradigms of family medicine-bridging traditions with new concepts; meeting the challenge of being the good doctor. Fam Med 2011; 10-19.
It is a pleasure for me to share this short account of the work we do in Ethiopia with medical students in Australia, along with a glimpse of my long stay in this beautiful country and what keeps me here.

My late husband and I arrived in Ethiopia in 1959 as gynecologists and obstetricians. At this time there was a great shortage of such, as well as there being no medical school in Ethiopia until 1966.

At the government hospital we met our first fistula patient and our hearts were touched by her sad plight. She had such a great need and tremendous perseverance in making the long journey to seek help, all alone, begging as she travelled many miles. It was her first baby, a stillbirth and she was about 18 years old. She was poor, with rough sandals, clothes smelling and soaked with urine. She was indeed a pitiful sight. What great stamina and determination she displayed to make such a journey!

This patient was the first of many who came in with the same plight from the countryside – soon becoming a constant stream of new patients. About 5% of women worldwide suffer an obstructed labour and need help in having a safe delivery. These patients are the survivors as many die in labour. Obstructed labour is most commonly caused by a small or mal-shaped pelvis or the baby is too big or is in an abnormal position. As my husband used to tell his students, “It’s either the passage or the passenger!”

Most of these cases can be cured and to be part of this cure is truly a wonderful thing. To restore a mother once more back with her family and cured is a reward greater than many other restorative surgical procedures. Mostly our patients are young and if not cured, their life is one of misery, poverty, loneliness and hopelessness. Doctors are few in Ethiopia and unfortunately many of them leave to seek better conditions in the wealthy world. I hope that many of you students will feel ‘the call’ to become career fistula surgeons in Africa, helping to eradicate this scourge.

So now, my message to all who read this article is to give this preventable injury a place in your mind as something that should not exist in the twenty-first century! Professor Chassar Moir, a British surgeon once said: “Nothing can equal the gratitude of the woman, who, wearied by constant pain and desperate with the realisation that her very presence is an offence to others, finds suddenly that life has been given anew and that she has once again become a citizen of the world.”

And do remember the words spoken years ago by my late husband, “A mother is a family’s richest possession, a being of priceless value.”
Prospective study of the effect of continuous subcutaneous insulin infusion on the quality of life of patients with type 1 diabetes mellitus

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Abstract

Objective: To assess the impact of initiating continuous subcutaneous insulin infusion (CSII) therapy on the quality of life in patients with type 1 diabetes mellitus.

Design, setting and participants: Prospective study of 20 patients transitioning from multiple daily injections to CSII between February 2010 and July 2011 at The Canberra Hospital.

Main outcome measures: Quality of life assessed by a modified Diabetes Quality of Life questionnaire pre- and three months following initiation of CSII therapy.

Results: The mean age of participants was 43.2 ± 13.6 years. 8 participants failed to complete the study, resulting in a sample size of 12. Treatment satisfaction, impact and total quality of life improved following 3 months of CSII therapy (P < 0.05). Social/vocational worry and diabetes related worry were improved but not significantly.

Conclusion: Quality of life improved after initiation of CSII therapy, with more specific improvements seen in the treatment satisfaction and impact domains.

Introduction

The 1993 Diabetes Control and Complications Trial (DCCT), and subsequent Epidemiology of Diabetes Interventions and Complications (EDIC) Trial, showed intensive insulin therapy used in managing type 1 diabetes mellitus (T1DM) can, when aimed at achieving near normal blood glucose levels, reduce the incidence of macro and microvascular complications (1, 2). More intensive treatment styles, involving three or more insulin injections per day or continuous subcutaneous insulin infusion (CSII), resulted in better glycaemic control and fewer complications when compared to conventional treatment methodologies, characterised by 1 to-2 injections per day (1, 2).

Several studies have been conducted aimed at the further investigation of the influence of intensive treatment on glycaemic control and diabetic complications (3). The general consensus is in agreement with the findings of the DCCT and EDIC, suggesting that intensive treatment should be the treatment modality of choice for T1DM. Clinical practice goals have been modified to reflect this opinion (4, 3).

Intensive insulin therapies are scheduled as a variety of regimens (4). The most common regimen is termed as a ‘modified fixed dose’ and is administered via multiple daily injections (MDI). This therapy is characterised by the use of short-acting insulin with food, the dosage of which is based upon pre-prandial blood glucose levels (BGLs) and anticipated carbohydrate (CHO) intake. A basal dose of long-acting insulin is administered either once or twice daily. Alternatively, an insulin pump can be used to continuously deliver insulin over the day, with additional boluses of insulin with meals based upon pre-prandial BGL and anticipated CHO intake. Correctional boluses of insulin are administered in response to high BGLs. The aim of this therapy is to achieve as close to physiological levels of insulin dosing as possible (4).

In the years following the release of the DCCT and EDIC Trials, research has focused on establishing the best mode of intensive therapy. CSII and MDI have been extensively researched, with CSII being shown to produce greater levels of glycaemic control, which is likely to lead to fewer macro and microvascular complications (5-12). Several studies show that CSII therapy is associated with fewer severe hypoglycaemic episodes (5, 8-12).

The onset of depression, anxiety and social withdrawal has been noted in patients following diagnosis of diabetes, or following the development of complications (13). This finding is made relevant by the recognition that quality of life (QOL) is one of the five strongest predictors of mortality in patients with diabetes (14). With this knowledge, the
use of CSII on QOL of patients has been a topic of debate, though research has not been extensive and has produced varied results. Some studies have shown an improved QOL in patients using CSII (5, 9–12, 15–17), whilst others have failed to find any difference between the two (8, 18). It is argued that CSII affords greater flexibility, increased treatment satisfaction, increased dietary freedom and decreased fear of hypoglycaemic episodes, all contributing to an improved QOL (15, 18). Disagreement in the body of evidence may be due to the effects that wearing a pump may have on body image, the patient’s perceived dependency on a machine, the possible increased susceptibility to diabetic ketoacidosis, the high financial cost and the level of technical proficiency needed to use a pump and the use of different measures to ascertain QOL (9, 18).

An unpublished study conducted within the Endocrinology Department at The Canberra Hospital found that CSII in T1DM patients resulted in a significant initial decline in HbA1c, from 8.40% (pre) to 7.74% (post). However, this decline was only transient, with HbA1c levels reverting to baseline after several years (19). This finding has raised questions regarding the efficacy of the Insulin Pump Program; therefore other indicators of pump efficacy must be explored, such as quality of life, to fully understand the benefits of this program.

Study aims

This prospective study aims to examine QOL after transition from MDI to CSII. A modified Diabetes Quality of Life (DQOL) questionnaire was used to assess the change in QOL in T1DM patients, pre- and post- CSII, with a hypothesised improvement in QOL three months following initiation of treatment. The null hypothesis was that QOL does not improve after initiation of CSII.

Methods

Study design and participants

This prospective study was approved by the ACT Health Human Research Ethics Committee and the Australian National University Human Research Ethics Committee. The study was conducted at The Canberra Hospital between February 2010 and July 2011. Eligible participants (20 – mean age 43.2 ± 13.6 years) were recruited from the Endocrinology Department, and were assessed immediately prior to initiating CSII for the first time. Participants underwent initial QOL assessment in their CSII initiation appointment, with the aid of a diabetes educator. Subsequent QOL assessment occurred with an identical QOL questionnaire mailed to the participant for their completion and return, at an ideal period of three months following initiation. Comparison was made between the patients’ pre- and 3 month CSII therapy QOL questionnaire results.

Quality of Life assessment

QOL was assessed using a modified version of the Diabetes Quality of Life (DQOL) questionnaire. The original DQOL was the first diabetes specific measure of QOL, and was developed for the DCCT to assess the QOL of the subjects within the study (1). It is a 46 item, five-point Likert scale questionnaire (1 = always impacted or worried, very dissatisfied; 5 = no impact, never worried, very satisfied), consisting of four dimensions (20, 21);

1. Satisfaction (15 items) – e.g. “are you satisfied with your current treatment?” and “how satisfied are you with the flexibility you have in your diet?”
2. Impact (20 items) – e.g. “how often do you have low blood sugar?” and “how often do you have a bad night’s sleep?”
3. Social/ vocational worries related to diabetes (7 items) – e.g. “how often do you worry about whether you will be denied insurance?” and “how often do you worry about whether you will miss work?”
4. Worries of future effects of diabetes (4 items) – e.g. “how often do you worry that you will get complications from your diabetes?”

The DQOL was chosen for use in this study as it is the most widely used measure of QOL and thus allows for comparison with other studies. Additionally, the DQOL has good internal consistency reliability, with a range in Cronbach’s α coefficient of 0.66-0.92, with measures of > 0.7 deemed acceptable for studies involving groups of patients (20-22). The DQOL also has an acceptable test-retest correlation, ranging from 0.78-0.92, which also exceeds the criteria for group assessment (20). Additionally, the DQOL has been deemed a valid measure of QOL, with acceptable convergent and divergent validity and appropriate concurrent validation (21-23).

The DQOL used in this study differs from the original DQOL in the addition of two items to the satisfaction dimension of the questionnaire. These two items were the following;

1. “how satisfied are you with your level of education about diabetes?”
2. “how well do you understand your diabetes?”

These items were added to provide some information about the efficacy of the diabetes education program at The Canberra Hospital.

Additional minor changes were made to specific questions in order to make the questionnaire more applicable to the participants of this study. “Impact” question 20, “how often do you hide from others that you’re having an insulin reaction?” was changed to “how often do you hide from others the fact that you are having a hypo?”. “Social and vocational worry” question 7, “how often do you worry about whether you will be able to take a vacation or trip?” was altered by exchanging “...vacation or trip” for “... holiday”.

Statistical analysis

DQOL scores were calculated by assigning a 1-5 weighting of the participant’s response to each item (1 = always impacted or worried/ very dissatisfied; 5 = no impact/ never worried/ very satisfied). Scores were then compiled into a total DQOL score by adding the scores for each item. Scores for each domain were computed by adding the scores for the items within the respective domains. The maximum total score one could attain was 240, and maximum scores for each domain were as follows; satisfaction = 85, impact = 100, diabetes related worry = 20, and social/ vocational worry = 35. Missing values were assigned a value of 3 (“neutral”) in order to minimise their effect on final scores.

Scores from the DQOL were analysed using descriptive statistics (mean and standard deviation) and a paired samples
two tailed Student’s t-test. T-tests were performed comparing the means of pre-CSII therapy scores to 3 month scores, with both total and individual domain scores analysed.

All the analyses were performed using Microsoft Excel software.

**Results**

**Participant characteristics**
Twenty participants were recruited from the Endocrinology department of The Canberra Hospital for this study. Eight patients failed to submit their 3 month DQOL survey, thus 12 patients were included in the statistical analysis. The average age of the 12 participants, at start of CSII therapy, was 37.7 years (SD = 14.0, range = 22.8-61.7).

**DQOL scores**
DQOL scores in the satisfaction domain were significantly improved after 3 months of CSII (mean = 64.8, SD = 9.9) when compared to pre-CSII scores (mean = 59.7, SD = 8.28) (p < 0.05). The same can be said for impact scores: after 3 months of CSII (mean = 72.2, SD = 6.9) QOL in this domain was higher than pre-CSII initiation scores (mean = 67.7, SD = 9.1) (p < 0.05). Social/ vocational and diabetes related worry dimensions produced higher scores in the 3 month DQOL survey, however these differences failed to reach statistical significance (see Table 1 and Figure 1, 2).

Total DQOL scores were significantly higher after 3 months of CSII (mean = 181.9, SD = 19.5) when compared to pre-CSII (mean = 168.9, SD = 19.1) (p < 0.05) (see Figure 2).

**Discussion**

Statistical analysis via descriptive statistics (mean and standard deviation) and a two-tailed Student’s t-test found a significant improvement in the satisfaction and impact domains after 3 months of CSII. Total DQOL scores were also significantly improved. The social/ vocational and diabetes related worry domains were enhanced but failed to reach statistical significance.

The improvement in QOL following CSII found in this study is in concordance with the findings of other studies with the same research question (5, 9-12, 15-17). Hoogma et al. (2005) conducted a study, which involved a crossover between CSII and MDI. The study used the DQOL as a measure of QOL and found improvements in total DQOL score and in the treatment satisfaction and impact domains and a significant decrease in diabetes related worries with CSII (12). Nicolucci et al. (2008) conducted a case controlled study comparing CSII and MDI’s effect on QOL. The study used a different assessment tool, the Diabetes Specific Quality of Life Scale (DSQOL) and the Diabetes Treatment Satisfaction Questionnaire (DTSQ). It also found an increased treatment satisfaction with CSII therapy, which concurs with the findings of this current study and the Hoogma et al. (2005) study. It also observed a decrease in diabetes related worry, which is in concordance with the non-significant trend found in this current study (15).

A potential reason for the discrepancy observed between the studies discussed and the findings of the current research paper is that the participants in this study were required to obtain private health insurance/pay up front for their insulin pump in order to begin CSII. This meant that the participant had to be motivated to begin CSII. Sources of a high motivation may be a high degree of diabetes-related worry, which may take significant time to allay (> 3 months). This may also explain why no change was observed in the social/vocational related worry
of fewer items (7 and 4 respectively) than the satisfaction and impact domains (15 and 20 respectively), such that small changes in these domains may fail to be elucidated. The study failed to examine other parameters, such as HbA1c, complications, etc., however these analyses were beyond the scope of this study. Finally, this was not a randomised control trial study; therefore increased attention from health professionals during pump initiation cannot be excluded as a factor improving QOL rather than the pump use itself.

Conclusion

The findings of this study support the body of evidence, suggesting that CSII has a positive effect on QOL. Further study is needed to investigate the long-term effect of CSII on QOL, with scope for this study to be extended with the same cohort of patients at a 12 month interval. Further study involving a compilation of findings based on QOL, glycaemic control and complications should be undertaken comparing pre- and post-initiation of CSII to further clarify the efficacy of the Insulin Pump Program at The Canberra Hospital’s Endocrinology Department.

Acknowledgements:
Quality of life investigators at The Canberra Hospital: V. Mahood and D. Roberts. Grant application and previous work completed by J. Tidemann and R. Schmidli.

Conflicts of interest:
None to declare.

Funding:
This study is funded by a National Health and Medical Research Council Program Grant.


Proton pump inhibitor use and vitamin B₁₂ deficiency: A problem in the future?

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Abstract

**Background:** Proton pump inhibitors (PPIs) are commonly prescribed in the clinical setting and are known to have a safe side effect profile and high efficacy. Recent literature reviews showed a positive correlation between their long term use and adverse effects such as fractures, pneumonia and enteric infections. However these studies have inconclusive findings on PPI use leading to vitamin B₁₂ deficiency.

**Aim:** To determine whether there is an association between PPI use and vitamin B₁₂ deficiency.

**Method:** A systematic review was conducted using PubMed, Embase and the Cochrane Library for records between 1988-2012. Reference lists of review articles were scanned to identify studies not found in the database search.

**Results:** Studies meeting inclusion criteria consisted of two clinical trials, 13 observational studies, two case reports and seven review articles. The clinical trials suggested that vitamin B₁₂ absorption is impaired during PPI therapy. Observational studies showed a reduction in serum vitamin B₁₂ levels in participants on long term PPI therapy. Whether this led to vitamin B₁₂ deficiency with a significant clinical impact remains unanswered.

**Conclusion:** Certain groups of the population were at risk of developing vitamin B₁₂ deficiency whilst on long term PPI therapy; this included the elderly, individuals with Zollinger Ellison syndrome, those on concurrent metformin and slow metabolisers of PPIs. Serum vitamin B₁₂ levels should be monitored to minimise the haematological, gastrointestinal and neuropsychiatric manifestations of vitamin B₁₂ deficiency.

**Background**

Proton pump inhibitors (PPIs) are commonly prescribed in the clinical setting worldwide. They have a safe side effect profile and high efficacy in reducing gastric acid (hydrochloric acid, potassium chloride and sodium chloride) secretion (1, 2). Recognised side effects are rare and include headache, diarrhoea and rash (3). Recent literature reviews showed a positive correlation between their long term use and adverse effects such as fractures, pneumonia and enteric infections (4, 5). However these studies had inconclusive findings on the use of PPIs leading to vitamin B₁₂ deficiency. This is an important issue as vitamin B₁₂ is a cofactor and coenzyme for a number of biochemical reactions including DNA synthesis, and when deficient, causes subtle clinical features that can progress to serious neuropsychiatric and haematological adverse effects (Table 1) (6, 7). Previous literature reviews on the adverse effects of PPIs had a limited inclusion of studies investigating its association with vitamin B₁₂. This systematic review aimed to determine whether there is an association exists between the use of PPIs and vitamin B₁₂ deficiency, by reviewing the literature from the discovery of the first PPI in 1988 to 2012.

Many causes of vitamin B₁₂ deficiency are identified, the most common being food cobalamin malabsorption, a disorder characterised by the inability to release cobalamin from food or its binding protein (8). Other causes include veganism without vitamin supplementation, gastrectomy, pernicious anaemia, ileal resection and congenital cobalamin deficiency (6, 9). Vitamin B₁₂ absorption requires an acidic environment in the stomach which is reduced by PPIs. This leads to increasing concern that users of PPIs may be vitamin B₁₂ deficient. Dietary vitamin B₁₂ enters the stomach bound to proteins in meat and animal products. This bond is broken by gastric secretions and pepsin. Free vitamin B₁₂ then binds to intrinsic factor - it should be noted that the secretion of intrinsic factor is not affected by PPIs. In the ileum it attaches to receptors on the intestinal mucosal cells and vitamin B₁₂ is bound to transport proteins known as transcobalamin I, II and III. Vitamin B₁₂ is finally distributed systemically via the portal system. Therapy with PPIs irreversibly inhibits the secretion of hydrogen ions from the H+/K+-ATPase pump on parietal cells which is the terminal step in the acid secretory pathway (10).

**Method**

A systematic review was conducted using a database search in PubMed, Embase and the Cochrane Library. Search terms used: ‘proton pump inhibitors AND vitamin B₁₂ deficiency’, ‘proton pump inhibitors AND cobalamin deficiency’, ‘PPI AND vitamin B₁₂ deficiency’, ‘PPI AND cobalamin deficiency’.

Fifty eight articles were found (Figure 1). Reference lists of review articles were scanned to identify studies not indexed in PubMed, Embase or the Cochrane Library. Relevant studies that investigated PPI use in humans published between January 1988 and January 2013 were included in this review. After the removal of duplicate studies, 25 articles...
remained which consisted of two clinical trials, 14 observational studies, two case reports and seven review articles.

Results

Of the 14 clinical studies identified, three found no association between the use of PPIs and vitamin B₁₂ deficiency, three found a positive association between the use of PPIs and impaired vitamin B₁₂ absorption, and seven showed a reduction in serum vitamin B₁₂ levels associated with the use of PPIs (Table 2 and 3) based on statistically significant p-values and 95% confidence intervals. The most common finding reported by the seven review articles was that the use of PPIs is related to a reduction in vitamin B₁₂ absorption, however, whether the participants develop clinically significant vitamin B₁₂ deficiency was not determined.

Healthy participants

A randomised control trial on 10 healthy male volunteers aged 20-50 years, whereby five participants were randomized to omeprazole (a type of PPI) therapy for two weeks, showed an acute reduction in vitamin B₁₂ absorption in a dose-dependent fashion (11). Another clinical trial on the elderly population supported this finding by showing that protein bound vitamin B₁₂ absorption was lower in the omeprazole treated group compared to the controls. The percentage absorbed were 0.5% and 1.21%, respectively (P<0.001) (12).

Gastro-oesophageal reflux disease/peptic ulcer

In eight patients with a history of a duodenal ulcer receiving omeprazole treatment for nine days, a modified Schilling test was used to monitor the absorption of protein bound and unbound vitamin B₁₂ (13). Patients on omeprazole had significantly reduced absorption of protein-bound vitamin B₁₂, indicated by a reduction in the excretion of co-cyanocobalamin from an average of 1.31 to 0.54(P <0.02), on 20mg of omeprazole and from an average of 1.25 to 0.29 (P<0.02), on 40mg of omeprazole. The same researchers analysed the serum vitamin B₁₂ levels of 25 patients on omeprazole for gastro-oesophageal reflux disease (GORD) who were treated for an average duration of 56 months. Serum vitamin B₁₂ levels dropped from 298 +/- 27pg/L to 261 +/- 16pg/L these findings were not statistically significant (P > 0.05). Similar results were found by Koop & Bachem (1992) who monitored the vitamin B₁₂ status of 34 participants with acid peptic diseases refractory to histamine-H2 receptor antagonists who were on PPI therapy for approximately 36 months (14). A downward trend occurred in the serum vitamin B₁₂ concentrations, however the change was not significant. A retrospective case control study was conducted where 125 cases were age and gender matched to 500 controls. They found a positive relationship between the long term (>10 months) use of PPIs or histamine-H2 receptor antagonists and the initiation of vitamin B₁₂ supplementation (15).

Elderly

A total of 1,054 participants over 65 years of age were followed for five years in a cohort study involving 125 people who were on either a histamine-H2 receptor blocker or PPI (16). After adjusting for age, gender and institutional residence,
**Table 2 Overview of studies I.**

<table>
<thead>
<tr>
<th>Author</th>
<th>Design</th>
<th>Objectives</th>
<th>Participants</th>
<th>↓ Vit B&lt;sub&gt;12&lt;/sub&gt; absorption*</th>
<th>↓ Vit B&lt;sub&gt;12&lt;/sub&gt; serum levels †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marcuard (11) 1994</td>
<td>Randomised control trial</td>
<td>To evaluate protein bound vitamin B&lt;sub&gt;12&lt;/sub&gt; sub-absorption before and after omeprazole.</td>
<td>10 healthy male volunteers 20-50 years old</td>
<td>Yes</td>
<td>†</td>
</tr>
<tr>
<td>Saltzman (12) 1994</td>
<td>Non-randomised trial</td>
<td>To investigate the effects of hypochlorhydria and acidic drink ingestion on protein-bound vitamin B&lt;sub&gt;12&lt;/sub&gt; absorption in elderly subjects.</td>
<td>8 elderly subjects 8 hypochlorhydric subjects due to omeprazole treatment 8 patients with atrophic gastritis</td>
<td>Yes</td>
<td>†</td>
</tr>
<tr>
<td>Schenk (20) 1999</td>
<td>Cohort</td>
<td>To investigate whether the combination of decreased vitamin B&lt;sub&gt;12&lt;/sub&gt; absorption and atrophic gastritis decreases serum vitamin B&lt;sub&gt;12&lt;/sub&gt; levels during omeprazole therapy.</td>
<td>49 patients with gastrointestinal reflux disease and followed up for a mean period of 25 months.</td>
<td>†</td>
<td>Yes</td>
</tr>
<tr>
<td>Sagar (24) 1999</td>
<td>Cohort</td>
<td>To investigate whether long-term PPI use affects serum vitamin B&lt;sub&gt;12&lt;/sub&gt; levels and to what extent it depends on CYP2P19 activity.</td>
<td>179 participants (111 PPI users)</td>
<td>†</td>
<td>Yes</td>
</tr>
<tr>
<td>Mitchell (16) 2001</td>
<td>Cohort</td>
<td>To test the association between the use of an antulcer medication (histamine-2 blocker or PPI) at baseline with initiation of cobalamin replacement during the 5 year follow-up period.</td>
<td>1,054 subjects over 65 years of age, including 125 who were taking an antulcer medication at baseline</td>
<td>§</td>
<td>§</td>
</tr>
<tr>
<td>Koop (14) 1992</td>
<td>Interrupted time series</td>
<td>Determination of serum vitamin B&lt;sub&gt;12&lt;/sub&gt;, iron, ferritin and folate levels after continuous (6-48wks) of omeprazole therapy.</td>
<td>25 males 9 menopausal females</td>
<td>No</td>
<td>†</td>
</tr>
<tr>
<td>Termanini (21) 1998</td>
<td>Interrupted time series</td>
<td>To investigate whether long-term treatment with omeprazole alters serum vitamin B&lt;sub&gt;12&lt;/sub&gt; levels in patients with Zollinger-Ellison syndrome.</td>
<td>111 patients treated with omeprazole 20 patients treated with histamine H2 antagonist.</td>
<td>†</td>
<td>Yes</td>
</tr>
<tr>
<td>Schenk (13) 2003</td>
<td>Interrupted time series</td>
<td>To evaluate absorption of protein-bound and unbound cyanocobalamin before and during treatment with omeprazole, and cobalamin levels in patients on long-term treatment with omeprazole.</td>
<td>8 former duodenal ulcer patients. 25 patients with GORD</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Valuck (17) 2004</td>
<td>Case control</td>
<td>To investigate the association between histamine H-2 receptor antagonist therapy or proton pump inhibitor use in older adults and vitamin B&lt;sub&gt;12&lt;/sub&gt; deficiency.</td>
<td>52 vitamin B&lt;sub&gt;12&lt;/sub&gt; deficient cases 212 controls 65 years or older.</td>
<td>§</td>
<td>§</td>
</tr>
<tr>
<td>Hirschowitz (22) 2008</td>
<td>Case control</td>
<td>To determine the true prevalence of vitamin B&lt;sub&gt;12&lt;/sub&gt; deficiency and whether it is caused by acid suppression from PPI.</td>
<td>61 acid hypersecretors 15 controls</td>
<td>†</td>
<td>Yes</td>
</tr>
<tr>
<td>den Elzen (19) 2008</td>
<td>Case control</td>
<td>To investigate whether long term use of PPI is associated with abnormal vitamin B&lt;sub&gt;12&lt;/sub&gt; status in elderly individuals.</td>
<td>125 long term PPI users Controls – partners of the PPI users</td>
<td>†</td>
<td>No</td>
</tr>
<tr>
<td>Force (15) 2003</td>
<td>Retrospective chart review</td>
<td>To determine whether chronic acid suppression is associated with the initiation of vitamin B&lt;sub&gt;12&lt;/sub&gt; suplementation.</td>
<td>125 cases 500 controls</td>
<td>§</td>
<td>§</td>
</tr>
<tr>
<td>Dharmarajan (18) 2008</td>
<td>Cross-sectional</td>
<td>To examine the relationship between serum vitamin B&lt;sub&gt;12&lt;/sub&gt; levels in older adults on histamine H2 antagonists or proton pump inhibitors over six years.</td>
<td>659 adults 60-102 years.</td>
<td>†</td>
<td>Yes</td>
</tr>
<tr>
<td>Long (23) 2012</td>
<td>Retrospective chart review</td>
<td>Evaluate the effect of concurrent metformin and proton pump inhibitor use with vitamin B&lt;sub&gt;12&lt;/sub&gt; deficiency.</td>
<td>614 type 2 diabetics. Non-vegetarian, under 60 years old, not diagnosed with pernicious anaemia</td>
<td>†</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Results in this column shows whether a significant association was found between vitamin B<sub>12</sub> absorption and PPI therapy in their participants.
† Results in this column shows whether a significant association was found between vitamin B<sub>12</sub> serum levels and PPI therapy in their participants.
‡ Not investigated.
§ The study did not distinguish whether the association was related to PPI use or histamine H2 antagonist.
the use of antilucer medication was associated with the need for vitamin B\textsubscript{12} supplementation (OR=2.61; 95%CI: 1.31, 5.05). At follow-up, 4.6% of the participants had initiated vitamin B\textsubscript{12} supplementation. Similar results were found in a case-control study on elderly patients over 65 years of age on either a histamine-H2 receptor blocker or PPI (17). Serum vitamin B\textsubscript{12} results from 52 cases were compared with 212 controls. When controlled for age, gender, multivitamin use and Helicobacter pylori infection status, the chronic use of a PPI or histamine-H2 antagonist for more than 12 months was associated with a significantly increased risk of vitamin B\textsubscript{12} deficiency (OR=4.45; 95% CI: 1.47, 13.34).

A cross-sectional study analysed 659 elderly patients (26% PPI users and 28% histamine-H2 antagonist users) between 60 and 102 years of age who were on acid suppression therapy for an average duration of 18 months (18). Interestingly, PPI use was associated with reduced serum vitamin B\textsubscript{12} levels (P<0.00005) which was not present in histamine-H2 antagonist users (P=0.1).

On the contrary, a case-control study that examined the effect of long term PPI use in the elderly showed no impact on vitamin B\textsubscript{12} levels (19). A total of 125 PPI users aged 65 years or over, and who used PPIs for a period of three years or more were compared to their partners who were not PPI users and acted as the control group. The groups were matched for age, H. pylori status and C reactive protein levels. No difference in serum vitamin B\textsubscript{12} levels were observed between the PPI users and their partners, the serum vitamin B\textsubscript{12} levels were 345 and 339 respectively (P=0.73).

**Atrophic gastritis**

Schenk et al. (1999) investigated whether PPI therapy had an impact on the vitamin B\textsubscript{12} levels of individuals who developed atrophic gastritis whilst on PPI therapy for GORD and were positive for H. pylori infection (20). Their cohort study followed 49 patients on PPIs for 61 months where 15 of them developed atrophic gastritis. Serum vitamin B\textsubscript{12} levels reduced from a median of 340pmol/L to 285pmol/L (P <0.01) in patients with atrophic gastritis. No significant change in serum vitamin B\textsubscript{12} levels occurred in those who did not develop atrophic gastritis (P=0.1).

**Zollinger-Ellison syndrome**

An interrupted time series study on 111 patients with Zollinger-Ellison syndrome (gastrinoma) on omeprazole showed a significant reduction in vitamin B\textsubscript{12} levels after 4.5 years of therapy (21). Hirschowicz et al. (2008) performed a case-control design study on the effect of lansoprazole on acid hypersecretors (high basal acid output >15mmol/hr) which comprised 46 patients with Zollinger-Ellison syndrome and 15 patients with pseudo Zollinger-Ellison syndrome (22). Serum vitamin B\textsubscript{12} levels in the 61 individuals underwent a decline from a median level between 890 to 950pg/mL to 495pg/mL in six years and to 409pg/mL after 12 years (P<0.02). Six participants developed deficient vitamin B\textsubscript{12} levels (140-200pg/mL). They also found that in the participants with a vitamin B\textsubscript{12} level in the lower limits of normal range, homocysteine levels were raised in 37% of the group which were reversed with vitamin B\textsubscript{12} supplementation.

**Diabetes**

The effect of concurrent metformin and PPI use in 614 diabetic patients was investigated in a retrospective chart review. Although the use of metformin or PPIs alone did not result in vitamin B\textsubscript{12} deficiency, the combination was associated with vitamin B\textsubscript{12} deficiency (23).

**Slow metabolisers of PPIs**

Sagar et al. (1999) performed genotyping on individuals to identify those with a mutant allele coding one of the cytochrome P450 enzymes (CYP2C19) that metabolises omeprazole. In individuals on longer than one year of therapy with 20mg of omeprazole daily, serum vitamin B\textsubscript{12} levels were significantly lower in the patients heterozygous for the mutant allele compared to those with the normal allele (246 +/- 7pmol/L vs. 305 +/- 98pmol/L, P<0.0001, respectively). This was shown in a cohort study of 179 individuals including 111 long term PPI users (24).

**Case reports**

Two case reports showed a relationship between vitamin B\textsubscript{12} deficiency and long term PPI therapy. A 51 year old presented with clinical manifestations of vitamin B\textsubscript{12} deficiency while on PPI therapy for GORD and oesophagitis (25). After four years of daily omeprazole at a dose of 40-60mg, he developed megaloblastic anaemia (serum vitamin B\textsubscript{12} 80pmol/L). The other report was on a 78 year old non-vegetarian female on four years of PPI and histamine-H2 antagonist therapy for GORD (26). Her vitamin B\textsubscript{12} levels dropped to the lower end of the normal range (256pg/mL) after four years. In both cases, the deficiency was reversed with vitamin B\textsubscript{12} supplementation.

**Discussion**

Great variability existed within the studies in their definition and measurement of vitamin B\textsubscript{12} deficiency, the duration of PPI use studied and results. A common finding was that certain groups of the population who are on long term PPIs are associated with reduced serum vitamin

<table>
<thead>
<tr>
<th>Table 3 Overview of studies II.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proportion of studies</strong></td>
</tr>
<tr>
<td>Inclusion of age</td>
</tr>
<tr>
<td>Focused on vitamin B\textsubscript{12} absorption</td>
</tr>
<tr>
<td>Focused on serum vitamin B\textsubscript{12} levels</td>
</tr>
<tr>
<td>Specification of participant comorbidities</td>
</tr>
<tr>
<td>Focused on the elderly population</td>
</tr>
</tbody>
</table>

*Although all of the studies included the participants’ co-morbidities, the completeness of this information is unclear.
B12 concentrations. These include the elderly, slow metabolisers of PPIs, patients with co-morbidities including atrophic gastritis, Zollinger-Ellison syndrome and diabetes mellitus. The issue of vitamin B12 deficiency is particularly relevant in the elderly population as the physiological changes that occur with ageing predispose to illness and the occurrence of additional co-morbidities places them at a greater risk of vitamin B12 deficiency (27). A significant portion of the elderly population (22% of nursing home residents) are prescribed long term PPIs (28). Twelve percent of the elderly population in the community is deficient in vitamin B12 in institutions this increases to 30-40%. Identified causes include food malabsorption syndrome (>60%), pernicious anaemia and insufficient dietary intake (6).

Vitamin B12 deficiency is one of the most important issues in the nutritional health of the elderly (27). Clinical features of vitamin B12 deficiency may take years to become evident however, of more immediate concern is the accumulation of homocysteine which is a component of the vitamin B12 metabolic pathway (6). Even moderately raised homocysteine concentrations increase the risk for atherosclerosis (29) and thrombotic events (30, 31). A meta-analysis of studies on the association of homocysteine with ischaemic heart disease (IHD) and stroke showed that a 25% lower homocysteine level (3μmol/L) was related to a 11% lower IHD (OR=0.89; 95% CI: 0.83, 0.96) risk and 19% lower stroke risk (OR=0.81; 95% CI: 0.69, 0.95) (32). It is recommended that serum vitamin B12 levels should be monitored regularly in the elderly who are on long term PPIs (33).

Definitions for vitamin B12 deficiency varied between the studies. Some studies used vitamin B12 absorption as an indicator whereas most of them used serum vitamin B12 levels and some even looked at commencement of vitamin B12 supplementation. In addition, a study looked at homocysteine and methylmalonic acid concentrations which are serum markers of vitamin B12 deficiency. These differences make it difficult to reach a clear conclusion when comparing the results. Inconsistencies also existed in the quality of participant information. Some of the studies relied on a limited search of patient medical history in the absence of full historical patient data access, potentially affecting the reliability of the results.

A 5-10 year delay exists between the onset of insufficient intake of vitamin B12 and the appearance of clinical illness due to hepatic stores and enterohepatic cycling where vitamin B12 is excreted in the bile and reabsorbed in the small intestine (6). In order to detect clinical features of vitamin B12 deficiency, monitoring should cover at least 10 years from the time of use. Only one study (22) characterised changes in vitamin B12 levels in users of PPIs for more than 10 years; the other studies covered a duration of PPI use that ranged between two weeks to seven years. Considering that it has only been 25 years since the first PPI, omeprazole was developed, more time is needed for the changes in vitamin B12 levels to come into light.

Plasma half-lives of PPIs range from 0.5 to 2 hours and the duration of action lasts two to three days due to its accumulation in the canaliculi and its irreversible mode of action (10). If a daily dose is taken, inhibition can last for up to five days. As mentioned by Marcuard et al. (1994), (11) vitamin B12 absorption occurs in the protein bound and unbound form. The absorption of the unbound form is not affected by PPI use. Since the absorption of vitamin B12 is not absolutely inhibited by PPIs, in addition to an abundant store of vitamin B12 in the human body and normal western dietary intake of 3-30μg of vitamin B12 which exceeds the estimated daily requirement of 2-5μg (6), this might explain why most of the studies found an association between long term PPI use and vitamin B12 deficiency.

Limitations

Many of the studies included in this review were observational studies that retrieved their results from patient information databases. The association found was solely based on the presence of two factors in a patient’s medical record, even though the participants were matched for age, sex and other factors. Possible confounders not taken into account include diet, ethnicity, socioeconomic status, medications and medical conditions such as Zollinger-Ellison syndrome, malabsorption syndromes, and patients with a bowel resection. These factors affect the ability of individuals to absorb vitamin B12. Difficulty exists in eliciting the pattern and duration of PPI use in patients by solely relying on patient records, for example, a patient who has been prescribed a PPI for 10 years may be taking it continuously or intermittently and the dosage may have been changed. Even if this information had been obtained, the great variation in the pattern of use would present difficulty when stratifying them into groups for comparison.

A conclusion cannot be drawn between PPI use and vitamin B12 deficiency based on the study on individuals who developed atrophic gastritis whilst on PPI therapy. This is because the condition itself can lead to vitamin B12 deficiency through impaired intrinsic factor and gastric acid secretion (34). A comparison group of individuals with the same characteristics but not on PPIs was required.

Three studies (15-17) examining the use of acid suppression therapy did not distinguish the difference between histamine-H2 receptor antagonists compared to PPIs in their results. Conflicting evidence exists on the effect of histamine-H2 antagonists and vitamin B12 levels. According to Dharmarajan et al. (2007), histamine-H2 antagonists do not affect vitamin B12 levels in the elderly population (17). However, Force and Natasha showed that histamine-H2 antagonists can reduce vitamin B12 absorption in malnourished individuals or those on therapy for more than two years (35). Only one RCT on PPIs found a statistically significant relationship between PPI therapy and vitamin B12 absorption. However, they did not report whether the participants exhibited any clinical features of vitamin B12 deficiency (11). Furthermore, none of the studies that reported a correlation between PPI therapy and vitamin B12 deficiency collected any information on whether clinical manifestations of vitamin B12 deficiency were present in the participants. The development of megaloblastic anaemia was only shown in one case report.

Apart from the studies that specified the sample of elderly participants, the age
of participants was not mentioned in a significant number of studies (14). Since many of the large scale observational studies found a positive association between PPI use and vitamin B12 deficiency in the elderly, the inclusion of younger participants without age stratification may lead to a dilution in the strength of association between PPI use and vitamin B12 deficiency.

Impaired absorption or reduced serum levels of vitamin B12 associated with PPI use has been supported by the majority of studies mentioned in this review. Although whether this malabsorption leads to clinically significant adverse effects as not reported, it can be expected that with time, serum vitamin B12 levels would be affected in the absence of adequate supplementation.

Future research
A large scale cohort clinical trial of PPI users is required to ascertain long term side effects and account for confounders present in previous observational studies. Clear distinctions need to be made in studies regarding participant demographics, type of PPI used, dosage and what constitutes long term usage. As aforementioned, certain groups of the population appear to be prone to develop vitamin B12 deficiency whilst on PPI therapy, which requires an accurate medical history from future participants. Most of the clinical studies on PPI focused on omeprazole but although the mode of action is the same, each PPI still has its unique pharmacokinetic profile (36) which may be associated with adverse effects to a varying degree. It is important to distinguish between those who have been prescribed a PPI as needed for a long duration compared to those who are taking it regularly. A standardized method of diagnosing vitamin B12 deficiency must be used in future studies. The holotranscobalamin assay kit is increasing replacing older assay kits, however a ‘gold standard’ for detecting vitamin B12 deficiency is yet to be developed (6).

Conclusion
There is evidence from clinical trials suggesting vitamin B12 absorption is impaired in individuals on PPI therapy. The effect on serum vitamin B12 concentrations is supported by observational studies indicating a reduction in vitamin B12 levels in participants that are on long term PPI therapy. However, whether this leads to vitamin B12 deficiency and have a significant clinical impact remains unanswered.

Since the average person’s dietary intake of vitamin B12 is more than enough to meet daily requirements and hepatic stores can last up to 10 years, the full blown effect of prolonged PPI therapy should be evident in the future. Current findings suggest that there are select groups in the population on long term PPI who are at risk of developing vitamin B12 deficiency especially the elderly and that their serum levels of vitamin B12 should be monitored.

Acknowledgements: Nil.
Conflicts of interest: None to declare.
Funding: Nil.

References:
An audit of antibiotic use for the treatment of urinary tract infections in general practice

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Abstract

Objective: To quantify discrepancies between treatment guidelines for urinary tract infections and antibiotic prescribing in general practice from 2006 to 2012.

Method: A clinical audit was conducted using the Australian National University Clinical Audit Project database. Inclusion criteria included diagnosis of urinary tract infection or cystitis in the general practice setting. Pregnant patients and those with antibiotics listed as existing treatments were excluded. The frequencies for urinary tract infections and antibiotic prescriptions were determined.

Results: Sixty cases of non-pregnancy related urinary tract infections were identified: 18 patients (30%) were prescribed trimethoprim; 18 (30%) were prescribed cephalexin; 5 (3%) were prescribed amoxycillin with clavulanic acid; 2 (3%) were prescribed nitrofurantoin; 3 (5%) were prescribed other antibiotics; and 16 (26%) were not prescribed antibiotics. The majority of patents were female and aged over 50 years.

Conclusion: The majority of treated patients were prescribed one of the four antibiotics recommended by local guidelines; however the second preference agent (cephalexin) was prescribed as often as the first preference agent (trimethoprim). More than one quarter of patients were not prescribed any treatment.

Introduction

Urinary tract infections (UTIs) are among the most frequently managed problems in general practice, with data from the Bettering the Evaluation and Care of Health (BEACH) study indicating that 1.8% of general practice (GP) encounters in 2010-2011 were for treatment of a UTI (1). It is estimated that 250,000 Australians develop UTIs each year, with women being affected far more commonly than men (2). Nearly one third of women will experience a UTI requiring treatment before the age of 24 years, and around 50% of women and 5% of men will have at least one UTI in their lifetime (2). Other risk factors for UTIs include: frequent sexual intercourse, diabetes mellitus, diaphragm contraception, pregnancy, immunosuppression, menopause, urinary tract malformation and obstruction and instrumentation such as urinary catheters (3).

UTIs may be classified as being uncomplicated or complicated. An uncomplicated UTI occurs in a structurally and functionally normal urinary tract and can usually be treated with a short course of antibiotics (4). A complicated UTI occurs in the setting of underlying structural, functional, or medical problems, which tend to reduce the efficacy of standard antibiotic treatments (4). They frequently involve drug-resistant organisms and are more likely to be recurrent. Complicated UTIs require targeted therapy, often in a hospital setting.

The majority of UTIs are uncomplicated, most commonly cystitis (4). They can be diagnosed clinically, without the need for urine culture, and treated empirically with antibiotics (5). In Australia, 70-95% of cases are caused by Escherichia coli (E. coli), and 5-10% are caused by Staphylococcus saprophyticus (5). Other causative pathogens, which are more commonly found in complicated UTIs include Enterobacteriaceae spp., Proteus mirabilis, and Klebsiella pneumoniae (6).

Current guidelines recommend the use of trimethoprim, cephalexin, amoxycillin with clavulanic acid (am/clav), or nitrofurantoin, as first line therapy for non-pregnant women with acute uncomplicated lower UTIs (5). Trimethoprim (300mg orally, daily for 3 days) is considered the first preference agent, due to low cost, convenient dosing regimen, short course duration, and generally low rates of E. coli resistance (23-41%) (7). Cephalexin (500mg orally, 12-hourly for 5 days) is listed as a second preference agent. E. coli are rarely resistant to cephalexin (1.0-1.5%) but it is associated with higher rates of adverse events, and requires more frequent dosing and longer treatment course than trimethoprim (7, 8). Am/clav (500/125mg orally, 12-hourly for 5 days) and nitrofurantoin (100mg orally, 12-hourly for 5 days) are both considered third preference agents. E. coli resistance to Am/clav is reported to be equal to that of cephalexin (1.0-1.5%) and is only recommended after sensitivity has been determined.
Pregnant women have an increased risk of serious complications from UTIs, including pyelonephritis, pre-term delivery, and low newborn birth weight (4). All women with a suspected UTI should undergo urine culture and sensitivity testing, and receive empirical treatment with cephalexin or nitrofurantoin while awaiting results (5).

Men presenting with symptoms of cystitis are more likely to have an underlying urinary tract abnormality, and urinary culture and sensitivity results should guide treatment (5). While awaiting these results, empirical treatment is recommended with the same agents used for women, with the exception of nitrofurantoin. Men also require a longer duration of treatment, with 14 days being the standard recommendation for all agents.

Left untreated, acute uncomplicated UTIs may resolve spontaneously or lead to chronic infection. In rare cases, infection may damage local tissues from ongoing inflammation (renal scarring), or ascend the urinary tract causing pyelonephritis, nephritis, or urosepsis (9). In most instances though, failure to treat results in urinary discomfort and restriction of daily activities.

Both actual patterns of resistance and laboratory reporting of antibiotics susceptibility have been shown to influence prescribing patterns in general practice (10, 11). It seems likely that GP adherence to antibiotic guidelines will be determined by local patterns of resistance combined with previous experiences and historical prescribing habits (10, 11). Limited research suggests that in the residential aged care setting in Australia empirical prescribing of UTIs by general practitioners largely follows guidelines (12).

It is important to evaluate antibiotic prescribing practices to provide feedback and endorsement of appropriate antibiotic prescribing. Antibiotic guidelines have been developed to provide prescribers with an up-to-date resource on the narrowest spectrum antibiotic for empiric therapy of common infections based on the most likely or important pathogens and their likely antibiotic sensitivity when culture results are not available. Judicious prescribing and adherence to evidence-based antibiotic guidelines aims to effectively treat infections while reducing the emergence of drug resistance. In order to describe the patterns of antibiotic prescribing for the treatment of urinary tract infections, a clinical audit was conducted, comparing current practice with guideline recommendations.

Method

The Clinical Audit Project (CAP) database was commenced in 2006 and has expanded to over 10,000 entries through successive iterations of the CAP program. Each 3rd Year student at the ANU Medical School is required to collect data for a minimum of 15 consecutive patients in a clinical setting, although from 2006-2007 the requirement was for 30 patients per student. This data includes patient demographic data, presenting symptoms, diagnoses made, current and newly-prescribed medications, investigations ordered, and student and clinician genders. Patients give written consent for the collection and use of the data, on the understanding that no specific identifying details are recorded.

The 2006-2012 CAP data set contained information on 10,062 patients, 4,027 of which were seen in the GP setting.

For this project, IBM SPSS Statistics Version 20 software was used to identify relevant cases by coding for UTI diagnoses made in the GP setting under the International Classification of Primary Care (ICPC) codes shown in the Table 1.

Pregnancy-related UTIs were excluded from the analysis due to their slightly different recommended management.

Further recoding was used to create variables that identified prescription of the first preference (Trimethoprim), second preference (Cephalexin) and third preference (Amoxicillin with Clavulanic acid, and Nitrofurantoin) antibiotics recommended for UTI treatment. The data set was then refined to select cases seen in general practice in which one of the diagnoses was a non-pregnancy-related UTI. Frequency tables were then generated to provide figures regarding prescribing practices and patient genders by year. Statistical significance was not examined due to the small number of suitable cases identified.

Results

Between 2006 and 2012, the CAP database contained 10,062 cases, including 4,027 cases that were seen in general practice (Figure 1). Of these, 61 cases involved diagnosis of UTI; however one case was excluded due to pregnancy. Of these cases, 78.3% were female and 21.7% were male. The majority (38%) of female patients with a UTI were between the ages of 51 and 60 years or 81 and 90 years (Figure 2). The majority (46%) of male patients diagnosed with a UTI were between the ages of 71 and 90 years.

The most commonly prescribed antibiotics were trimethoprim (30%) and cephalexin (30%), followed by am/clav (5%), and nitrofurantoin (3%) (Figure 3). Other antibiotics were prescribed in 5% of cases. More than one-fifth of patients (27%) were not prescribed any antibiotics. Trimethoprim and cephalexin accounted for 64% of all prescribed antibiotics in females and 46% of all antibiotics prescribed in males (figure 4).

Discussion

The results of this audit illustrate that...
antibiotic prescribing by GPs for UTIs differs from the current antibiotic guidelines. The first preference antibiotic, trimethoprim, was prescribed in only 30% of cases, with the second preference agent, cephalexin, being prescribed with equal frequency. Third preference agents, am/clav and nitrofurantoin, were prescribed much less frequently (5% and 3% respectively) and only to females. Sixteen patients were not prescribed any antibiotics, despite having a symptomatic UTI. Of these patients, only 3 were investigated with urine culture and sensitivity testing. Interestingly no patient under the age of 30 years was empirically prescribed trimethoprim, instead the majority received cephalexin.

In recent years, the importance of appropriate antibiotic prescribing has become increasingly evident (13). Antibiotic stewardship is vital due to the limited number of new antibiotic drugs becoming available and the growing resistance of pathogens to existing agents (14). The consequences of microbial resistance can be devastating, and include: increased morbidity and mortality, prolonged hospital stays, increased expenditure on antibiotic development, and overall increased healthcare costs (15).

There have been few Australian studies that investigate prescribing practices of empiric antibiotics for UTIs. In a study by Lim et al. (2012) into antibiotic prescribing practices within Melbourne nursing home facilities between 2006-2010, it was shown that cephalexin was the most prescribed antibiotic for uncomplicated UTIs (38% of presentations), with trimethoprim prescribed slightly less (34% of presentations) (12). These figures are comparable to those found in this study.
The number of GP consultations for UTIs in the CAP study population was comparative to the results of the BEACH study. From the CAP database, approximately 1.5 encounters per 1,000 in general practice resulted in the diagnosis of a UTI, compared with 1.8 encounters per 1,000 observed in the BEACH study (1).

A recent clinical audit by the NPS into GP prescribing for UTIs demonstrated a high level of guideline concordance, with antibiotics prescribed as recommended in 84% of cases of uncomplicated cystitis (16).

Internationally, there have also been limited published studies for comparison. An American study of national patterns in the treatment of urinary tract infections in women presenting to ambulatory care physicians between 1989 and 1998 found the use of trimethoprim and trimethoprim-sulfamethoxazole declined (from 48% in 1989-1990 to 24% in 1997-1998) in favour of other agents (quinolones and nitrofurantoin) (17). The use of non-recommended antibiotics was high (46% in 1997-1998) and did not change significantly over the preceding decade (17). This figure is much higher than the 5% rate of non-recommended antibiotic use found in this study, suggesting overall guideline concordance is greater among Australian practitioners. Further comparison between the studies is difficult due to fundamental differences in study design, collection period, practitioner population, and local guidelines.

Several factors may be responsible for the observed discrepancies between prescribing practices and guideline recommendations for the treatment of UTIs. Antibiotic guidelines change regularly, and timely access to continuing professional education is required for guidelines to translate into practice. Differences in education among GPs may explain the observations of this study. Other clinical and non-clinical factors may also contribute to antibiotic selection (18). These may include: mode of pharmaceutical delivery, acceptable daily dosing schedule, and individual patient contraindications such as drug allergies or renal and/or hepatic impairment (19).

In this study, the use of cephalexin and am/clav for the 1-10 and 11-20 year old age groups was possibly favoured due to the availability of a syrup preparation which is the preferred drug delivery mode for pediatric patients (20).

Knowledge of local pathogen resistance patterns may also result in deviations from the clinical guidelines. If a causative microorganism was shown to be resistant to the first preference antibiotics, GPs may have been likely to adjust their antibiotic selection. There were also a number of patients who were not prescribed any antibiotic therapy. While this may have been because GPs were awaiting culture and sensitivity results to guide antibiotic selection, the data only reported further bacteriology testing in a few of these cases. Even if further investigations were to be conducted, empiric antibiotic treatment is still indicated at first presentation (5). It is possible that GPs expected spontaneous resolution of the UTIs, however evidence suggests that this occurs in only 20-50% of uncomplicated UTIs, and symptoms are likely to be troublesome to the patient in the meantime.

Prescribing practices may also be

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**Figure 3** Proportion of patients prescribed each antibiotic.

**Figure 4** Frequency of antibiotic prescribed by sex.
influenced by non-clinical factors such as pharmaceutical promotions, GP familiarity with certain antibiotics, GP prescribing habits, and patient preference for certain antibiotics or brands (19, 21).

Considering the continuing uncertainty around GP prescribing practices for UTIs, it is evident that further research in the area is needed. Understanding the factors that influence prescribing would allow the development of measures to improve them. Additionally, it would be helpful to conduct a larger study specifically on UTI prescribing behaviours and gather more specific information, such as the dose prescribed, investigations ordered, and the rationale for antibiotic selection. A larger sample size would also allow a more accurate analysis of prescribing trends; particularly whether antibiotic choice changes over time, and whether certain antibiotics are preferred in children due to their mode of administration.

To improve guideline concordance rates, continuous monitoring and feedback on prescribing practices is likely to be beneficial, given that it is performed in a positive spirit that fosters education of GPs (15). In addition, increased access to the antibiotic guidelines should be available to GPs, possibly through subsidies to online subscriptions to the electronic version of the guidelines. Linking computerised prescribing software to empiric protocols to remind GPs of the first preference agents to treat UTIs may also be useful. Additionally, ongoing promotion of current guidelines through general practice educational bodies may promote a cultural change towards evidence based prescribing.

Limitations

The sample size in the study was too small to examine the trends in prescribing from 2006 to 2012. For example, in 2008, only 3 UTI cases were recorded. In the interests of practicality, the data collection form was limited to a number of key fields. This meant that other possible contributors to antibiotic selection (such as allergies and antibiotics prescribed for previous UTIs) were not recorded. Data collection was performed by medical students and it is possible that data collection was not always performed consistently. For example, important information may have been omitted, such as co-existing conditions that may have precluded the use of certain antibiotics. Selection bias may have also contributed to the observed results. CAP data is collected annually over the winter months, and the treatment and frequency of UTIs may exhibit seasonal variation. Likewise, due to the intimate nature of the condition, many patients may have felt uncomfortable with medical students observing their consultation. Such patients may not have consented to participating in the project and would have been excluded.

Conclusion

This study has demonstrated a divergence from antibiotic guidelines when GPs prescribe antibiotics for urinary tract infections. Inappropriate antibiotic prescribing has numerous implications, including increased microbial resistance, increased cost, treatment failure, and increased patient morbidity and mortality. Further studies are needed to determine the factors influencing prescribing practices and whether these factors justify antibiotic choices. Measures such as monitoring and feedback, access to the guidelines, and cultural change are all needed to optimise antibiotic prescribing by GPs.

Acknowledgements: Nil.

Conflicts of interest: None to declare.

Funding: Nil.


7. Kiffoye N. Urinary Tract Infection (UTI) and Pyelonephritis [Internet] [cited 2012 26 July]; Available from: http://207.57.68.208/BrochureManual%204th%20Ed/General%20Topics/UTI.pdf


An audit of enabling factors, barriers and attitudes to immunisation in general practice among parents who choose to immunise

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Abstract

Background: Childhood immunisation is an important public health initiative that decreases the burden of vaccine-preventable disease in Australia. The study aim was to determine the enabling factors and barriers to immunisation and perceptions of immunisation among parents who immunise their children in general practice in the Australian Capital Territory (ACT).

Findings: We surveyed parents who were presenting for their child to be immunised in two general practices in the ACT. Of the 56 parents surveyed (85% response rate), 89% considered childhood immunisation important and only 3% mentioned government incentive payments. Two enabling factors for immunisation were reminder notices from the general practice (57% of parents) and information provided by ACT Health (30% of parents). The most cited barrier to immunisation was concern in immunising while the child was ill (49% of parents). Parents perceived that they had control over their child’s immunisations, a high level of understanding about immunisation and that immunisations would be beneficial in controlling their child’s illnesses. Parents also perceived few physical or emotional symptoms for their child from immunisation.

Conclusions: Parents who choose to immunise their children in general practice in the ACT perceive a benefit to their child’s health from immunisation. They appreciate receiving reminder notices and commonly use information about immunisation provided by ACT Health in their child’s personal child health record.

Introduction

Childhood immunisation is an important public health initiative that decreases mortality and morbidity due to vaccine-preventable diseases (1). Australia has targets for full immunisation coverage of over 90% that are currently met nationwide and in the Australian Capital Territory (ACT) for children aged 12 months and 24 months (2, 3). Rates for five year olds was estimated at 89.9% nationally and 92.5% in the ACT in 2011 (3).

A small group of Australian parents are conscientious objectors to vaccination, estimated at 1.4% nationally (2), but more often children are incompletely immunised due to perceived barriers to immunisation (4). Reported barriers include minor illnesses in the child or the family (4), concerns about vaccine side effects (4-6), confusion about the immunisation schedule (6) and the inconvenience of the immunisation process (6). These barriers, combined with parental understanding of immunisation (7), the source and quality of communications they receive about immunisation (8, 9) and social group norms lead to complex decisions about perceived risks and benefits that are reflected in the immunisation status of their children (10, 11).

Australia has implemented a series of initiatives to increase rates of childhood immunisation, such as linking both childcare and family tax benefit payments to immunisation (12, 13). These initiatives have been followed by a clear rise in childhood immunisation rates (2), however it is not clear whether the incentive payments to parents are an important part of this increase as they do not seem to rate highly as a conscious reason for immunising (12).

The study aim was to explore perceptions of childhood immunisation amongst parents that choose to immunise their children in general practice and identify the enabling factors and barriers to immunisation in ACT general practices. This information will be used to highlight the successful strategies employed by general practice in facilitating immunisation and suggest areas of improvement in the future.

Method

Our convenience sample involved those parents consulting general practice for any childhood immunisation. An eighteen question survey was administered by two practice nurses at two general practices in Canberra between November 2010 and March 2011 to all parents presenting for any childhood immunisation. Surveys were completed onsite. Analysis of data was undertaken through PASW Statistics 18.0 for Windows. Results for the brief illness perception questionnaire are presented as the median value and the interquartile range (IQR). Ethics...
Table 1 Survey response rate and range of childhood immunisations sampled.

<table>
<thead>
<tr>
<th>Scheduled immunisation</th>
<th>Practice 1 n (%)</th>
<th>Practice 2 n (%)</th>
<th>Overall n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 months</td>
<td>4 (13)</td>
<td>1 (6)</td>
<td>5 (11)</td>
</tr>
<tr>
<td>4 months</td>
<td>5 (17)</td>
<td>1 (6)</td>
<td>6 (13)</td>
</tr>
<tr>
<td>6 months</td>
<td>9 (30)</td>
<td>5 (31)</td>
<td>14 (30)</td>
</tr>
<tr>
<td>12 months</td>
<td>5 (17)</td>
<td>4 (25)</td>
<td>9 (20)</td>
</tr>
<tr>
<td>18 months</td>
<td>4 (13)</td>
<td>4 (25)</td>
<td>8 (17)</td>
</tr>
<tr>
<td>4 years</td>
<td>3 (10)</td>
<td>1 (6)</td>
<td>4 (9)</td>
</tr>
<tr>
<td>Total</td>
<td>30 (100)</td>
<td>16 (100)</td>
<td>46 (100)</td>
</tr>
</tbody>
</table>

Figure 2 Illness Perception Questionnaire.

A – How much do your child’s immunisations affect their life? (0 = no effect at all, 10 = severely affects their life), N = 28.
B – How long do you think your child’s immunisations will last? (0 = a very short time, 10 = forever), N = 29.
C – How much control do you feel you have over your child’s immunisations? (0 = absolutely no control, 10 = extreme amount of control), N = 28.
D – How much do you think immunisation can help control your child’s illnesses? (0 = not at all, 10 = extremely helpful), N = 29.
E – How much does your child experience symptoms from immunisations? (0 = no symptoms at all, 10 = many severe symptoms), N = 29.
F – How concerned are you about your child’s immunisations? (0 = not at all concerned, 10 = extremely concerned), N = 28.
G – How well do you feel you understand your child’s immunisations? (0 = don’t understand at all, 10 = understand very clearly), N = 28.
H – How much does your child’s immunisation affect your child emotionally? (e.g. does it make your child angry, scared, upset or depressed?) (0 = not at all affected emotionally, 10 = extremely affected emotionally), N = 28.

Questions are modified from the validated brief illness perception questionnaire (14). T bars are 1.5 times the height of the box or the maximum or minimum values, whichever is smaller and outliers are indicated by an open circle.

Results

Of the 56 parents offered the survey, 46 responded (85% response rate). Table 1 shows 30 surveys were collected from the first general practice and 16 from the second.

The reasons parents immunised their child are listed in Table 2, with 89% of parents indicating that up to date immunisation is important for their child’s health. By contrast, only 2% of parents identified government incentives as important through the childcare benefit or the maternal immunisation allowance.

The enabling factors helping parents keep their child’s immunisations up to date are listed in Table 2. The most common enabling factor (57% of parents) was the reminder notices sent by the general practitioner (GP). The second most common enabling factor was categorised as the “other” category (37% of parents), where six parents identified a fridge magnet immunisation schedule and five parents identified the child’s personal health record (the “Blue Book”), both provided by ACT Health. The third most common enabling factor (30% of parents) was the reminder notices sent by ACT Health. The final enabling factor (15% of parents) was the provision of dedicated immunisations by the practice nurses in the general practices.

Overall, 18 parents (42%) had received reminder notices from their GP, with considerable variation between the two general practices (54% at practice 1, 20% at practice 2). The reminders, when received, were predominantly by mail (80%).

Parents were asked about the potential barriers that might prevent any parent from keeping their child’s immunisation up to date. These are listed in Table 2. Nearly a third of parents (29% of parents) thought there were no such barriers. The most common barrier (49% of parents) was a parent’s concern about giving an immunisation when their child is ill. The next most common barrier (29% of parents) was a parent remembering when immunisations were due. The
Table 2 Reasons for immunisation and enabling factors/barriers to immunisation*.

<table>
<thead>
<tr>
<th>Multiple response questions</th>
<th>Responses n (%)</th>
<th>Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are many reasons why parents might have their child immunised. Why was your child immunised today?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to date immunisation is important for my child’s health</td>
<td>41 (69)</td>
<td>89</td>
</tr>
<tr>
<td>Reminder notice prompted immunisation</td>
<td>7 (12)</td>
<td>15</td>
</tr>
<tr>
<td>Other reason</td>
<td>5 (8)</td>
<td>11</td>
</tr>
<tr>
<td>Other parents immunise their child</td>
<td>4 (7)</td>
<td>9</td>
</tr>
<tr>
<td>To claim childcare benefit</td>
<td>1 (2)</td>
<td>2</td>
</tr>
<tr>
<td>To claim maternity immunisation allowance</td>
<td>1 (2)</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>59 (100)</td>
<td>128</td>
</tr>
<tr>
<td>What helps you keep your child’s immunisation up to date?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reminders from the GP</td>
<td>26 (43)</td>
<td>57</td>
</tr>
<tr>
<td>Other reason</td>
<td>17 (28)</td>
<td>37</td>
</tr>
<tr>
<td>Dedicated immunisation by general practice nurses without the need to see the GP</td>
<td>7 (11)</td>
<td>15</td>
</tr>
<tr>
<td>Reminders from ACIR</td>
<td>7 (11)</td>
<td>15</td>
</tr>
<tr>
<td>Reminders from ACT Health</td>
<td>3 (5)</td>
<td>7</td>
</tr>
<tr>
<td>Reminders from the childcare centres or schools</td>
<td>1 (2)</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>61 (100)</td>
<td>133</td>
</tr>
<tr>
<td>What are the reasons why parents might find it difficult to keep immunisations up to date?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concerns about immunisations when their child is ill</td>
<td>22 (28)</td>
<td>49</td>
</tr>
<tr>
<td>No reasons why parents might find it difficult</td>
<td>13 (17)</td>
<td>29</td>
</tr>
<tr>
<td>Difficulty remembering when the immunisation is due</td>
<td>13 (17)</td>
<td>29</td>
</tr>
<tr>
<td>Difficulty getting an appointment with a GP or Maternal and Child Health Nurse</td>
<td>10 (13)</td>
<td>22</td>
</tr>
<tr>
<td>Difficulty finding time to have the immunisation done</td>
<td>9 (12)</td>
<td>20</td>
</tr>
<tr>
<td>Other reason</td>
<td>6 (8)</td>
<td>13</td>
</tr>
<tr>
<td>Difficult to find information about immunisation safety and effectiveness</td>
<td>5 (6)</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>78 (100)</td>
<td>173</td>
</tr>
</tbody>
</table>

*Table 2 and Table 3 are from multiple response questions and presented as the percent of all responses and the percent of cases. The percent of cases gives the percent of survey parents who answered the question in the affirmative and so do not sum to 100%.

least common barrier (11% of parents) was a parent finding information about immunisation safety and effectiveness.

Practice nurses and GPs both gave parents information about immunisation in the form of verbal and written material. However, Table 3 shows parents observed that practice nurses were more likely to give such information compared to the GP, reflecting the fact that practice nurses were performing nearly all the immunisations.

Nearly all parents (91%) sourced the personal child health record (the “Blue Book” produced by ACT Health) for information about immunisation. The other significant sources of information listed in Table 3 were verbal advice from the Maternal and Child Health Nurse (42%), GPs (31%), hospital midwives (27%), the family (27%), and the Internet (36%). Antenatal classes were a source of information for only 11% of parents.

Parents completed a brief illness perception questionnaire (14) involving eight questions designed to assess the parent’s cognitive and emotional responses to childhood immunisation (Figure 1). The illness perception questionnaire used in this study was modified from a validated tool used for a range of chronic medical conditions (14) but has not been used in the context of immunisation before. The results from the questionnaire are presented as the median value and the IQR. In the completed questionnaires, immunisation was perceived to have moderate consequence for their child’s life (median (IQR) = 4 (5),
Immunisation was perceived to have moderate longevity (median (IQR) = 5 (2), Figure 1B). Parents perceived a high level of understanding of their child’s immunisations (median (IQR) = 8 (4), Figure 1G). Parents perceived a high degree of personal control over their child’s immunisations (median (IQR) = 8 (3), Figure 1C). Parents perceived that immunisation provided a high degree of control over their child’s illnesses (median (IQR) = 9 (2), Figure 1D). Parents perceived that their child experienced a low degree of symptoms (median (IQR) = 3 (2), Figure 1E). Parents perceived that their child experienced a low degree of emotional disturbance (median (IQR) = 3 (4), Figure 1H) from their immunisations.

**Discussion**

General practices are responsible for 45% of childhood immunisations in the ACT (3). Our study found that nearly all parents who choose to immunise in general practice believe immunisation is important for their child’s health, a result consistent with previous surveys (8) and studies of the attitudes of pro-immunisation parents (9). Incentive payments by government played a minor part, a finding also mirrored in a previous survey (12).

Parents indicated that reminders from the GP were the biggest enabling factor that allowed them to keep their child’s immunisations up to date. Despite this, only 42% of parents in this study reported receiving reminder notices. Furthermore, nearly one third of parents indicated that forgetting when immunisations were due was an important barrier. Good reminder systems improve immunisation rates by between 5 and 20% (15), therefore improved reminder systems are an important area where improvements to immunisation rates could be made in general practice in the ACT.

Information provided by ACT health was the second most important enabling factor for parents, in particular the personal child health record (called The “Blue Book”). The child health record is an ideal place to promote immunisation, as it is likely to be retained and used throughout childhood. The child health record was perceived by parents as providing important information from trusted health professionals, a crucial factor influencing immunisation decisions by parents (7-9).

Our study found that the major barrier to immunisation occurred when parents were concerned about proceeding with immunisation when their child is ill, a barrier also identified in other studies (6). Despite this, many parents thought there were no reasons against keeping

<table>
<thead>
<tr>
<th>Table 3 Sources of information about immunisation*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple response questions</strong></td>
</tr>
<tr>
<td><strong>Responses n (%)</strong></td>
</tr>
<tr>
<td><strong>Cases (%)</strong></td>
</tr>
<tr>
<td>Pamphlets or other written material was provided by practice nurses</td>
</tr>
<tr>
<td>Verbal advice was provided by practice nurses</td>
</tr>
<tr>
<td>Posters, pamphlets, other written material were available in the waiting room</td>
</tr>
<tr>
<td>Verbal advice was provided by GP</td>
</tr>
<tr>
<td>Pamphlets or other written material was provided by GP</td>
</tr>
<tr>
<td>Other information was provided by GP clinic</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Where do you find information about immunisation?</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Responses n (%)</strong></td>
</tr>
<tr>
<td><strong>Cases (%)</strong></td>
</tr>
<tr>
<td>The ‘Blue Book’</td>
</tr>
<tr>
<td>From the Maternal and Child Health Nurse</td>
</tr>
<tr>
<td>The internet</td>
</tr>
<tr>
<td>From the GP</td>
</tr>
<tr>
<td>From Hospital Midwives</td>
</tr>
<tr>
<td>Family</td>
</tr>
<tr>
<td>Other parents</td>
</tr>
<tr>
<td>Antenatal classes</td>
</tr>
<tr>
<td>Another source</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

*Table 2 and Table 3 are from multiple response questions and presented as the percent of all responses and the percent of cases. The percent of cases gives the percent of survey parents who answered the question in the affirmative and so do not sum to 100%.
were also excluded, as the focus of the study was on the enabling factors and potential barriers faced by parents that chose to immunise. The response rate to the illness perception questionnaire was lower compared to the rest of the survey (29 completed, response rate 63%). This may reflect the illness perception questionnaire being the last part of the survey and being on the back of a double-sided sheet. Parents completed the survey at the time of immunisation and so time constraints may be responsible for the lower rate of response. Finally, a written survey excludes participation based on literacy and language and may represent a source of bias. This is most relevant in the results from the second general practice, where there were eight declined surveys (overall response rate 67%). This practice was in an inner-city location with a high migrant and refugee patient population and many of these survey refusals were for reasons of literacy.

In conclusion, parents who choose to immunise their children in general practice are driven not by incentive payments from government, but by a perceived health benefit to their child’s health. We recommend parents continue using ACT Health’s “Blue Book” as a source of information. We recommend that general practices in the ACT continue sending reminder notices to parents and implement strategies to ensure the maximum number of parents is reached with such notices. General practices should be open to discussing immunisation with other health professionals, as parents gather information from a wide variety of sources. Ante-natal classes may be an underutilised avenue for delivering information to parents about childhood immunisation.

**Author’s Contributions:** SM and MK designed the study, including the survey items. SM arranged for data collection and performed the data analysis. SM planned and drafted the manuscript. MK edited the manuscript and was the study supervisor.

**Acknowledgements:** Nil.

**Conflicts of interest:** None to declare.

**Funding:** Nil.
Dynamic leukocytes: An evolving paradigm in acute cardiac injury after myocardial infarction

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Leukocyte attachment to vascular endothelium

The attachment of leukocytes to vascular endothelium is believed to be a crucial process in the initiation of ischaemia-reperfusion injury (1, 2). An earlier study examined leukocyte depletion and the concomitant reduction in infarct size in reperfused hearts by lowering the circulating neutrophil (nuclear polymorph) levels in dogs by 77 +/- 2% through the administration of rabbit anti-serum (3). Acute myocardial infarction was induced in these anaesthetised animals by 90 minutes of left circumflex coronary artery occlusion, followed by six hours of tissue reperfusion. The dogs treated with neutrophil anti-serum developed myocardial infarcts that were, on average, 43% smaller than the cardiac infarcts in dogs treated with non-immune rabbit serum. Additionally, a saline-treated control group revealed an average infarct size that was not significantly different from the non-immune serum group, but was still 48.0 +/- 4.7% of the area at risk, a value significantly greater than that in the neutrophil anti-serum dogs (p value less than 0.05, indicating statistical significance).

Subsequent work examined the implications of the above study by delineating the importance of leukocyte attachment to endothelium in relation to myocardial salvage and coronary endothelium protection (3, 4). It was subsequently demonstrated that cardiac protection from ischaemia-reperfusion injury has a physiological basis in the inhibition of vascular adhesion molecules (selectins) on migrating leucocytes (4). These findings suggest that the adhesion and interaction of leukocytes with the coronary vascular endothelium plays a significant role in ischaemia-reperfusion injury to the heart, a condition, by its very nature, brought about by angioplasty (5). Additional work helped to clarify the mechanisms of leukocyte migration (6). The initial step in this integrated process involves primary leukocyte-endothelial interaction (neutrophil rolling). Neutrophil rolling is mediated by P-selectin and E-selectin on the surface of the endothelial cells, and L-selectin on the surface of the neutrophils.

Histopathologic examination revealed that infarcted myocardium from dogs given saline solution or treated with non-immune serum had extensive neutrophilic infiltration, a phenomenon which was virtually absent in infarcted tissue from dogs treated with neutrophil anti-serum (3). These findings are supported by other animal studies and suggest that neutrophil accumulation in response to myocardial ischaemia induces oxygen free radical cell damage that may be responsible for a significant amount of the irreversible tissue damage resulting from transitory coronary artery occlusion, namely endothelial cell dysfunction, cardiac myocyte swelling, and contraction band necrosis (7-9). Building on this work, others have subsequently demonstrated that early endothelial dysfunction observed following reperfusion is likely the result of decreased nitric oxide production and the synthesis of oxygen free radicals.

Abstract

The prompt reperfusion of ischaemic myocardium following coronary artery occlusion is one of the key foundations of clinical cardiology in the treatment of coronary artery disease. Paradoxically, experimental evidence suggest that cardiac damage is caused by the reperfusion process itself (ischaemia-reperfusion injury), and this has obvious clinical relevance for patients undergoing angioplasty. Leukocyte attachment to the coronary vascular endothelium during reperfusion is an initiating step in this injurious process. Myocardial infarction affects the functional capacity of the heart by limiting cardiac inotropy (contractility). The pathophysiology of these events is only partially understood, but it is widely agreed that a cascade of events, including oxygen free radical-induced cell damage and adenosine receptor interactions act together integratively. The ultimate aim of clinical cardiology is the translation of experimental knowledge into effective, innovative treatments. The augmentation of cardiac function following heart attack is one area of research currently undergoing rapid growth. This essay will attempt to elucidate the role of leukocytes in ischaemia-reperfusion injury to the heart, and to identify its relevance to patient care. Furthermore, this paper will examine the functional capacity of the heart following myocardial infarction, and how cardiac function can be improved through a range of treatment modalities. Through the critical evaluation of a range of diverse scientific literature, it is hoped that an overview of the current status of this important area of cardiovascular physiology is achieved.

Neutrophil-derived oxygen free radicals
free radicals (10, 11). Even though leukocytes and endothelial cells possess several defenses against oxidative stress, a voluminous quantity of oxygen free radicals can lead to oxidative injury and vascular dysfunction in vivo (12, 13).

Reperfusion in the coronary microvasculature

In another experiment that drew upon the animal model work of (2), male dogs were anaesthetised with intravenous thiopental sodium (20 mg/kg) and α-chloralose (100 mg/kg), and mechanically ventilated (9). During the procedure, a catheter was placed into the left atrium. The left anterior descending coronary artery in fourteen dogs was then obstructed proximally. Ischaemia was established by cyanosis and akinaesia of the left ventricular wall, supporting the findings of (14, 15). Three groups of animals were studied as seen in Fig 1 below. The ischaemia-reperfusion group (n=9) underwent 60 minutes of ischaemia and 120 minutes of reperfusion. The ischaemia-control (I-Ctl) group (n=5) experienced 180 minutes of ischaemia with no subsequent reperfusion. The control group (n=5) underwent no ischaemia for 180 minutes.

The coronary microvasculature (average diameter between 25 and 130 µm) was visualised with a fluorescence microscope (9). Leukocytes were then labeled by infusing acridine orange for two minutes into the left atrium before each measurement. Images were then recorded two minutes after the acridine orange infusion ceased at the following time points: 15 and five minutes before the protocol was begun (period 1); 10, 30 and 55 minutes of the first hour of the protocol (period 2); and 10, 60, and 120 minutes into the second and third hours of the protocol (period 3) (Figure 1).

From Figure 1 it can be seen that

Figure 1 Illness Perception Questionnaire.
Fluorescence measurements (gray level of vessel wall minus gray level of background) along the walls of coronary microvessels over 195 minutes. Starting at time 0, the ischaemia-reperfusion group ( □ n=9) was subjected to 60 minutes of ischaemia (period 2) and then reperfused for 120 minutes (period 3). The ischaemia-control group ( ▼, n=5) was subjected to 180 minutes of ischaemia only starting at time 0 (periods 2 and 3). The control group ( △, n=5) was not subjected to ischaemia and was perfused under baseline conditions for the duration of the protocol. The vertical dashed line labeled “Ischaemia” indicates the time of onset of ischaemia for the ischaemia-reperfusion and ischaemia-control groups. The vertical dashed line labeled “Reperfusion” indicates the time of onset of reperfusion for the ischaemia-reperfusion group. Although there were no differences between the three groups during period 2, fluorescence was significantly greater in the ischaemia-reperfusion group than in the ischaemia-control or control groups during period 3. Fluorescence in the ischaemia-reperfusion group during period 3 (reperfusion) was also significantly greater than fluorescence in the same group during period 2 (ischaemia). Values are mean ± SEM. Based on (9).
fluorescence intensity is a measure of leukocyte attachment to the endothelium. There was a rapid accumulation of leukocytes observed in the reperfused vessels. However, the canine heart possesses significant collateral coronary vessels, thus limiting the applicability of knowledge to human models, where the degree of collateralization is not as significant. It is highly likely that activation and attachment of leukocytes to the microvascular endothelium during reperfusion promotes endothelial insult via myriad biochemical and physiological events (9, 16). A more comprehensive understanding of this process may lead to more effective reperfusion treatments for patients with a range of coronary pathologies (11, 17).

The biomechanics of neutrophil migration in the coronary vasculature

One study clearly delineates a set of experiments that test passive neutrophil deformation, research that has led to the development of mathematical and mechanical models that approximate the cellular response to applied forces in vivo (18). The mechanical deformation of neutrophils in response to external forces during vascular migration is essential to their function as circulating cells. Neutrophil distention is important not only for their passage through arterioles and capillaries in the myocardium, but also for the compression they must undergo during interaction and adhesion with the endothelium under conditions of shear, or high blood flow.

Numerous mechanical models have been proposed for neutrophil behaviour, with each treating the neutrophil as a uniform, incompressible sphere (19). In one model, the cell is treated as a linear standard viscoelastic solid that undergoes compressive loading in a predictable, Newtonian manner (18). However, another model regards the neutrophil as a linear Maxwell material, and one that is ubiquitously bounded by constant surface tension (20). Both models have their proponents and serve as reliable approximations for complex cellular behaviour, but are nevertheless imperfect representations of cellular biomechanics. Furthermore, both models are congruent for leukocyte attachment to vascular endothelium, thus providing a sound physical foundation for the phenomena previously described (6).

One previously mentioned study used micropipette experiments to establish the biomechanical properties of human leukocytes. Individual cells in EDTA were subjected to a known aspiration pressure via a micropipette to simulate the conditions of the intravascular milieu. The cells were then mathematically modeled as homogeneous spheres (the solid viscoelastic model). This model accurately predicts the deformation of the neutrophil for small strains, and also accounts for microvascular obstruction in cardiac arterioles and capillaries, therefore providing a basis for subsequent work (21). Nevertheless, other findings concur that any model that attempts to mimic the structural properties of the cell using a homogeneous, isotropic continuum can only be considered a representation and an approximation of reality. Uniform representations fail to clearly account for the complex microstructure of the cell, including L-selectin (18, 20). Nonetheless, mathematical models are useful in explaining general, abstract concepts about cell behaviour in chaotic systems.

The augmentation of cardiac function following myocardial infarction

Reperfusion therapy can improve survival following acute myocardial infarction (22). In canines, it has been demonstrated that 40 minutes of ischaemia, while causing irreversible myocyte injury, does not cause significant neutrophil-induced capillary damage (7). However, with ischaemia beyond 60 minutes, the endothelial cells of most cardiac capillaries experience oxidative stress and are occluded by neutrophils, erythrocytes and debris, facilitating microvascular obstruction (21). Surgical myocardial revascularisation with the left internal thoracic artery over the left anterior descending coronary artery is an effective treatment option when ischaemia is present secondary to chronic coronary artery disease (23, 24). However, at a microvascular level, the effects of free radical production can have pernicious consequences beyond the scope of coronary artery bypass (5, 22, 25).

The secondary effects of free radical production by the endothelium promote neutrophil-induced exacerbation of endothelial dysfunction in patients with acute anterior wall myocardial infarction (26). The administration of human recombinant superoxide dismutase limits the damage caused by free radical accumulation, supporting the view that the vascular endothelium is a major source of oxygen-derived free radicals (27). Furthermore, other studies suggest that two oxygen free radical scavengers, superoxide dismutase and catalase (SOD and CAT) directly target free radicals in vivo (12, 28). Expanding on this work, two phases of endothelial dysfunction have been described. The initial dysfunction can be attributed to the generation of oxygen-derived free radicals. Secondly, decreased nitric oxide production leads to the upregulation of selectins, resulting in increased leukocyte-endothelial cell interactions, thus permitting leukocyte-derived factors to contribute to the dysfunction (17).

Furthermore, it has been postulated that ischaemia-reperfusion injury causes loss of function as a result of both necrotic and apoptotic cell death, both of which modify myocardial function (29). In response to ischaemic stress, adenosine is released in the myocardium and activates A1 adenosine receptors (A1ARs) to protect the heart from ischaemia-reperfusion injury (30). Activation of A1ARs may also be an endogenous form of cardioprotection and ischaemic preconditioning (IPC) (31). A more recent research group created a mouse model with targeted deletion of the A1ARs (adenosine receptor knockout) (32). This was an ideal model with which to study preconditioning of the myocardium and established the relationship between A1AR and tolerance to myocardial ischaemia-reperfusion-induced dysfunction and infarction.

Following myocardial infarction, contractile dysfunction develops not only in the infarct zone, but also in non-infarcted regions of the left ventricle distal to the infarct zone, supporting previous work (6). Furthermore, inflammatory activation after myocardial infarction stimulates inducible nitric oxide synthase
nitric oxide and associated vasodilatation stimulation would suppress inflammation and safeguard cardiac function, thus giving credence to the conclusions of Cleveland et al. (1997) in relation to intrinsic cardiac protection in vivo.

Conclusion

The reperfusion of ischaemic myocardium following coronary artery occlusion is one of the bastions of clinical cardiology in the treatment of coronary artery disease. However, a multitude of experimental evidence suggests that cardiac damage is caused by the reperfusion process itself. Leukocyte attachment to the coronary vascular endothelium during reperfusion is an initiating step in this deleterious process. Myocardial infarction affects the functional capacity of the heart by limiting cardiac function. In response to ischaemic stress, adenosine is released from the myocardium. Furthermore, the synthesis of oxygen-derived free radicals and decreased nitric oxide production lead to increased leukocyte-endothelial cell interactions, events that exacerbate and potentiate ischaemia-reperfusion injury.

One of the major limitations of studying leukocyte function in ischaemia-reperfusion injury is quantifying the biomechanical variables, which, by their very nature, can only be approximations. The modeling of biological, especially cellular, systems is fraught with technical difficulties, but simulation methods are rapidly developing. The pathophysiology of these events are not understood in its entirety, and a more comprehensive understanding will lead to novel, innovative reperfusion treatments for a host of disease states characterised by ischaemia. Thus, on the basis of available evidence, it can be concluded that a combination of events, including leukocyte attachment, oxygen free radical-induced cell damage and adenosine receptor interactions, act to initiate and prolong vascular endothelial dysfunction in the reperfused heart.

Acknowledgements: Nil.
Conflicts of interest: None to declare.
Funding: Nil.

In utero diagnosis of micrognathia: A case report and review of the literature

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Abstract

Micrognathia is the presence of an abnormally small jaw and in most instances refers to the mandible. It is associated with many clinical syndromes, including the Pierre Robin Sequence (PRS). PRS features a triad of micrognathia, glossoptosis and airway obstruction. Syndromes such as PRS can have a large medical and psychological impact on the affected families. Specifically, micrognathia is associated with breathing and feeding issues that have been linked to impaired growth, development, and cognition. Prompt diagnosis, early monitoring, and multidisciplinary management of these patients is necessary for best possible outcomes. Ideally, early diagnosis of micrognathia or PRS would be made in utero.

In utero diagnosis of micrognathia or PRS is rarely described in the literature. This report discusses such a case, allowing early planning for the post-natal period.

Introduction

Micrognathia is the presence of an abnormally small jaw and in most instances refers to the mandible. This is a craniofacial abnormality that can be associated with significant morbidity, including swallowing difficulty, airway obstruction, and feeding problems (1). Although it can occur alone, it is associated with as many as 274 syndromes, such as Turner syndrome and Cri du Chat syndrome (2). In utero diagnosis of micrognathia may, in some cases, lead to diagnosis of certain syndromes.

One presentation of micrognathia can be as part of Pierre Robin Sequence (PRS), a triad of micrognathia, glossoptosis (inferoposterior displacement of the tongue), and airway obstruction (3). PRS was initially described to include cleft lip and palate (CLP), but not all investigators now deem CLP to be necessary to the diagnosis. The incidence of PRS is estimated to be between 1:8,500 to 1:20,000 (4). Associated mortality has been reported to be between 2.2% and 30% (5).

In normal fetal development, there is a rostro-caudal delay of mandibular development compared with the maxilla. This results in the impression of a class II orthodontic skeletal relationship until early childhood when there is rapid growth of the mandible (6). Stunted growth of the mandible, however, can become apparent when there is increasing discrepancy between the upper and lower jaws. Lack of mandibular growth in utero can subsequently disrupt normal development of the tongue, palate, and associated structures. Consequently, micrognathia may be present in conjunction with other anatomical anomalies such as cleft lip and palate or natal teeth (7). In addition the tongue may have disrupted growth, or be displaced posteriorly. Displacement of the tongue before nine weeks gestation can disrupt palatal shelf fusion resulting in CLP (8). About 90% of PRS cases are associated with a cleft lip and palate (9).

Glossoptosis is believed to be responsible for the airway obstruction that may occur with micrognathia (3). It has been suggested that the posterior displacement of the tongue may allow it to rest on the epiglottis and act like a valve, closing off the airway during inspiration. Glossoptosis is usually diagnosed post-natally, where it can result in acute respiratory distress.

Figure 1 USS at 30 weeks confirms presence of small lower jaw.
Airway compromise is worse when supine, or when there is disruption of pharyngeal tone such as during feeding and sleeping. This may be apparent as increased work of breathing, especially in the inspiratory phase, as well as apnoea and cyanosis.

Unlike other syndromes featuring micrognathia, pharyngeal motor problems are observed only in PRS (2). Pharyngeal muscle hypotonia may contribute to airway obstruction by allowing gastro-oesophageal reflux, which results in pharyngeal inflammation, further constricting the airway. These mechanisms result not only in airway difficulty, but poor feeding and problems with growth and weight gain in infancy.

Micrognathia is therefore an important feature in determining post-natal health. Early diagnosis, ideally, can aid in post-natal planning and optimisation of infant growth and development. In the available literature, only a few cases of in utero diagnosis of micrognathia have been published.

**Case report**

A 26 year old woman, Gravida 2 Para 1, was seen in the antenatal clinic. On anomaly ultrasound screening at 18 weeks gestation fetal micrognathia was detected (Figure 2). The possibility of low-set ears and a mid-palatal defect was also suspected. There was no known family history of PRS or isolated micrognathia.

An amniocentesis carried out at 19 weeks gestation revealed a normal fetal karyotyp (46XY). A fetal MRI was done at 20 weeks gestation that confirmed micrognathia (Figure 3). All other structures appeared normal. There was fluid in the stomach, indicating the fetus was swallowing.

At 25 weeks gestation the amniotic fluid index (AFI) was 19, with the largest pocket of fluid measuring 6cm. This was classified as the upper end of the normal range for gestation. At this stage fetal biometry placed the fetus between the 60th-80th centile. Estimated fetal weight was 1,250 +/- 185 grams. Further growth was monitored routinely via clinical examination and ultrasound (Figures 1 and 4).

The mother went into labour at 39 weeks gestation, and the neonate was delivered by rotational forceps due to persistent occipitoposterior (OP) positioning in the second stage of labour. The male neonate spontaneously ventilated on room air, and had Apgar scores of 8 and 9 at 1 and 5 minutes respectively. Venous and arterial cord gases were unremarkable. The birth weight of the neonate was 3,000 grams. He was noted to have micrognathia, retroglossia, and a cleft in the soft palate extending to the horizontal plates of the palatine bones (Figure 5 and 6).

Although the neonate was crying spontaneously and did not seem to be in respiratory distress, he was initially transferred to the neonatal intensive care unit for observation. Here, he was found to have no problems breathing and no episodes of oxygen desaturation when lying down. Feeding was aided by a nasogastric tube (NGT).

As there were no breathing problems, a tracheostomy or mandibular distraction was not indicated. The patient was scheduled for surgical repair of his cleft palate at 2-3 months of age.

**Comment**

The craniofacial complex develops from the frontonasal prominence, and the paired lateral nasal, maxillary, and mandibular prominences. Growth
and development of these prominences to form the craniofacial complex are affected by growth factors and chemotactic agents, as well as the pressure effects of neighboring structures. Specifically, proliferation and differentiation of neural crest cells in the facial structures are dictated by signalling pathways from the neighbouring endoderm and ectoderm. These signals occur at specific time-points during embryogenesis, and are dependent on formation of adjacent structures (10). Disruptions in these signalling pathways can result in malformation of the craniofacial structures, such as that seen in micrognathia.

Micrognathia can cause deformation of adjacent developing structures, such as the tongue and hard palate. Hard palate formation in embryogenesis involves fusion of the palatal shelves of the two maxillary processes. These shelves are initially oriented vertically. With mandibular growth the developing tongue is allowed to move anteriorly and inferiorly, providing space for the palatal shelves to elevate and fuse. Failure of mandibular growth can consequently prevent downward and forward movement of the tongue (resulting in glossoptosis), which in turn may prevent palatal shelf fusion (resulting in cleft palate) (5). Therefore, micrognathia can occur alone or in conjunction with glossoptosis with or without cleft palate (as seen in PRS).

Development of these craniofacial anomalies can be due to both malformation (disruption of signaling pathways during embryogenesis) and deformation (disturbed growth due to adjacent structures).

The main acute issues associated with PRS are upper airway obstruction (UAO) and feeding problems (11). Together, these can lead to failure to thrive. Monitoring for these patients is based on oxygen saturation and weight gain. Some centres also describe the use of serial polysomnography (PSG) to monitor UAO (12).

Treatment options for PRS are aimed at widening the pharyngeal space and bridging the upper airway. Modes of widening the pharyngeal space include simple anecdotal measures such as prone positioning, but may extend to more invasive options such as glossoptomy, mandibular traction, and mandibular...
distraction osteogenesis (6). As this patient had a patent airway, none of these interventions were indicated. Bridging the upper airway aids both breathing and feeding. Breathing issues can be addressed via tracheostomy, nasopharyngeal airway, or positive pressure (11). Again, these were not considered in this patient as the airway was patent.

Feeding issues alone can be aided via a surgical repair of the cleft, or use of removable palatal plates, which may also improve tongue position and induce mandibular growth (11). The patient in this report was assessed to require a NGT for feeding until 2-3 months of age, at which stage he would have a surgical repair of his cleft palate.

The armamentarium of available treatment options for PRS illustrates the complex and dynamic nature of the condition. Ongoing feeding and breathing issues have been linked to the possibility of impaired cognition later in life, thus prompt diagnosis, early monitoring, and multidisciplinary management of these patients is mandatory for best possible outcomes (13).

Figure 6 Young male infant with Pierre Robin Sequence at 3 weeks of age.

Author’s Contributions: Dr Shreya Verma (BDS), Dr Kenneth Nathan (MB ChB BAO MRCOG FRANZCOG)

Acknowledgements: Nil.

Conflicts of interest: None to declare.

Funding: Nil.

Declaration of Ethics Approval: The authors confirm that informed consent was gained from the patient prior to publication.

Sourcing and Copyright ownership of clinical photography: Figure 1–5 - Dr S Verma

Images and Artworks

Medicine and the arts: Launch of the MSJA Images and Artworks category

Megan Hickie
Editor-in-Chief
Medical Student Journal of Australia (MSJA)

"Wherever the art of Medicine is loved, there is also a love of Humanity" - Hippocrates

Medicine and the arts have always been inextricably intertwined. Hippocrates, often referred to as the father of medicine, viewed medicine as just one branch of the humanities, asserting, “medicine is, of all the Arts, the most noble” (1).

At Harvard Medical School, Yale School of Medicine, and other universities across the United States (US), medical students study the visual arts as part of their formal medical education (2-4). Survey data from 2002 revealed that over half of the medical schools in the US involve medical humanities in their degree programs, and that the inclusion of the arts in medical curricula serves to improve both student well-being and clinical skills (5).

Similar trends are emerging in the United Kingdom and Europe, with medical students participating in body painting sessions, life-drawing classes and formal art education within their medical courses (6-8).

Here in Australia, the use of the visual arts in medical teaching is becoming increasingly prevalent. Paramedic students at the Queensland University of Technology create visual works that reflect patients’ perspectives, to augment classes about medical ethics (9). Clinical anatomy is taught at the University of Western Australia using body painting (10). Medical Students at the University of Newcastle analyse paintings at the Newcastle Region Art Gallery to improve their ‘medical gaze’ (11).

Visual art can be used to enhance medical education in many ways. At Yale Medical School, students examine paintings in the Yale Center for British Art with a view to improving their descriptive skills in dermatology (3). At the University of Michigan Medical School, medical trainees create visual pieces to better understand the experience of people living with chronic disease (12). At Harvard Medical School, classical works are used as a launching pad for more broad philosophical discussions. As Mullangi recounts in Academic Medicine, “while gathered around an ancient Greek sarcophagus at the Museum of Fine Arts in Boston, Dr Katz led a group of internal medicine residents in discussions about their experiences with death” (2).

Throughout 2013, the Medical Student Journal of Australia (MSJA) has been working with the National Gallery of Australia (NGA) to better understand the relationship between art and medicine, and the role of art in medical education. To celebrate this relationship, Frances Wild, Acting Manager of Access Services at the NGA, will be contributing a piece about the NGA’s armmed program in the next issue of the MSJA; Volume 5 Issue 2.

In addition, early in 2013, the MSJA called for submissions of original images and artworks from our readers. We hoped that this would start a discussion about the role of art in medicine; and we believe it has. We received some deeply thoughtful and technically impressive works, all of which will be published on the MSJA website (msja.anu.edu.au).

The MSJA is pleased to announce that the winners of the Inaugural Images and Artworks Category for Volume 5 Issue 1 are: 8 Mile Creek, Yuendumu by Kellie Hillisley, Neurotrophins and Motor Neuron Proliferation by Megan O’More and Eye of the Storm by Shrikar Tummala (pictured opposite). Self-Knowledge by Jade Lee was selected as the cover image for Volume 5 Issue 1.

We would like to thank the many talented and dedicated artists who submitted works to the MSJA this year. The MSJA is now accepting Images and Artworks for Volume 5 Issue 2 (msja.anu.edu.au).

I initially selected a picture of an elderly man, and decided to focus on and paint his left upper facial region. I selected this area of the photograph to paint because it captured my feelings towards the elderly. They suffer from many diseases, require several medications and suffer the side effects of these medications. They also experience a decline in vision and mobility and often suffer from depression and dementia. But, in my experience with the elderly, I have found them to be optimistic, kind, serene and sincere. This is metaphorically represented by a storm which is characterised by the peaceful and calm ‘eye of the storm’ and the chaos which surrounds it. Thus, the eye in my painting represents the elderly and their positive view of the world, while the surrounding ageing skin and jagged lines represent the problems that they face daily.

My inspiration for painting this piece also came from a quote from Elisabeth Kubler-Ross who said “the most beautiful people we have known are those who have known defeat, known suffering, known struggle, known loss, and have found their way out of the depths. These persons have an appreciation, a sensitivity, and an understanding of life that fills them with compassion, gentleness, and a deep loving concern. Beautiful people do not just happen.”
This is the full quote that inspired my piece, and as pretentious as it came across at first, it resonated with me. This lecturer from the 1600s compared the study of anatomy to something as beautiful and poetic as self-exploration and introspection of one’s soul, and I appreciated that. It resonated with me because it brought up memories of grand artists, like Leonardo Da Vinci, Henry VanDyke Carter (the lesser known Henry of “Gray’s Anatomy”), and the very familiar Dr. Frank Netter, all who have contributed significantly to the study of anatomy in medicine.

Every time I see an MRI scan of any part of the human body, I’m always blown away by how every piece fits perfectly into an extremely complicated puzzle. Before I started medical school, I shadowed a radiologist who scrolled through a full CT body scan and pointed out all these details and intricacies that ran throughout. He said to me, “Gee, it’s beautiful, isn’t it?” I nodded in dumbstruck wonderment. I used to worry I wouldn’t find much inspiration in medicine to draw and paint like I once did, but it’s not so bad anymore. Art is in the anatomy.

“Self-knowledge can, and ought to apply not only to the soul, but also to the body; the man without insight into the fabric of his own body has no knowledge of himself.”
- John Moir, study of anatomy, notes from an opening lecture, Anatomical Education in a Scottish University, 1620.
The ‘Dreamtime’ is referred to by many Indigenous people as the time of Earth’s creation. Once the ancestral spirits had created everything it is believed that they returned to the land. Legend suggests that they formed themselves into creeks or pools of water, which is where they remain today. All codes of conduct, relationships, rules and rituals were determined during this time. Incorporating these cultural beliefs into our future practice plays a pivotal role in the development of therapeutic relationships in the Indigenous health setting. Aboriginal and Torres Strait Islander peoples’ views of health and wellbeing differ to, and are more holistic than, those encapsulated by the biomedical model. While Aboriginal viewpoints of medical treatment have changed over time, there has been less change in beliefs regarding the cause of illness. The sociomedical system of health beliefs held by Aboriginal people places emphasis on social and spiritual dysfunction causing illness.

Kellie Hillsley
Our understanding of disease and the discovery of treatment methods effective in treating diseases are dependent upon medical research. Neuropathological diseases including Alzheimer’s disease and amyotrophic lateral sclerosis continue to require further investigation in order to find adequate treatment to prevent neuronal degeneration and disease progression.

During my undergraduate education at the University of Queensland I was fortunate to participate in research investigating the role of neurotrophic growth factors on cellular proliferation and differentiation. Specifically, my research focused on the effects of brain derived neurotrophic factor (BDNF) and nerve growth factor (NGF) on the growth of a fused glioma and motor neuron cell line (NSC-34 cells).

The images displayed here are photographs of NSC-34 cells treated with NGF fixed at day 0 (first image), and day 7 (second image), using a phase microscope at 20x magnification. They show the presence of neural cells and neurite growth. This research confirmed evidence of neurotrophin receptor binding and subsequent activation of signaling pathways that stimulate cellular proliferation in motor neuron cells.

It is hoped that future research into neurotrophins such as BDNF and NGF may identify specific signaling pathways associated with neuropathological diseases. Further research could therefore have important implications for clinical management of diseases, allowing more specific treatment targets to effectively alter neurological disease course.

Megan O’Moore
Smoking in Indigenous Australians: Will plain packaging legislation make a difference?

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Indigenous Australians have a much higher rate of smoking compared to the general population. The age-standardised rate of current daily smoking is 43.3% for Indigenous Australians compared to 18.3% for non-Indigenous Australians (1). The aim of this paper is to review the determinants of smoking in the Indigenous Australian population and to determine whether the recently introduced tobacco plain packaging legislation can be expected to contribute to decreasing the smoking rate in this population. The Indigenous Australian population refers to people who identify as Aboriginal Australian or Torres Strait Islander. The determinants of smoking behaviour are complex and multifaceted. In the Indigenous Australian population, the role of structural inequities that contribute to poor health behaviours is not to be underestimated.

Smoking is a historically entrenched part of Indigenous culture. Indigenous Australian cultures are very complex and diverse with more than 600 different clan groups, otherwise known as ‘nations’ before the European arrival (2). Smoking forms part of the diverse range of ceremonies, arts, family, sporting and religious practices by which Indigenous Australians celebrate their cultural heritage. Before European settlement, tobacco is thought to have been introduced to Australia by islanders who travelled to Northern Australia to fish (3, 4). European settlers then exploited tobacco addiction in order to manipulate Indigenous Australians to work or hand over land (3). Smoking tobacco is a deeply ingrained part of many Indigenous cultures, and is therefore a custom that is very difficult for Indigenous people to let go of. The historical context of tobacco smoking in the Australian Indigenous population is reported as a barrier to cessation by some Indigenous Australians today (5). This view emphasises the importance of history and culture to the behaviour of Indigenous Australians. The historical and cultural context of tobacco smoking has contributed significantly to its place in modern Indigenous Australian communities.

Social determinants of smoking are thought to be most important in mediating uptake and continuation of smoking behavior. A qualitative study of Indigenous and non-Indigenous youth suggests that family and peer influences play a particularly important role in the socialization of smoking in young Indigenous Australians (6). Reciprocity and social cohesiveness are often expressed in Indigenous communities through the exchange or sharing of cigarettes. Sharing and giving cigarettes is an important part of Indigenous Australian culture and this may lead to social exclusion of non-smokers (5). For some Indigenous Australians, the social benefits of giving and receiving cigarettes may outweigh the perceived health risks of smoking. Smoking in the workplace, social settings or home facilitates ‘yarning’, the Indigenous Australian form of chatting. Workplace no smoking policies are difficult to introduce in Indigenous communities because employees value the social experiences they have while smoking (7). Similarly, no smoking policies in schools, where they exist, are often poorly enforced, which is likely to increase smoking rates in young Indigenous Australian people (6). The individual and community benefits of smoking perceived by some Indigenous Australian people contribute to the high prevalence of smoking in the Indigenous Australian population.

Psychosocial reasons for smoking are commonly reported by Indigenous Australian people. Early childhood stress is linked to drug dependence in later life (8). The high prevalence of nicotine dependence in Indigenous Australians could therefore be partly attributed to the impact of the stolen generation. Indeed, Indigenous Australians who were removed from their families during childhood are more likely to be smokers than those who were not (9). Indigenous Australian women report that they smoke more when they are stressed or anxious (10). These psychosocial contributors to smoking rates in Indigenous Australians have implications for the timing of interventions. The role of stress and trauma in smoking behaviour suggests that a successful intervention would be best introduced when people are not especially stressed.

Indigenous people may have a decreased understanding of the health effects of smoking compared to non-Indigenous Australians, including the effects of smoking during pregnancy, and this has implications for potential campaigns. A higher level of education in Indigenous Australians is associated with increased non-smoking rates (9). Whilst this may partly reflect the effect of education on socioeconomic status, it is also due to lack of specific education about the effects of smoking. Interviews with Indigenous Australian
women in Western Australia revealed an incomplete understanding of the effects of smoking on neonates, infants and young children (10). This suggests that Indigenous Australians need more effective and better targeted anti-smoking campaigns than they currently have access to. Modern anti-smoking campaign studies have shown that mainstream advertisements are more effective for Indigenous Australians than for non-Indigenous Australians at providing new information. Indigenous Australians also responded much better to graphic images of the ill person rather than advertisements of family members of the ill person (11). This suggests that even in the absence of directed targeted media campaigns for Indigenous people, the anti-smoking message can be improved by tailoring mainstream advertisement campaigns to Indigenous communities.

The level of access to pharmacological therapies to treat nicotine addiction is lower in Indigenous Australian communities compared with the general population. Due to the highly addictive nature of nicotine, treatments such as nicotine replacement therapy, varenicline and bupropion are necessary for many Indigenous Australians to quit smoking, in addition to educational interventions. Some of these medications are subsidised as part of the Pharmaceutical Benefits Scheme (PBS), while others are not (12). Further subsidisation of such medications and of medical consultations through Medicare and the PBS is needed to help lower the smoking rate in Indigenous Australians.

Whilst there are initiatives in place to reduce smoking rates in Indigenous Australians, they have significant shortcomings. In 2008, the Australian government signed off on a 5 year funding policy to ‘Close the Gap’ and aimed to achieve a variety of Indigenous health outcomes. One of the major initiatives was targeting the high smoking rates of Indigenous Australians. However, studies and interviews with health workers found an implementation gap in remote and very remote Indigenous communities (13). An implementation gap occurs when a very realistic and comprehensive policy fails to deliver practically and the policy does not translate into effective action. This has occurred and is occurring for a variety of reasons. Health worker capacity is a major concern; there simply are not enough skilled workers in those remote Indigenous communities to fully carry out all the goals of the various policies (14). Additionally, due to the remote nature of some of the communities, the time the health workers need to travel limits their time spent in the community. Whilst a fragmented approach to preventative health is somewhat unavoidable given the variety of Indigenous cultures in Australia (12), different aims and focuses between community groups make effective anti-smoking campaigns difficult to coordinate and implement. All of these barriers make it almost impossible to curb the high rate of smoking in Indigenous Australians. Actions need to be taken to ensure a better outcome. Such actions could include higher incentives for health workers in remote Indigenous communities, improved infrastructure to provide travel amenities to health workers and integration of service providers in the community to tackle the high smoking rate collaboratively.

In December 2011, Australia passed the Tobacco Plain Packaging Act 2011, legislation designed to remove the branding on cigarette packets. Pilot studies done before the introduction of the legislation showed that plain packaging decreases tobacco consumption, especially in young adults (15, 16). In the Indigenous population the smoking rates of young adults is particularly high. Legislative measures have been reported to support social strategies to reduce smoking in young Indigenous Australians (6). Another study has shown that plain packaging combined with pictorial health warnings is superior to pictorial health warnings alone (17). The likely reason for this is that plain packaging is designed to remove the brand appeal, whilst the pictorial health warning is demonstrating the harms of smoking. Given that Indigenous Australians respond much better to graphical advertisements, it is hypothesised that the plain packaging legislation combined with the existing pictorial health warnings will contribute to decreasing the smoking rates of Indigenous Australians.

Smoking in Indigenous Australians is a major health problem and disproportionally affects Indigenous Australians compared to non-Indigenous Australians. Smoking is an entrenched part of many Indigenous Australian cultures. A variety of complex historical, cultural, social and political factors perpetuate the high smoking rates. However, the recent introduction of the plain packaging laws in Australia, combined with the various existing campaigns, suggests that a long-term decrease in smoking rates in the Indigenous population is possible.

Acknowledgements: Nil.

Conflicts of interest: None to declare.

Climate change and the Indigenous health gap: How useful is adaptation?

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Abstract

International efforts to mitigate climate change have been largely unsuccessful, and adaptation is increasingly touted as a viable response. Climate change already negatively impacts human health and this trend will be exacerbated as it progresses. Despite efforts to ‘close the gap’ between Aboriginal and Torres Strait Islander (Indigenous) and non-Indigenous Australians, Indigenous health will likely be disproportionately harmed by climate change. Capacity to prevent the unequal health effects on Indigenous people will be limited. Australians promote a ‘fair go’ and equity as societal values, but adaptation may not be a viable strategy to reduce health inequity between Indigenous and other Australians. However, climate change mitigation will support Australia’s efforts to close the Indigenous health gap.

Climate change and health

Some consider climate change to be the greatest threat to global health of this century (1). It already negatively impacts human health, and continued climate change will exacerbate adverse effects (2). Butler and Harley list three categories of climate change health effects (2). Primary effects are those in which the climate impacts directly on the human organism, including increased heat stress. Secondary effects operate via the ecosystems in which humans live. Patterns of disease transmission have been altered by the impacts of climate change on vector, parasite and host animal populations (2). The tertiary effects of climate change involve socio-economic and political interactions with the climate and ecology. Increased food shortages and prices (2,3), migration (4,5), and violent conflict (6-8) are tertiary effects of climate change with substantial health implications.

Indigenous health

Aboriginal and Torres Strait Islander (Indigenous) people suffer worse health than other Australians. Evidence suggests a gap in life-expectancy at birth of over ten years (9). Mortality rates for Indigenous children under 5 years are estimated to be 221 per 100,000, compared with 100 per 100,000 for other Australian children (9). In 2007, the Council of Australian Governments affirmed its goal of Closing the Gap between Indigenous and other Australians and committed to several targets, including closing the life expectancy gap and halving the gap in mortality rates for children under 5 years (9). This is consistent with the Australian values of equity and a ‘fair go’ for everyone.

Indigenous people will bear a disproportionate health burden from climate change (10,11). Several aspects of Australian demography contribute to the unequal burden. In general, Indigenous people live further north than other Australians. Indigenous people account for only 2.5% of all Australians, but represent 26.8% of the population in the Northern Territory, 3.6% in Queensland and 3.1% in Western Australia (12). Temperature increases will most adversely affect the health of those in these hotter northern climates, partly due to heat stress and increased rates of food-borne diseases (13). Changed temperature, humidity and rainfall could increase the incidence of Ross River and dengue fever, though southern capitals will likely be spared dengue for at least the next century (13).

The Indigenous population is more remote than the non-Indigenous population. Twenty-six percent of Indigenous people live in remote or very remote Australia, compared to 2% of non-Indigenous people (14). Those in remote Indigenous communities are at particular risk from heatwaves, which can lead to heatstroke, renal failure and mental illness, and exacerbate existing health conditions, leading to premature death (13). They are also at greater risk from bushfires, with concomitant injuries, respiratory illness and mental health problems (13). Rural communities more broadly are at greater risk from long-term decreases in rainfall and drought, with ensuing social and mental stress (13). Ironically, they are also at greater risk from extreme weather events and flooding (13).

The Indigenous population is younger than the Australian average (9). Climate change will worsen over coming decades, even in scenarios of greatly reduced emissions (3), which seem unlikely based on current trends. The effects of greenhouse gases emitted today will continue to act on the climate and cause continued change over decades, enhancing intergenerational inequity. As a younger, more rapidly expanding population, Indigenous people will receive the poor end of this bargain.

Many Indigenous people conceptualise a greater degree of moral, social and physical connection between people and ancestral ‘country’ than non-Indigenous people (15). Indigenous conceptions of individual health are linked to health of ancestral country. For instance, Aboriginal people at Hall’s Creek believe a healthy state is one in which energies
and fluids flow within and between individual bodies and country. Obstructions or perturbations of dreamtime objects in the landscape can result in ill-health or death among associated individuals (15). The negative ecological effects of climate change may impair Indigenous health via ecological harm to ‘country’ (10), including through increased psychological stress and challenges to personal connection to country.

From a Western perspective, access to bush foods may also decrease, limiting this component of many Indigenous Australians’ diets (16). In summary, Indigenous Australians have greater exposure to many of the health impacts of climate change than their non-Indigenous counterparts.

Mitigation and adaptation as responses to climate change

International efforts to find a successor to the Kyoto protocol have been unsuccessful to date. Canada legally withdrew from the Kyoto protocol last year with its greenhouse gas (GHG) emissions substantially above target. Globally, GHG emissions continue to rise, in spite of the global financial crisis and economic slowdown in the West. Atmospheric GHG concentrations are therefore rapidly increasing. Ongoing construction of GHG-producing infrastructure, including coal-fired power stations, makes short-term GHG reductions unlikely.

Climate change mitigation was initially seen as the primary solution to climate change. Over the past several years there has been a shift in climate negotiations from mitigation to adaptation, which is coming to be seen as having equal importance (17), and the importance of funding adaptation activities has grown (18). The views of Rex Tillerson, CEO of Exxon Mobile, are representative of an increasing minority, “changes to weather patterns that move crop production areas around – we’ll adapt to that. It’s an engineering problem and it has engineering solutions...The fear factor that people want to throw out there to say ‘we just have to stop this,’ I do not accept” (19). Acknowledging that some climate change is inevitable, the health literature increasingly suggests adaptation as a major part of the health response (18,20).

Continued rise of GHG emissions locks-in future climate change and necessitates adaptation. Adaptation has a number of limitations, however. Maladaptation can burden the most vulnerable, increase greenhouse gas emissions, preclude future adaptation pathways or decrease incentive to adapt (21). Excessive focus on adaptation could reduce the perceived urgency of substantial mitigation, and may itself be maladaptive.

Adaptation and Indigenous health

Adaptation can occur at the level of physiology, individual behaviour and societal change. Indigenous Australians have worse baseline health than other Australians, and therefore less capacity for physiological adaptation. Wealth is essential to some types of behavioural adaptation. Poverty will likely diminish many Indigenous people’s adaptation options, limiting household air-conditioning or healthy diets, should food costs increase further.

Societal-level adaptation will likely further disadvantage Indigenous people. Laissez faire mechanisms will be most accessible to those with money and influence. Government-funded initiatives may not make up the difference and could widen the gap. Large-scale infrastructure projects will likely favour urban areas. More broadly, cultural and other factors can weaken government delivery of health-related government services to Indigenous people (22). Adaptation efforts specifically focusing on health equity can partially alleviate inequity internationally (18), and no doubt in Australia, but realpolitik will likely limit its success. All three levels of adaptation may further disadvantage Indigenous people.

Discussion and conclusions

Indigenous Australians have greater exposure to climate change risk than non-Indigenous Australians. Diminished adaptive capacity will heighten risk and further disadvantage Indigenous Australians; this will be compounded by societal adaptation, though adaptive efforts specifically to reduce inequity could lessen this effect. The recent shift in emphasis in climate change negotiations and public discussion from mitigation to adaptation will therefore likely hinder efforts to close the gap in Indigenous health.

The foregoing analysis suggests that climate change may threaten Australia’s capacity to achieve its stated core values, including those of racial equality and a ‘fair go’ for all of its citizens. Adaptation will no doubt ameliorate some of the problems caused by climate change, and can be an important tool for minimising health inequity in the face of climate change (23). However, adaptation will probably be unable to counter the contribution of climate change to the Indigenous...
health gap, and will likely exacerbate it. Other social values, such as justice and transparency, are endangered by climate change as well as (often unconscious) psychological and socio-political responses to it (24). To date, there has been little analysis as to whether or not adaptation can ameliorate the impact of climate change on societies’ ability to enact these values. The present article suggests adaptation may be of limited use in upholding these values in the face of climate change.

Indigenous and minority populations in countries other than Australia may have greater vulnerability to climate change than dominant groups. Dynamics similar to those in Australia could result in a diminished set of adaptive responses. Adaptive responses that benefit Indigenous and minority groups may be further weakened in societies with greater levels of discrimination, government corruption and existing inequality. Increased health inequality could exacerbate ethnic and other tensions, including conflict.

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Although it was winter, the heat was unbearable — the ice in our water melted within seconds. We were sitting in front of the fan in the house of a woman who can only be described as heroic. Well known and respected by those in the community, Sister, as we called her, had survived one of history’s worst genocides and had since dedicated her life to improving the health and economic status of families with much less than her. As we relaxed amongst the exorbitant comforts of her house, we discussed many things. There were introductions of new volunteers, stories and advice from experienced ones, deliberations about the state of healthcare in Cambodia and frequent self-deprecating remarks regarding the difficulties of life without the first-world privileges on which we’d become dependent.

As we indulged, an elderly Khmer woman appeared at the door. “Joom reeup sooa” we recited, lowering our heads. Already having exhausted our limited Khmer language, Sister began to engage with the woman. As they spoke, there was a visible change in Sister; a new weight had been added to her already burdened shoulders. She turned to the group and began explaining a story that had become all too familiar: the woman came from a very poor family, by no means uncommon in that area of Cambodia, and lived but two streets away from the house in which we were sitting. Having heard of the many bharang (white skins) in town, she knew that this was one of very few opportunities she had to help herself and her family. She had mustered the courage to face the alien crowd to ask a question that was translated to us as “Can you help me build a toilet?”

We fought our instinct to shout a resounding ‘YES!’ We needed to appraise the situation to determine whether it was appropriate and possible to assist with the provision of a toilet. Corruption is rife in Cambodia and unfortunately we always engaged a necessary suspicion. Sister informed the woman that we would visit her house in the coming days to see if we could help. We also needed to buy ourselves time to investigate a source of funding. As the woman turned to walk away, a silence fell over the room.

Amidst a culture in which nothing is given more importance than pride and saving face, the happy ending is almost irrelevant. Suspicions cleared and toilet provided, we continued our days in awe of her fortitude.

Death of a mother

As she lay on the floor of the bus, the world around her lost clarity, she thought only of her husband and child. Earlier that evening, she had been riding side-saddle on the back of her husband’s archaic motorbike. Although in indescribable pain, she would not allow it to be seen by others in the village: a stoic effort as she was due to give birth for the first time and without analgesia. In rural Cambodia, many births are still unattended. A small number of wealthy families can afford to travel to a hospital or private clinic in Phnom Penh, but this is by far the exception. She had access to transport to the local health centre, but no further. They drove along the rugged roads, travelling at a snail’s pace to avoid the potholes that had been left as a consequence of the rainy season. To the locals the night was cold, yet beads of sweat were dripping from her forehead, as if a surrogate for the screams she
when compared to Australia where only around 1 in 10 adults are illiterate (2).

Desperate for justification, I gave benefit of the doubt to those who dedicated time and funding to the design and production of the educational materials. I speculated that the posters were designed to be read in partnership with a health worker, however I’d observed that cultural complexities in Cambodia resulted in mostly practitioner-centric consultations; I could count on one hand the number of occasions on which I had witnessed effective patient education. I stood perplexed by the image, trying to make sense of the complex set of deformities. Bewilderment took over when a colleague informed me that the indecipherable poster was a public health initiative to reduce tobacco use.

The teachings, the literature, the experience and the collective knowledge all demonstrate that long-term, culturally appropriate interventions are the most effective measures for community empowerment through self-determination. Why then not in-field?

My chest tightened as I began to grasp the intertwined nature of medicine, public health, socio-economic development and government. Underneath my mosquito net on the floor of the hut, I was unable to placate my anxiety that night. The overwhelming complexity of international health and development had left me feeling burdened, however not without a renewed vigour for the challenge.

**Acknowledgements:** Nil.

**Conflicts of interest:** None to declare.

**Funding:** Nil.

**Stock image:** mohan p (publicdomainpictures.net)


Dementia is a generic term describing a progressive dysfunction of cortical and subcortical function leading to cognitive decline (1). The cognitive changes are accompanied by disturbances of mood, behaviour, and personality. Dementia currently affects almost 280,000 Australians and is the third leading cause of death in Australia after heart disease and stroke (2).

According to the Australian Institute of Health and Welfare, in 2006, of the 190,000 Australians diagnosed with dementia, 64% were female (3). Furthermore, this trend is seen internationally. In a meta-analysis of the prevalence of dementia in the World Alzheimer Report in 2009, not only was it shown that the prevalence of dementia increased exponentially with age but the prevalence for men was observed at between 19% and 29% lower than that for females (4).

The prevalence of dementia is higher in women than it is in males and there have been many theories to help explain this, ranging from the basic longevity argument to differing clinical and pathological presentations. Despite this, the literature is still divided about whether a true differentiation exists between the genders.

The longevity argument for explaining the increased prevalence of dementia in females is based on two facts. First of all, many epidemiological studies have shown that women have longer lifespans than men. According to the World Health Organization (WHO) Women, Ageing and Health report, women outnumber men in the older age groups, with the discrepancy in number only widening with age (5). Worldwide, there are approximately 123 women for every 100 men aged over 60 years and by the age of 80 and over, there is nearly double the number of females to males, with 189 women for every 100 men (5). Secondly, the strongest predictor for dementia is age, with the prevalence of dementia increasing sharply in those aged over 80 (6). Therefore coupling the notion that women live longer with old age being the major risk factor for developing dementia, it makes a plausible argument for the imbalance in the prevalence of dementia in women compared to men.

Another theory about the discrepancy in gender representation is that of clinical presentation. Dementia has an extremely long and progressive prodromal phase that can precede the clinical diagnosis of dementia by up to 14 years (7). In a case-control study by Amieva et al. (2008) using 350 Alzheimer disease subjects, the evolution of their clinical presentation over 14 years was recorded. It was found that the first sign was a decline in cognitive performance, appearing as early as 12 years before the diagnosis of dementia. Following this, more global deficits were noticed with an increase in memory complaints and depressive symptoms. Approximately two years later, the subjects became more dependent in their activities of daily living and in the last three years, the impairment progressively worsened until the dementia phase was apparent. A study by Peres et al. (2011) went further to assess if there was a gender discrepancy in the prodromal signs of dementia. In a population-based cohort, they followed subjects’ development of dementia over a 15 year period. They found that women were more likely to present to their doctor complaining of memory problems and men were more likely to present with a restriction in instrumental activities of daily living (IADLs) (8). From the study performed by Amieva et al. (2008), it suggests that women would report symptoms of dementia very early in the process by a subjective memory complaint, whereas men tend to report later with restriction in IADLs. Therefore it could be inferred from this that more dementia is being picked up in women due to the reporting of memory complaints earlier on in the disease process compared to men.

Lastly, the macroscopic and microscopic pathological features found in the brains of patients with dementia have been studied extensively. Whilst some features such as
cortical atrophy are consistently found across the majority of types of dementia, there are specific histological findings that are unique to particular sub-types. The major neuropathological lesions of Alzheimer’s disease for example, are Aβ deposition, senile plaques, and neurofibrillary tangles (9). When comparing the prevalence of senile plaques and neurofibrillary tangles in males and females with Alzheimer’s at autopsy, there was no difference found between the genders (10). Interestingly however, in a study by Barnes et al. (2005) when comparing the clinical manifestations of Alzheimer’s disease with the pathological findings, they found a stronger correlation in females. For each additional unit of pathology, the odds of clinical Alzheimer’s disease in males was nearly 3-fold, whereas in females it was greater than 20-fold (11). So, although the prevalence of pathological lesions in the brain does not differ between genders, women are more likely to express these lesions, as Alzheimer’s clinically, than men.

Despite years of research, the literature is still divided about definitive findings that help explain the preponderance of dementia in females. The fact of the matter is that women across the world disproportionately bear the burden of dementia. With our ever ageing population, and assuming the age-specific dementia prevalence rate persists, the global burden of dementia is expected to rise dramatically. By further researching the gender discrepancy in the prevalence of dementia, protective factors and risk factors can be identified that will one day help in finding a treatment, or better yet, preventative measures that can be implemented so that we can preclude this disabling chronic disease.

Acknowledgements: Nil.
Conflicts of interest: None to declare.

Stock image: George Hodan (publicdomainpictures.net)

The global war on drugs has failed, with devastating consequences for individuals and societies around the world."

This was the finding of the 2011 assembly of the Global Commission on Drug Policy (GCDP), a conglomerate of the world’s most prominent policy makers, activists, intellectuals and business people (1). The commission’s task had been to assess the global response to illicit drug use and facilitate a humane and evidence-based solution to address the harms associated with drug abuse in the world today. The final verdict was that the hardline, prohibitionist tactics of law enforcement have been ineffective since their global introduction in the 1970s and that drug markets and drug-related harm are proceeding unopposed by the current sanctions (1). In Australia, roughly 400 individuals die each year as a direct result of drug abuse; countless others are subject to imprisonment, emotional hardship and morbidity (1). It is now time for an evidence-based re-evaluation of this issue in order to redesign our approach towards illicit drug use – a reframing of the problem away from criminalisation and towards medicalisation.

The war on drugs: An out-dated approach to drug policy in Australia

In 1968, the concept of a ‘war on drugs’ was coined by Richard Nixon as an integral component of his presidential platform of invoking law and order against the counter-culture of radicalism and experimental drug use that had evolved throughout the 1960s (2). Right-wing Australian politicians were soon to follow suit as keen proponents of a Nixon-style injection of law enforcement to curb the expansive market for recreational drugs (3). By 1970, every Australian state had criminalised what are now known as ‘illicit drugs’ (3). Now, forty years since its conception, it is becoming increasingly evident that strong-fisted strategies like the ‘war on drugs’ have been an inappropriate, costly and largely ineffective method of ameliorating drug-related harm (1, 2). Instead, these systems result in the marginalisation and alienation of citizens who are in need of medical attention (1). In light of the new evidence demonstrating how ineffective this method has been, it is important that Australia now alters its approach to this issue and develops a drug strategy that relies on empirical evidence and not emotional rhetoric to shape its future policy position and reduce drug-related harm.

Australia’s current National Drug Strategy (NDS) was constructed around three pillars: a reduction of drug supply; a reduction of drug demand; and a reduction in harm caused by those who continue to participate in drug use (4). While this framework implies a balanced approach between law enforcement and health sectors, the unfortunate reality is that an asymmetry exists in the allocation of resources between the two, staunchly favouring law enforcement (4). This is best demonstrated by a recent economic assessment that noted an expense of only $252 million annually spent on the provision of health care for individuals with drug-related ailments while $5.36 billion annually was spent on their prosecution – a mammoth 0.48% of the GDP (5). The aforementioned disparity in funding allocation has not been shown to be cost effective, and in fact, is likely exacerbating the fundamental socioeconomic elements that potentiate drug related detriment (4).

Largely, those advocating for total and strict prohibition do so from a moral or religious stand point (6). An unfortunate consequence of decades of propaganda warning of the dangers of illicit substances is that a stigmatisation of drug users has been forged in the minds of the community imposing a moral scaffold on the way these individuals are perceived. While the use of the term ‘criminal’ in describing illicit drug users is technically apt, it is the socially imposed stigmatisation of this group of ‘criminals’ that perpetuates the cycle of detrimental behaviour seen in illicit drug users today (1, 2). This societal discourse forces the drug trade underground, inflates drug prices and stimulates violent and acquisitive crime. However, it fundamentally fails to address the core underlying issues leading to the abuse of illicit substance in the first place (1). In actuality, the marginalisation of these individuals often enacts far more harm than drug use itself, as it limits ties to social support networks as well as financial and health services that could help them evade the deleterious social and physical effects of substance abuse (1).

Other arguments for the sustained staunch criminalisation policies revolve around the potential of some of these substances for serious harm. These arguments seldom appreciate the commensurate danger of many legal substances or behaviours that are not criminalised: smoking, alcohol, fast food, over-exercising and unprotected sex just to name...
a few. This is not to say that the use of illicit substances is unrelated to harm, but rather the criminalisation of minor offenders often carries a greater harm than that of the drug itself (3, 4, 6).

The importance of harm minimisation strategies and the future of drug policy reform

The current NDS has not been effective in providing the minimisation of harm to citizens of this nation and instead is landing an inordinate amount of minor offenders in prison rather than offering health care-based solutions (7). This is evidenced by the boom in incarceration rates since the 1980s with as many as 30% of male prisoners reporting that illegal drugs were at the core of the offence that resulted in their imprisonment (7). Prison itself is of tremendous detriment to those who are incarcerated. Aside from the risks of physical violence there are also striking associations between imprisonment and of the development of mental health disorders and the contraction of blood-borne viruses (7). Imprisonment also impacts social determinants of health evidenced by the poor likelihood that convicted individuals will find meaningful employment on release and as high as a 70-fold relative risk of all cause mortality within 6 months of release (8). As well as the risks associated with incarceration, the criminalisation of drugs has cultured a strong black market for these products, which in itself breeds direct and indirect causes of harm to society. These consequences range from drug related violence and acquisitive crime, to the health implications of the ingestion of poor quality or tainted drugs (6). The current spate of anthrax-contaminated heroin in the UK is a pertinent illustration of such unintended consequences of drug criminalisation (9).

The attempts of the NDS to eliminate drug use through law enforcement are also costly to the Australian taxpayer. Illicit drugs by their nature yield no tax revenue due to the clandestine nature of those organisations currently producing and importing them (4). To contrast this with the direct cost of the current drug burden in Australia, illicit drugs cost roughly an average of $250 million each year in reduced productivity, $250 million spent each year on the provision of health care and $5.4 billion dollars yearly on law enforcement totalling nearly $6 billion dollars per annum (3, 4). At the same time, this stalwart prohibition also creates a predictably advantageous consequence in the black market whereby police crackdowns stem drug supply and subsequently increase the market value of the product (3). The current policies, aside from doing very little to decrease the availability of drugs, are in fact bolstering the profits of suppliers. If anyone should be lobbying for the continued criminalisation of illicit substances it should be the drug dealers themselves. The regulation and decriminalisation of illicit drugs could quash the industry currently committed to the maintenance of drug dependence and reinject revenue into harm prevention and regulatory strategies that would benefit the citizens of our nation rather than continuing to fund drug exporters abroad (6).

Other countries have already begun to re-evaluate their systems of controlling the burden of drug use. Portugal notably instituted a de facto policy change in 2001 that saw the possession of all forms of psychotropic substances decriminalised (the production and supply of these drugs is still an offence) in conjunction with a holistic plan to mitigate risks associated with drug consumption (10). Now, 10 years on, the policy appears to be a successful one. While supporters of prohibition will cite that the lifetime drug use rates increased by as much as 50% in Portugal, it is often neglected that the proportion of the community reporting recent drug use (within 3 months) and current drug use (within 7 days) have actually been maintained or decreased since the enactment of the new drug policies (10, 11). These two statistics in conjunction suggest that while drug use may be tried experimentally, exposure is often brief and does not affect the long-term rates of drug use in the country. The most tangible measure of policy success was the notable decrease in direct drug related mortality by 95%, representing a reduction from nearly 400 deaths per annum pre-2001, to fewer than 20 in the latter part of the decade (11). This drop has been facilitated by policies that allow patients to receive the health and well-being services they require free of persecution or prosecution that underpins so much of drug-related harm.

The Australian NDS is devoid of the scrutiny so essential in devising most policies in today’s enlightened age of evidence-based practice and instead remains rooted in the adage of the 70s where moral absolutism reigned supreme. This inadequacy of the NDS can be recognised by its inability to stem the supply or demand for drugs and the ongoing potentiation of the drug-related harm. “Prohibition is a cure that makes the disease worse. It aims to stop the use of drugs, but instead, it glamorises drug use. It aims to morally improve the drug user but instead it corrupts society” (6).

Now is the time to break the taboos surrounding drug law, return the issue to the parliamentary agenda and institute an efficacious, cost-effective drug strategy that protects Australians from harm.

Acknowledgements: Nil.

Conflicts of interest: None to declare.

Stock image: George Hodan (publicdomainpictures.net)

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The AAP’s revised policy on routine neonatal circumcision: Critical evaluation and relevance to the circumcision debate in Australia

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Introduction

Male circumcision (MC), the non-therapeutic surgical removal of the male foreskin, has been the subject of considerable debate in Australia and across the globe, given its position at the crossroads of cultural, religious, medical, ethical and human rights considerations (1, 2).

In August 2012 the American Academy of Pediatrics (AAP) announced a change in their position regarding MC of neonates following a critical review of literature. In a change from their previous position that the benefits associated with newborn MC were not sufficient to outweigh inherent risks, the AAP report concludes that the “evaluation of current evidence indicates that the health benefits of newborn MC outweigh the risks; furthermore, the benefits of newborn MC justify access to this procedure for families who choose it” (3). This paper will critically evaluate this recommendation, the evidence outlined in the AAP report, and comment on any relevance to the ongoing circumcision debate in Australia.

Rates of and policies on circumcision

The revised position of the AAP is a significant change from their previous position that MC was not a medical necessity (4), and diverges from the positions of other industrialized nations’ medical bodies, including those of Australia, New Zealand, England, Canada, Finland and The Netherlands (5-8). The positions of relevant medical bodies are summarized in table 1. The Australian Paediatric Association (APA) and The Royal Australian College of Physicians (RACP) hold near-identical positions, that “the frequency of diseases modifiable by circumcision, the level of protection offered by circumcision and the complication rates of circumcision do not warrant routine infant circumcision in Australia” (8). MC was routinely performed in Australia up until the 1950s, when 85% of newborn males were circumcised. Since then the practice has steeply declined – currently only 10-20% of newborn males are circumcised (8). Unlike many other Anglophonic nations, the prevalence of MC in the USA did not reduce drastically over the latter 20th century. Currently approximately 55% of American newborns undergo MC (3) (Table 1).

Abstract

Recent trials conducted in three African countries indicate that male circumcision (MC) significantly reduces the risk of HIV transmission between individuals. In response to these studies, the American Academy of Pediatrics (AAP) amended their position on MC, stating that the health benefits of newborn MC outweigh risks. This paper evaluates the AAP’s new position in light of recent evidence, the context of the American and Australian health landscapes and those of the African studies where the central research was conducted, and the cultural factors that feed into the circumcision debate.

The association between MC and reduced risk of HIV infection relies heavily on the conclusions of three African studies of questionable reliability that assessed high-prevalence communities where the primary mode of transmission is via heterosexual intercourse. Despite this, the AAP report concludes that the protective effect of MC is limited to “reducing the risk of HIV acquisition among heterosexual males in areas with high HIV prevalence”. There is no evidence that MC in low-prevalence areas where the majority of HIV transmission occurs through male-male intercourse, such as the USA and Australia, has any protective effect; therefore there is no reason for Australian paediatric bodies to change existing policies on MC.
The AAP report outlines a range of benefits associated with MC. Particular attention is given to the relationship between circumcision status and HIV status, though links are also demonstrated between MC and reduced risk of urinary tract infection (UTI), syphilis, herpes simplex virus type 2 (HSV-2), human papillomavirus (HPV) and penile cancer (3). While the report concludes that MC provides protection against each of these conditions, the literature underscoring these conclusions is inconsistent. There is often no consensus, and occasionally outright controversy, regarding the nature of the relationship between MC and these conditions, particularly with respect to strength of evidence, causality and magnitude of risk reduction (3, 15, 16). The apparent relationship between MC and HSV-2, HPV and syphilis is particularly unclear, as the evidence given by the AAP fails to demonstrate a consistent risk reducing effect.

The only condition that MC provides significant, consistent protection against, per the evidence outlined by the AAP, is UTIs (17, 18), where the degree of risk reduction is “between 3- and 10-fold in all studies” (3). However UTIs are uncommon in males of any age (19), so the absolute number of UTIs averted following neonatal MC is modest. In one study, it was found that UTI occurs in 1-2 per 1,000 circumcised infants versus 7-14 per 1,000 in non-circumcised infants in the first year of life (20). It follows that 1,000 children must be circumcised to prevent ~10 UTIs, which are simple to treat and rarely produce serious sequelae (8). MC for the prophylactic prevention of UTI, with the inherent risks of surgery, appears excessive.

The association between MC and reduced risk of UTIs in childhood was clearly not a factor in the AAP’s decision to change their stance on non-therapeutic MC as it had been well characterized in past AAP reports. Rather, the change appears to be largely based on three major prospective studies conducted in South Africa, Kenya, and Uganda that showed an association between MC in adult men and reduced risk of HIV infection by 60%, 53%, and 60%, respectively (21-23). The AAP report fails to acknowledge that these studies have been the focus of significant controversy, with questions asked of their methodology, accuracy and external validity. These questions are probed below.

### Risks of adverse outcomes

Complications of MC are rare, and rates vary markedly depending on how adverse events are classified. The AAP report cites rates in the USA of between 0.19 and 0.22%, encompassing skin problems, infections, bleedings, glans injury, and urethral complications (3). Serious complications are exceedingly rare, but even infrequent major complications (the report mentions case reports of amputations, viral transmission and death) are concerning as non-therapeutic MC is never a medical imperative. Regardless, the extent of adverse outcomes is not properly considered in the report as the AAP explicitly chooses not to collate and analyze case reports in their literature review, invariably skewing their findings toward the conclusion that benefits outweigh risks (16).

### Is the AAP report relevant to Australia?

The primary motivator for the change in policy appears to be evidence for a protective role for MC against HIV infection, as determined by three randomized controlled trials (RCT) from sub-Saharan Africa (21-23). However the three African studies have been the subject of much debate – with respect to their methodology (24-26) and external validity (1, 27). The studies have been criticized for being non-double-blinded, non-placebo controlled RCTs, which were terminated prematurely, suffered from multiple forms of bias and had poor follow-up (1).

The AAP report does not go as far as to extrapolate the findings of the African trial to a Western society with a low prevalence of HIV such as the USA. They limit their

### Table 1 Prevalence of circumcision and HIV, and policies on circumcision in relevant countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>Circumcision prevalence (%)</th>
<th>HIV prevalence (%)</th>
<th>Policy on circumcision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>10-20 (8)</td>
<td>0.001 (8)</td>
<td>The RACP have stated that “in low prevalence populations such as Australia and New Zealand circumcision does not provide significant protection against STIs and HIV, and is less effective than safe sex practices” (8).</td>
</tr>
<tr>
<td>USA</td>
<td>54.7-55.9 (3)</td>
<td>0.0038 (8)</td>
<td>The AAP was neutral with respect to circumcision until August 2012, when it concluded “the health benefits of newborn MC outweigh the risks” (3).</td>
</tr>
<tr>
<td>Kenya*</td>
<td>85 (11)</td>
<td>6.3 (11)</td>
<td>MC “is an effective intervention for reducing the risk of HIV and sexually transmitted infections; therefore, safe, voluntary male circumcision alongside other HIV prevention strategies should be promoted in Kenya” (12).</td>
</tr>
<tr>
<td>Uganda*</td>
<td>25 (11)</td>
<td>6.5 (11)</td>
<td>“Safe medical male circumcision shall be an integral part of comprehensive HIV prevention services, sexual and reproductive health care services” (13).</td>
</tr>
<tr>
<td>South Africa*</td>
<td>35 (11)</td>
<td>16.9 (11)</td>
<td>MC is prohibited under the age of 16, unless it is carried out for religious or cultural reasons or is deemed necessary on medical grounds (14).</td>
</tr>
</tbody>
</table>

*The three African countries listed are the locations of key studies that the AAP report draws on. Note the lack of any correlation between circumcision incidence and HIV prevalence (e.g. compare Uganda and Kenya). Superscript parentheses refer to sources.

**Benefits of circumcision**

The association between MC and reduced risk of UTIs in childhood was clearly not a factor in the AAP’s decision to change their stance on non-therapeutic MC as it had been well characterized in past AAP reports. Rather, the change appears to be largely based on three major prospective studies conducted in South Africa, Kenya, and Uganda that showed an association between MC in adult men and reduced risk of HIV infection by 60%, 53%, and 60%, respectively (21-23). The AAP report fails to acknowledge that these studies have been the focus of significant controversy, with questions asked of their methodology, accuracy and external validity. These questions are probed below.
Conclusion regarding the protective effect of MC to “reducing the risk of HIV acquisition among heterosexual males in areas with high HIV prevalence” (3). The nature of the problem in Australia, where HIV is a low prevalence infection largely contained to the MSM population, is poorly matched to the proposed treatment, which has only been shown to have a protective effect on adult men in high-prevalence populations and which has been shown to have no risk reducing effect in MSM (27-30). Further, since the benefits of MC are risk-reducing not risk-eradicating, unprotected sex with an HIV-positive individual still warrants condom use. As Darby and Van Howe (2011) note, “If it is still necessary to wear a condom there seems little point in getting circumcised” (1). Given that the treatment is a poor match for the nature of the disease in Australia, and prophylactic use is required to ensure non-transmission regardless of circumcision status, a more appropriate use of resources should be to fund to condom provision, needle programs and sex education in order to change risky behaviour. As the Royal Dutch Medical Association concluded, “behavioural factors appear to play a far more important role than whether or not one has a foreskin” (7).

Conclusion

The AAP’s conclusion that the benefits of MC outweigh risks appears premature or inappropriate given the strength of evidence and the many disparities between the context of the African trials and the Western health world. As the RACP statement on circumcision submits, “It is still not clear that findings from African studies, where the predominant mode of HIV transmission is heterosexual intercourse, can be extrapolated to Australia and New Zealand or other western countries, which have much lower rates of HIV infection and where the predominant mode of transmission is penile-anal sex among men” (8).

Neonatal MC is not analogous to a ‘surgical vaccination’ in the context of Australia (31). Rather, MC should be treated as any other surgery – an intrusive procedure that has specific indications, presupposes inherent risks, and is performed on the balance of medical ethical principles. Delaying decisions regarding neonatal MC until the patient is able to offer their own informed input affords the greatest respect for autonomy and informed consent, and allows the patient to consider cultural, social and religious factors for himself. The only benefit conferred by MC that a non-circumcised child foregoes is the risk-reduction for childhood UTIs, but these are easily treatable. In adults, prophylactic MC should be considered by sexually active men at high risk of HIV transmission, in tandem with condom use and risk-reducing behaviour.

That the AAP reached a different conclusion to the representative paediatric and medical bodies of other prominent industrialized nations is curious. Perhaps social, cultural and religious factors were given undue weight in order to rationalize an already widespread practice in America, whereas the same practice is rejected in largely non-circumcising countries, as suggested by Frisch et al. (2013). It will be interesting to see if the literature bears out the suggested protective roles for MC in the future, and how these advances impact the circumcision debate.

Acknowledgements: Nil.

Conflicts of interest: None to declare.

A proposal to screen for childhood obesity in Australia: The ‘Healthy Children Healthy Futures’ program

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Childhood obesity

The prevalence of childhood obesity in Australia has risen markedly over the last 30 years (1). Obesity in childhood can result in short-term consequences such as ‘discrimination, victimisation and teasing that can affect psychological wellbeing’ as well as physical health problems such as early onset type 2 diabetes mellitus, hypertension, and high cholesterol (2). Obese children are also more likely to become obese adults (3); thus, long-term consequences of childhood obesity include health problems associated with adult obesity such as type 2 diabetes mellitus, cardiovascular disease, and some cancers (2). Childhood obesity is therefore a significant contributor to morbidity, mortality, and the overall burden of disease in Australia. The rapid increase in childhood obesity rates in recent decades has largely been due to the simultaneous and equally rapid changes in Australian society. For example, the increased availability and use of motorised transport and constant access to television and video games has led to a more sedentary lifestyle than in the past (4). Changes in the food market such as increasing globalisation have led to an increase in the availability of soft drinks and energy dense foods (5). Addressing these environmental factors will require significant, widespread and fundamental primordial preventative strategies, which are beyond the scope of this report. Instead, this report outlines the patterns and burden of childhood obesity in Australia, and presents a proposal for a new strategy to prevent childhood obesity at the secondary level: the ‘Healthy Children Healthy Futures’ (HCHF) Program.

Patterns of disease

In Australia, childhood obesity is ‘rising at an annual rate of 1%’ (7). Between 1986 and 1995, the prevalence of overweight and obesity in children aged 7-15 years doubled to 20-25% (8). Since 1995, levels of childhood obesity have continued to increase. In children aged 5-12 years, the prevalence of obesity has risen from 21% in 1995 to 23% in 2007-2008; and in children aged 13-17 years there has been a greater increase in prevalence from 21% to 29% in the same time period (2). The prevalence of obesity increases as the age of children increases (10). Thus, preventative strategies are best implemented early in childhood before children become overweight. However, at present, approximately one quarter of Australian children are already overweight (9). These children may have missed out on early preventative strategies, but it is not too late to implement secondary preventative measures to reduce the long-term consequences of obesity. Existing preventative strategies are not enough to combat rising rates of childhood obesity.

Burden of disease

Obesity is responsible for 7.5% of the burden of disease in Australia, placing it third behind smoking and high blood pressure (10). In younger age groups, the morbidity and mortality attributable to obesity may be small. This is because many of the health consequences of childhood obesity happen later in life. Thus, obesity is a significant contributor to the burden of disease throughout the lifespan, and as age increases, attributable morbidity and mortality also increase. In 2003, 7.2% of total deaths and 7.5% of Disability Adjusted Life Years (DALYs) were attributable to high body mass (10). Obesity is estimated to cause 23.8%
of type 2 diabetes mellitus; 21.3% of cardiovascular disease; 24.5% of osteoarthritis; and 20.5% of breast, colorectal, uterine, and kidney cancers (11). The cost of obesity-related disease in 2005 was $1.2 billion; when lost productivity is included, this figure increases to $21 billion (9). Prevention is the best way to minimise the burden of obesity.

Strategies to minimise morbidity and mortality attributable to obesity

Many strategies for reducing childhood obesity have already been put in place, each with varying levels of success. Some of these strategies aim to intervene at the primordial and primary levels by reducing underlying societal influences that lead to increased risk factors for childhood obesity such as lack of physical activity and poor diet. An example of one of the more successful measures is the Brisbane City Council’s ‘School Travel Program,’ which includes a walking school bus and campaign to encourage children to walk or cycle to school. The ‘School Travel Program’ resulted in a 19.1% increase in children walking to school from 19% in 2008 to 38.1% in 2009 (12). At the primary level, the Australian Government has implemented a ‘Healthy Kids Check’ program in which all four year olds are offered a check up by a General Practitioner (GP) (13). This primary prevention program aims to detect children with risk factors for obesity, such as poor diet and a sedentary lifestyle, and intervene by helping parents modify their child’s lifestyle before they become overweight or obese. While the ‘Healthy Kids Check’ program does screen for risk factors for obesity in young children, it does not screen for overweight and obesity in older children. The ACT’s ‘Kindergarten Screening Program’ is one of the few secondary preventative strategies for childhood obesity in Australia. The program includes a BMI measurement for Kindergarten children; however, this data is primarily used to monitor rates of childhood obesity and evaluate the success of other preventative measures, rather than offer tertiary prevention for the children detected by screening (14). At present, Australia does not have an organised national screening program for childhood obesity. There is a national guide for tertiary prevention: the National Health and Medical Research Council’s ‘Overweight and Obesity in Children and Adolescents: A Guide for General Practitioners’ (GP Guide). This guide outlines tertiary prevention strategies including treatment for the complications of obesity such as hypertension and type 2 diabetes mellitus, as well as strategies for healthy weight loss (15). However, identifying children who require this tertiary prevention is opportunistic and relies on GPs identifying overweight and obese children who may present for different reasons. Many children are missing out because there is no screening program to detect them.

A proposal for secondary prevention through screening: The ‘Healthy Children Healthy Futures’ program

There is a lack of secondary prevention for childhood obesity in Australia. According to the World Health Organisation’s (WHO) criteria for population screening, a condition must be important, have a latent or early symptomatic stage, and the natural history should be well understood in order to qualify for screening (16). Childhood obesity meets these criteria: it is an important condition because it contributes significantly to the burden of disease in Australia (10); the early stages have few symptoms except excess body fat; and the natural history is well established: if left untreated, the condition can lead to type 2 diabetes, hypertension, and some cancers (2,3). Thus, a screening program for childhood obesity is warranted. Children who are already overweight or obese need to be identified through screening so they can be offered tertiary prevention to minimise the long-term health consequences of obesity. This report proposes a new strategy for the prevention of childhood obesity. The proposed screening program should hypothetically be called the HCHF Program. While existing strategies focus on prevention from the primary and tertiary levels, the HCHF Program would be a secondary prevention program for childhood obesity in Australia. It would complement existing strategies, and could function as an extension of the ‘Healthy Kids Check,’ and a precursor to tertiary preventative strategies currently implemented by GPs.

Ideally, the HCHF Program should be trialed in different communities in Australia to assess its effectiveness for different socio-economic, geographic, and ethnic groups. During trials of the HCHF Program, screening should be offered to 5-, 10-, and 15-year-old children to evaluate the effectiveness of the program in different age groups. Screening should be limited to small groups during the trial phases to avoid overwhelming GPs with follow-up requests. The HCHF Program should encourage parents to screen their children at home to avoid children suffering potential embarrassment at being measured and weighed at school (17). Screening kits would be mailed to parents of children in the appropriate age groups. The kits would contain letters to parents explaining the nature of the screening program and benefits of participating, including access to tertiary prevention. The kits should ask parents to calculate the BMI of their child. Children who do not fit into healthy BMI ranges would then be encouraged to attend an appointment with their GP who could then implement a tertiary prevention program.
obesity meets the WHO criteria for screening, and therefore warrants a nation-wide screening program. This report proposes the HCHF Program: a hypothetical secondary preventative strategy which links existing primary and tertiary preventative strategies for childhood obesity. The HCHF Program itself also fulfills the WHO criteria for screening, and would therefore be a worthwhile addition to current preventative strategies for childhood obesity in Australia, leading to significant reductions in morbidity, mortality, and the burden of disease attributed to childhood obesity in Australia.

Acknowledgements: Nil.

Conflicts of interest: None to declare.

Stock image: Petr Kratochvil (publicdomainpictures.net)

3. Australian Institute of Health and Welfare. Australia’s Health 2010 [Internet]. 2010

MSJA • Volume 5 Issue 1 • 2013
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Treating by force: The ACT’s amendments to involuntary mental health care in patients with acute mental illness

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Mental health laws in the Australian Capital Territory (ACT) arm doctors with the ability to forcibly detain and treat consumers who are suffering from acute mental illness and are at risk or pose a risk of harm. The issues of consumer rights, statutory protections for doctors and protection of the community from mental illness related violence has been a long standing one. Throughout the history of mental health law in Australia, the ethical conundrums have never been fully perfected. The ACT has attempted to ameliorate the situation by amending the mental health laws to require practitioners to undertake capacity and risk assessments and justify involuntary treatment on capacity and risk. This article considers how these amendments could affect current involuntary mental healthcare and whether or not the ethical situation is ameliorated at all.

The amendments

For over four years, the ACT has been reviewing its mental health laws with rigorous community, stakeholder and consumer consultation input within the reform Bill. Provisions within the latest iteration of the exposure draft Bill, entitled the Mental Health (Treatment and Care) Amendment Bill 2012 (“the Bill”), are still being deliberated.

What do the proposed amendments change?

The proposed amendments, which differ from the status quo, seek to explicitly recognise the rights of people living with a mental illness by requiring decision makers to actively consider those rights when making mental health treatment and care decisions. The proposed amendments require that mental health consumers subject to the amendments should “determine, and participate in, their assessment and treatment, care or support, taking into account their rights[... ] in the least restrictive way possible (1).”

In contrast with the current law, the amendments specifically require practitioners to undertake a capacity and risk assessment of the consumer who was conveyed to, or attended, the emergency department/facility due to concerns for the safety of the consumer’s wellbeing. Although practitioners must undertake capacity assessments of patients as a matter of standard practice, there is evidence to suggest that assessments are not always performed at the level required by the Bill.

What have been some consequences of practitioners failing to make these assessments in the past?

With respect to involuntary mental health care, a capacity assessment is critical in establishing the status of the consumer, and the appropriate treatment plan. When performed inadequately, capacity assessments can contribute to the stigma attached to the consumer, and, can adversely impact upon the right of the consumer to make decisions regarding his/her care and treatment. If the capacity assessment is wrong, or is conducted using improper forms or
procedures, it can have serious implications for the consumer, and his/her ability to exercise his/her rights. Additionally, it could have grave implications for the practitioner who risks being charged with false imprisonment and/or unsatisfactory professional performance. (Health Practitioner Regulation National Law Act 2010 (ACT)). In order to understand the nature of capacity assessments, it is important to examine them closely.

**Capacity assessments**

Unfortunately, the Bill itself provides no guidance on how capacity is to be assessed. There is no evidence to suggest why the drafters omitted this, but a reasonable hypothesis could be that the omission was intentional so practitioners would not be bound to potentially impractical realities.

The Bill is silent on the preferred method for capacity assessments but the extrinsic materials, that is the Explanatory Statement, is explicit. It provides that decision making capacity includes “the ability to:

1. Understand the available options,
2. Understand the consequences of choosing from those options and
3. Clearly communicate a decision (2).”

In order to satisfy capacity to consent, a doctor must at the very least, examine the patient with these three abilities (above) in mind. However, despite having capacity, a

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![Figure 1](image-url)

**Figure 1** Risk assessment tool examining 20 risk factors which are divided into 3 groups: past, present and future risk factors.
practitioner can still order involuntary treatment if the practitioner determines there is a serious risk of harm to the consumer or the community (2).

**Risk assessment**

According to the Bill, a person with capacity may still be involuntarily treated if he/she is deemed to pose a risk of serious harm, that is, act violently towards others or harm themselves (2). However, the Bill and the Explanatory Statement are silent on what risk assessment should be undertaken in order for a doctor to have properly executed an involuntary treatment order. To preserve the autonomy and the rights of the person with mental illness, risk assessment should be conducted in line with the principles of the Bill (1). Currently, clinical judgement has been approved by the ACT Civil and Administrative Tribunal (‘ACAT’) seised of its Mental Health jurisdiction, with respect to risk assessment. What could be more in line with the “recovery approach”, however, is structured professional judgment which involves a combination of actuarial science and clinical judgment. An example is the HCR-20 Violence Risk Assessment Scheme developed by Webster, Douglas, Eaves and Hart in 1997. This risk assessment tool examines 20 risk factors which are divided into 3 groups: past, present and future risk factors (3). This is illustrated by Figure 1.

Dr Kevin Douglas, a specialist in violence risk assessment, found the more risk factors a person possessed in the HCR-20, the higher the probability for the person to act violently (3). In using such a risk assessment algorithm, risk can be assessed more accurately than using clinical judgment alone as it adds an objective element to the clinician’s subjective assessment. In this way, the mentally ill patient is not simply deemed a risk by virtue of his mental illness, but rather, he is given a risk score which can justify detention and treatment. Douglas suggests that this risk assessment tool should be used when making risk assessments of involuntary mental health consumers.

**The ethical position**

The law justifies involuntary treatment and detention of a mentally ill person not on the basis of a wrong being committed; but rather the threat the patient poses to himself or others (4). The nature of mental illness means it has allowed/allows for an imbalance of power between the patient and those treating him. This power-imbalance, coupled with the option of coercive treatment opened up the possibility for abuse.

In order to prevent abuse, the notion of consent to treatment arose. Australia first saw the issue of consent in relation to mental healthcare in 1977. The Foster Committee’s ‘Inquiry Into Psychosurgery’ report recommended, inter alia, that a surgeon must obtain the patient’s informed consent before psychosurgery is commenced (5).

A person’s consent, however, can be overridden when there is a risk that the subject person could either harm themselves, or perhaps even worse, harm someone else. This is implicit in contemporary (post 1980s) mental health law which provides the “right to be quietly mad” (6). This “right” means that neither the State nor doctors can detain a person for treatment simply because that person had a mental illness (6). In order to treat and detain a person, the person has to exhibit behaviour that would “likely lead to violence (6).” This behaviour includes attempts at suicide or attempts of serious harm or violence against a third party (6).

Upholding the right to freedom and choice of the individual becomes difficult because with the existence of a mental illness and a calculation/estimation of potential risk, a person can be treated against their will, have restrictions placed on their liberty and right to associate with others, and/or be detained at a mental health facility (7). In these instances, a patient is often in dire need of treatment, and an emergency order may save that person’s life. Ethically this action that at once appears to limit the patient’s liberty and freedom might actually be justified on the basis that the treatment provides a “freedom” – freedom from the symptoms of acute mental illness – to the patient.

**Conclusion**

The proposed changes to the current Mental Health law attempt to align with ethical best practice. However, the changes fall short of what they could ordinarily achieve because the focus remains upon the danger the mental health consumer presents to society. Furthermore, the Bill is silent on how capacity assessments should be properly undertaken. This could lead to capacity assessments not being performed adequately. The result could be that the objectives of the Bill are a hollow victory for law reformers.

Acknowledgements: Nil.

Conflicts of interest: None to declare.

Stock image: Microsoft Office

1. (Second Exposure Draft) Mental Health (Treatment and Care) Amendment Bill, 2012, (Legislative Assembly for the Australian Capital Territory) s 7; s 59; s 60; s 63(3); s 64(2); s 77, 8, 9, 91.
2. Draft Explanatory Statement, Mental Health (Treatment and Care) Amendment Bill, 2012, (Legislative Assembly for the Australian Capital Territory) 3; 3; 4.
7. Mental Health (Treatment and Care) Act of 1994, Legislative Assembly for the Australian Capital Territory, ss29(1), 31, 35, 36A, 36B.
Ethical aspects of the STrategic Reperfusion Early After Myocardial infarction (STREAM) study

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Case study

Mr. JS is a 63-year-old man living with his wife in a capital city. While watching television with his wife, he became diaphoretic with severe retrosternal chest pain accompanied by shortness of breath. After ignoring the pain for approximately 30 minutes, his wife called an ambulance. Mr. JS was previously healthy and had no regular medications, though he had not seen his GP in years. His initial vital signs included a heart rate of 102 beats per minute, blood pressure of 144/94 mm Hg, and a respiratory rate of 20 breaths per minute. Paramedics performed a 12 lead electrocardiogram (ECG) that showed 3 mm elevation in leads II, III, and aVF. Upon making this determination and confirming that there were no exclusion criteria, the paramedics presented Mr. JS with a three-page consent form, asking him to sign so that he could participate in the Strategic Reperfusion Early After Myocardial Infarction (STREAM) study. Not fully understanding, but also not wanting to delay his care, Mr. JS signed the consent form. As per the study protocol, Mr. JS was randomised and was assigned to the treatment group. Mr. JS therefore received tenecteplase from the paramedics in the ambulance rather than the conventional therapy of primary percutaneous coronary intervention in hospital.

Understanding the study intervention

To be able to truly understand the study intervention, it is essential that we first begin by considering the current treatment for myocardial infarction (MI). The initial management of ST-elevation MI (STEMI), which often takes place in the ambulance or in the patient’s home, includes oxygen, aspirin, glyceryl trinitrate (GTN) spray, and morphine (1). An antiemetic is often administered with morphine (2). Of these interventions, only aspirin has been shown to improve patient outcomes (1). Though the universal use of oxygen is not discouraged in some guidelines (1), the current Australian Resuscitation Council (ARC) guidelines recommend limiting the use of oxygen for MI to patients who are breathless or have low oxygen saturation levels (3). Concurrent with these first line treatments, a 12 lead ECG should be obtained and reviewed to make the diagnosis of a STEMI and to guide further treatment. Clopidogrel complements the antiplatelet action of aspirin and will also be administered in addition to aspirin (3). This combination has been shown to improve patient outcomes regardless of the type of reperfusion they receive with no significant risk of increased bleeding (1, 3).

These initial therapies primarily help to manage pain and some reduce mortality from the MI, but even aspirin and clopidogrel do not correct the problem of the thrombus blocking a coronary artery. The ultimate goal in treatment for patients with STEMIs is reperfusion. By quickly restoring blood flow, damage to the heart can be minimised. Determining the optimal method for restoration of blood flow is where the management becomes more difficult and an ethical dilemma with consent for MI research arises. The two basic options for reperfusion are thrombolytic medications or percutaneous coronary intervention (PCI). The thrombolytic medications, such as tenecteplase, act by activating plasminogen to plasmin to degrade fibrin. Because thrombolysis can actually trigger increased thrombin activity, enoxaparin or unfractionated heparin (UFH) is given along with the thrombolytic agent (3, 4). PCI is more invasive and involves threading a catheter, usually through the femoral
The debate between whether reperfusion by thrombolysis or PCI is more superior is complex. When it is available, immediate PCI is the optimal treatment for STEMI (1, 5-7). This is illustrated by findings that show that PCI has a 95% success rate at restoring blood flow while thrombolysis are only 54% successful (8). The challenge is that most systems are unable to meet the time guidelines for prompt PCI, with patients often experiencing long delays to PCI after presenting with STEMI (9, 10). These delays have been associated with a 10% increase in relative risk of death for every 30 minute delay (11). This has prompted some to suggest that even though PCI is superior to in-hospital thrombolysis, immediate thrombolysis prehospitally may be better than PCI since this could have the patient reperfused an hour or more earlier than if they were to wait for PCI. This interesting suggestion has led to clinical trials that involve the use of prehospital thrombolysis for STEMI.

Facilitated Intervention with Enhanced Reperfusion Speed to Stop Events (FINESSE) was a large trial that examined an approach of facilitated PCI, trying to combine the benefits of early reperfusion from thrombolytics with the proven superiority of PCI (12). They compared “facilitated” approaches to PCI with standard PCI, using either abciximab plus half-dose reteplase or abciximab prior to PCI. Their results showed that the facilitated PCI strategy did not improve patient outcomes compared to standard PCI and was associated with more episodes of bleeding. One particular limitation of this trial was that it included patients up to six hours after the onset of pain when they may have been less likely to benefit from reperfusion. A modest but non-significant trend towards better outcomes in patients who received reteplase was seen in the study (12). The STREAM trial builds off FINESSE by focusing on these early presentations (less than three hours after pain onset) and comparing prehospital fibrinolysis to conventional PCI (13).

**Ethical considerations**

This case is a challenging example of the need to respect patient autonomy, particularly in regards to research participation. Issues around research participation and patient consent are ethical dilemmas commonly encountered in the prehospital setting (14). To respect his autonomy, Mr. JS is being asked to provide his informed consent to participate in the research trial. Given his current medical condition and the complexity of the proposed trial, his capacity to give consent and his ability to be truly informed in understanding the study intervention are both questionable. This is occurring while Mr. JS is actively having an infarction, with each minute delay contributing to increased mortality (15), therefore placing this decision under significant time constraints that further reduce his autonomy (16). Given the complexity of the study and the time constraints in this emergency setting, it seems extremely unlikely that a patient like Mr. JS would ever be able to give true informed consent.

Informed consent is one of the requirements specified in the Declaration of Helsinki that outlines the ethical principles for research that involves human subjects (17). In order for informed consent to be obtained, the patient must be provided with information on their diagnosis and the proposed treatment including the purpose, risks, and alternatives. The expected outcome if the treatment is refused should also be explained (18). The exact amount of information that needs to be disclosed for a patient to provide informed consent is less clear, but it is generally accepted that it should be to the level that a “prudent patient” would consider to be important (19).

In addition to being informed, the patient who is being asked to give consent must have capacity to make this decision (18). A full discussion on capacity assessment is beyond the scope of this article, but capacity generally means that the patient is able to understand all the relevant information and its implications. They should also be able to make a decision that they can communicate to the treating clinician. Patients who are actively having an MI may also be temporarily reduced in their cognitive abilities and therefore not competent to give informed consent (20). This likely contributed to the findings of one review of consent for MI trials that showed that in 11-43% of cases, patients had no or almost no recollection of giving consent to participate (21). One study of MI patients enrolled in research trials found that only 18% of patients actually read the informed consent page before signing (22). Other factors such as anxiety, fear, pain, and narcotic administration may also play a role in reducing the patient’s capacity to make informed decisions about clinical trial participation (22). Additionally, the prehospital care environment puts the patient in a particularly vulnerable position where they are dependent on the paramedics and may feel unintentionally pressured to consent to the proposed trial (16).

Even if a patient was not in the significant portion of patients
whose cognitive capacity or other factors prevent them from being competent to make a decision, the complexity of the trial may prevent their decision from being truly informed (23). The informed consent form for use in the STREAM trial that Mr. JS was enrolled in is three pages long, with the full title alone stretching for 50 words. After reading it, one cannot help but feel as though the goal of the consent form is to obtain a signature rather than true informed consent.

It is clear that there are pros and cons to the principle of autonomy in cases like this. Though autonomy is important for respecting an individual patient’s rights, it risks impeding research progress overall. Trying to obtain informed consent also delays treatment for all patients (both treatment and control groups). It has been argued that informed consent may need to be set aside for these trials to continue in the future, potentially using a waiver of consent design as is commonly used in cardiac arrest research instead (16, 21, 24). A more ethically sound approach may be to reconsider Zelen’s single arm design, which involves informed consent for only those patients who will be receiving the new therapy (25, 26).

Clearly, there is a difficult balance that must be found in respecting individual an patient’s autonomy without allowing this principle to stop the research and progress in improving overall MI care.

These trials have significant ethical issues but are essential to improving our ability to treat MI by providing an answer to the key question of whether prehospital thrombolysis is superior to waiting for PCI in hospital. Without this research, the progress that we have seen in reducing mortality from MI in recent decades will surely decrease. Despite the importance of the research, investigators must carefully consider the ethical aspects of these trials. It is clear that true informed consent is often not being obtained. Future clinical trials must recognize the vulnerable position of patients and should include increased efforts to truly obtain informed consent. Alternatively, novel study designs should be used to reduce the ethical implications of these trials while allowing this essential research to continue.

Acknowledgments: I am grateful to the STREAM researchers for providing a copy of the prehospital consent form template.

Conflicts of interest: None to declare.

Stock images: Microsoft Office

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OPINION

Applying biomedical ethical principles to issues of animal welfare

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Effort should be made to avoid anthropomorphising an animal’s experience of the world. However, an individual experiencing the world is ethically considered valuable in and of itself (5). In this sense, in situations where the interests of humans and the interests of animals are in conflict, one argument is that we are ethically obliged to take into account the welfare of all sentient beings (5). Many philosophers argue that consciousness, that is, awareness and experience of the world, implies inherent value in the life of all animals and consequently there is no justifiable ethical basis for speciesism (5, 6). One of the striking findings to emerge from modern genetic science is the refutation of a distinct and marked genetic boundary between species (7). We share almost all of our genes with chimpanzees and half of our genes with fruit flies (8). The very definition of ‘species’ is variable and, some argue, carries no moral weight (8). Humans mass produce livestock for global consumption and experiment on millions of animals every year, yet at the same time we are theoretically capable of intellectually analysing the ethics of these processes. Factory farms are deleterious to the environment, as well as to human and nonhuman life. The pain and stress endured by factory farmed animals and by animals subject to live export is not critical to our own survival. Indeed, it is argued that factory farming makes little sense, as the net weight of food required to feed the billions of animals imprisoned far exceeds the weight of the meat produced (9). Medical practitioners and students of medicine are trained to be ethically engaged both in their work and the outcome of their work for those who seek their expertise. Their voice in this area is crucial, in that ethical reasoning underpins their daily existence. Why should their ethical engagement extend to human beings and no further?

Cruelty in biomedical research

Few, if any, biomedical researchers would argue that animal research should be conducted outside of a reasonable ethical framework. What needs to be discussed and agreed-upon, however, is the precise definition of ‘humane’ versus ‘cruel’ treatment of animals used in research (10). The ethically bound biomedical community strictly upholds ethical principles in their dealings with humans. Should these same ethical principles be applied by the medical community to the treatment of animals? Animal protection issues that provoke moral concern in the community include, but are not limited to, the use of animals in biomedical research and the treatment of factory farmed animals for human consumption (2-4). From an ethical perspective, we may argue that the moral separation of humans from other animals is purely arbitrary and, perhaps, irrational. This article intends to encourage people invested in the field of medicine to increase their awareness of the pursuit of animal rights and welfare within the framework of biomedical ethics.

Abstract

Biomedical ethical principles are the cornerstone of modern medicine as they protect those seeking medical care, while empowering medical professionals (1). The ethically bound biomedical community strictly upholds ethical principles in their dealings with humans. Should these same ethical principles be applied by the medical community to the treatment of animals? Animal protection issues that provoke moral concern in the community include, but are not limited to, the use of animals in biomedical research and the treatment of factory farmed animals for human consumption (2-4). From an ethical perspective, we may argue that the moral separation of humans from other animals is purely arbitrary and, perhaps, irrational. This article intends to encourage people invested in the field of medicine to increase their awareness of the pursuit of animal rights and welfare within the framework of biomedical ethics.

“Animals are not brethren, they are not underlings; they are other nations, caught with ourselves in the net of life and time.” – Henry Beston
nociception (12). Further examples of unreliability come from research conducted on thalidomide in the 1950s and 60s, and by the pharmaceutical company Tegenero in 2006. In these examples, much animal testing failed to predict disastrous drug effects in humans. Additionally, the UK Committee of Safety Medicines found that only 25% of harmful effects found in animal testing occurred in humans (13). There are countless examples of extreme discomfort, pain and harm experienced by animals at the hands of biomedical researchers. Can we be ethically responsible only 80% of the time? The treatment of animals for experimentation is sometimes justified from a utilitarian perspective declaring that humanity’s long-term benefits outweigh the trauma inflicted; that the moral imperative to assist humanity outweighs the moral imperative to protect other animals from suffering (14). Yet, there is a growing ethical concern not just among philosophers but physicians too (see Physicians Committee for Reasonable Medicine: www.pcrm.org) that the moral separation of humans from non-human animals is profoundly unreasonable.

In terms of biomedical animal research, a variety of laboratory alternatives may be underutilised due to a lack of awareness that animals can be replaced, or due to practical and economic complications of using a non-traditional method of research (11). Some well-publicised alternatives include ex vivo methods on human tissue obtained post-mortem and surgical procedures on human organs (13). They also include experiments involving reconstituted human epidermis (one of the most successful in vitro models), as well as other laboratory-grown cellular structures such as livers, kidneys and neural pathways (15). Such non-animal alternatives are highly relevant, not least because pharmaceutical agents can be directly tested on the target material. Recently there has been some move toward appreciating animal ethics within pharmaceutical companies. Proctor & Gamble have committed to reducing animal experiments to 1% of all toxicology tests (16). Countries that are part of the organisation for economic co-operation and development (OECD), like Australia, tend to have stricter animal ethics guidelines than non-OECD nations (11). Australian efforts to increase the prevalence of biomedical research without the use of animals will undoubtedly increase awareness of such methods within scientific communities across the world. Indeed, one could argue that in many cases, animal research is now an economic and scientific short-cut to prevention and treatment of health problems in humans. We are moving toward a time when much of the animal experimentation conducted is becoming out-dated and unnecessary. For example, the use of rhesus monkeys in visual cortex experimentation can give little insight into human anatomy due to significant organ variations (17). However, these primates are the most common experimental subjects in this area. Not only do these animals pay the price of inhumane treatment, but the price we pay as students and biomedical professionals is an ethical dissonance that cannot be rationally resolved.

**Meat in the human diet**

Concern for animal welfare extends beyond issues surrounding research experimentation with extensive developments also being made in our awareness of the ethical principles violated by the meat industry. The meat industry and the treatment of animals within it should be regarded with considerable alarm by all individuals in society, including students and medical professionals who aspire every day to ethical dealings with others. In terms of environmental impacts, animals used by the meat industry exist in numbers large enough to alter the planet’s climate by their methane emissions (18) with scientists suggesting that up to 300,000 people die each year from climate change-related effects (4). Animal welfare is grossly lacking in the meat production industry. Factory farming is concentrated animal farming. Each year over 10 billion chickens and half a billion turkeys are factory farmed in the US. The birds are genetically altered to grow bigger and faster — to a point where they can no longer walk under their own weight. They are given large doses of antibiotics to stave off the inevitable infections arising from such crowded conditions. The birds are taken to slaughterhouses in crates and tied to a conveyor belt where they will be dumped in electrified water before having their throats cut with a mechanical knife. Some survive the procedure before being submerged in boiling water (19). The meat industry is now at a point where increased production occurs at the gross expense of quality of life of animals. Our very capacity to reason, empathise and morally engage at an individual and communal level should be justification enough to compel a deeper consideration of meat consumption. Not only might a vegetarian or vegan diet be considered a relatively ethical one, but adhering to a non-meat diet decreases the likelihood of developing type 2 diabetes and coronary heart disease (20).
Conclusion

Historically, many Western philosophies celebrate anthropocentrism due to the human being’s capacity to reason and morally engage. However, it is ethically unreasonable to claim that these capacities elevate us above other life forms. If nothing else, our capacity to function ethically confers a responsibility to protect the rights of all sentient life. It is not ethical to infringe on the rights of animals simply because it is lawful. Animals used in research or the meat industry cannot be described as being treated humanely, if their lives are subjected to inhumane and cruel treatment. As students and practitioners of medicines we are ethically bound to uphold ethical principles in our dealings with humans. We must consider whether these principles are inconsistent with our treatment of all sentient beings.

Acknowledgements: Nil.

Conflicts of interest: None to declare.


MSJA • Volume 5 Issue 1 • 2013

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The introduction of plain packaging laws in December 2012 was a massive public health win against tobacco smoking. Plain packaging is a nightmare for the tobacco industry. The pack has changed from a colourful advertisement of the cigarette brand to an ugly box with repugnant health warnings. This deglamourises smoking among children and teenagers and should further reduce the rate of smoking among Australians over time (1).

But plain packaging is no magic bullet. It was never intended to make hard-core smokers give up overnight. Plain packaging merely expands the suite of tobacco control measures that have been introduced since the 1960s. So where do we go from here?

Smoking undeniably kills. We should certainly do everything we can to discourage it. Smoking causes more than one in ten deaths in Australia (2). It drastically increases the chance of getting heart attacks, lung cancers and a myriad of other diseases (3). In fact, it is hard to think of an organ that tobacco does not affect. Smoking also has massive economic and healthcare costs. The social costs of tobacco smoking in Australia was estimated to total $31 billion in 2004–05, or 3.4% of gross domestic production. We should undoubtedly aspire to make smoking history.

The literature provides endless options on potential strategies to control tobacco (4, 5). They range from restricting sales to specific outlets, to extending smoking restrictions, to changing the cigarette itself. But given the significant costs of smoking, should the government just ban smoking altogether?

Probably not. The existing campaign against smoking has been successful because it is based on science and evidence (6). Most importantly, the measures have been realistic and viable. A complete ban on smoking excessively punishes existing smokers and is unlikely to work because it would be very difficult to enforce. It can also create a black market for tobacco products. This is in fact what happened in Bhutan in 2004, when it became the first country in the world to ban the sale of tobacco altogether (7). Tobacco products started appearing in the black market and being sold at inflated prices. Worst of all, people continued to smoke. In clubs and pubs, many defiant Bhutanese made a mockery of the ban.

In 2006, the Ministry of Health found that 24% of Bhutanese children aged 13 to 15 had used a tobacco product in the last 30 days, and 16% had smoked a cigarette (7). As a World Health Organization staff noted at the time, no evidence suggest that a ban would be effective (8). Bhutan shows that an abrupt ban may not stop smoking altogether.

We should also learn from the experience of drug prohibition. Despite prohibition policies introduced decades ago, almost every country in the world still suffers from drug use problems. Over the past two decades, global heroin and cocaine production surged, while prices plummeted (9). This is the opposite of what should have happened. Not only has prohibition been ineffective, it has created huge problems around the world. They include increased violence, crimes, drug overdose deaths, infections and official corruption (8). Drug prohibition clearly did not work.

A total ban is also difficult to justify on ethical grounds. On the one hand, the beneficence principle is at the heart of any tobacco control measure: a tobacco ban aims to save lives and reduce disability. From a resource allocation perspective, a total ban would lead to a fall in health care spending on diseases associated with smoking, freeing up limited resources that can be used in other way. That said, the health care cost savings may be undone by the costs spent enforcing the law. Furthermore, a total smoking ban excessively violates an individual’s right to autonomy. This is arguably too high a price to pay for a measure that is likely to be ineffective. According to the American Public Health Code of Ethics, “public health should achieve community health in a way that respects the rights of individuals in the community” (10). Self determination is a fundamental human right (11).
smokers smoke voluntarily and confine harms to themselves, a total ban would be overly paternalistic. While some existing measures do infringe individual rights, such measures are arguably justified because it protects others. Many of the current smoking control laws, such as bans in public places, is based on protecting bystanders. Similarly, plain packaging is designed to protect our children and teenagers.

The individual costs of a complete smoking ban can also be massive. Unlike other regulations such as compulsory seat belts, being forced to quit smoking is much more than an inconvenience. We need to recognise that many smokers find it extremely hard to quit.

While we should definitely discourage smoking, a ban is not the answer. It would provide ammunition for the tobacco industry to argue that control measures penalise and prosecute smokers. This is untrue and counterproductive for the tobacco control campaign. We need to strike the right balance between reducing harm and respecting autonomy.

Some people may have no sympathy for smokers because they do not understand why someone would willingly adopt such a vice. It is likely that many smokers were unaware of the harms when they decided to take up smoking, as clear evidence of the dangers of tobacco has only become available since the 1950s (12, 13). Smoking was also the norm during the post-war years. In 1945, 72% of Australian men smoked (14). This contrasts with only 16% in 2010 (15).

More can be done to curb smoking. But we need to focus on policies that actually work and can be ethically justified. They include raising taxes on tobacco products, putting more money into media campaigns, and modernising the Tobacco Advertising Prohibition Act 1992 to cover new forms of media (5). We need to provide more support for quitting, especially ones that target Indigenous Australians and lower socioeconomic groups. A comprehensive approach will be much more effective than a piecemeal one.

There may be a time when cigarettes are no longer sold from a standard commercial outlet. But that should be driven by behavioural change, rather than a paternalistic ban. It should result from a culture that ensures smoking is not the norm. Those who choose to smoke have made an informed choice after taking into account the associated risks and costs.

We should undoubtedly continue to scrutinise the tobacco industry, who are knowingly promoting a product that kills. We should certainly continue to protect our children and non-smokers. And we should continue to find new ways to discourage smoking.

But we should not impose a blanket ban on smoking.
Thou shalt not be sick: The influence of religion on health

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Introduction

Medical students are frequently reminded of the importance of assessing a patient’s religious identity during clinical interviews in an attempt to gain insight into how this may alter the patient’s experience of health and illness (1). It is important then for students and health professionals to understand the possible mechanisms by which religious belief, faith and spirituality may influence or impact upon individuals and how this may inform clinical practice and the provision of health related services. The literature suggests that in order for health service delivery to respond appropriately to religiosity, there needs to be continued and tolerant exploration of the complex nature of spirituality’s effect on health (2). Historical tensions surrounding the separation of religion and health suggest that the therapeutic integration of medical practice and faith is key (2), however in a time of evidence-based medicine, it is unlikely that the necessary impetus for this will be attained until more concrete evidence of the impact of religiosity on health has been established. As is briefly explored below, it is important to recognise the possibility that such impacts may not always be described as positive.

Positive influences

In the comprehensive literature review conducted by Townsend et al. (2002), it was reported that a correlation between religious affiliation and the promotion of physical and mental health may be due to a wide range of effects including:

“...promoting positive social and interpersonal function, affirmation of shared beliefs, improving coping skills, resolution of guilt, diminished fear of punishment, the threat of embarrassment and possibility of social sanctions and the desire to emulate the lives of a reference person or group (3).”

In addition, compassionate attitude has also been identified as an important factor in the purported relationship between religion and health, relating to positive psychosocial outcomes including reduced depressive symptoms and perceived stress (4). Traits such as those identified are arguably not exclusive to those with religious beliefs; however, it may be possible to justify that they are more frequently observed in those who identify with a religious institution and/or participate in religious activity.

Specifically, Flannelly and Inouye (5) have examined the relationship between religion, health status, socioeconomic status and the quality of life in human immunodeficiency virus (HIV) positive individuals. Amongst other variables, they determined that religious affiliation and religious faith made significant positive contributions to the individual’s quality of life, as measured with the Quality of Life Index (QLI) (5). Numerous other examples of positive influence can be found in the literature and range from improved optimism and physical health in the elderly (6) to decreased mortality in post-menopausal women (7) and reduced levels of tobacco use (8). The interpretation of studies such as these is complicated by a number of factors. In Flannelly and Inouye’s attempts to determine the impact of religious affiliation and faith, participants’ affiliation was defined as either belonging to an organised religion or not (5). In a modern pluralistic society, oversimplification of religious affiliation to a binary option of yes or no inadequately represents differing intensities and cultural variations of affiliation. The complex examination of individual coping mechanisms was also reduced to having a religious influence or not (5), again falling victim to the fallacy of reification.

Negative influences

There has been extensive discussion in the literature of evidence of a negative effect of religiosity on health. Flannelly et al. (2004) present concepts for how religious beliefs may have a deleterious effect on the mental health of an individual. Firstly, they allude to the possibility that religious belief, most likely in its more devout form, may pose a threat to an individual’s mental health. For example, religious doubt and struggle may be due to a wide range of effects including a fear of punishment, reduced optimism and a feeling of guilt (9). Studies have shown that negative coping behaviours such as these have been associated with decreased clinical outcomes in both physical (10) and mental (11) health. Cases of religious doubt and struggle have
even been found to be associated with an increased risk of mortality (12).

The doctor-patient relationship

In an attempt to understand the effects that religious influences may have on the doctor-patient relationship, research has addressed the relevance of any purported effect of religion on health status through the surveying of physician opinion (13). Physicians have unanimously acknowledged that religion has some level of influence on both individual and community health status, with one of the most predominant opinions encountered being that religion provides a framework by which an individual or community understands illness, thereby having an effect on decision making related to health and illness (13). It is notable that physicians identified both positive and negative aspects of religious belief with a consensus that religion can be seen as beneficial for one’s health status when it offers a means for patients to cope with illness through encouraging a positive outlook, whilst on the other hand, religion can be seen as non-beneficial or even detrimental when it allows for psychological conflict or a clash with medical recommendations (13). The latter is frequently encountered in medical ethics, typified by cases involving patients who identify as Jehovah’s Witness and refuse blood transfusion against medical advice based on their theological beliefs (14).

The conclusions reached through the work of Curlin et al. (2005) state that regardless of the evidence for or against the impact of religious belief on health status, the approach of physicians to religious belief, faith and spirituality in the patient encounter is unlikely to significantly alter. This is due to the fact that it is already widely acknowledged that religion and spirituality can play both a positive and negative role in patient coping mechanisms and for this reason may affect the biological, psychological and social realms of the patient (15).

The role of chaplaincy

An interesting observation noted by Carey and Cohen (2008) is that when looking at the effect of religious beliefs on health care decision making, rather than intrinsic health status, individuals with religious beliefs are more likely to seek help in deliberating treatment options, for example through chaplaincy services. It is reported that the majority of chaplaincy services in health care do not provide advice about treatment options specifically, but instead assist and support the clarification of personal values. This can certainly be seen as a positive opportunity when patients are faced with the need to make health care decisions, particularly those regarding end of life care, however concern may arise as to whether the assistance given remains truly assistive rather than didactic. It is suggested that in order to appropriately deal with this, there needs to be effective training and utility of chaplains. In a society where professions are becoming increasingly subject to regulation, it may be plausible to initiate effective monitoring and accountability measures for chaplaincy services to ensure that decisions in regards to health care remain autonomous and those of the competent patient, free from any force of coercion, including that associated with religious and spiritual affiliations.

Conclusion

Although the literature presents evidence for both positive and negative influences of religion on physical and mental health, the reasoning for both may be viewed independently of religiosity itself and more appropriately examined in terms of individual traits. Future research should not only investigate the association, validity and causality of any relationship between religiosity and health outcomes, but should be refocused to address the prevalence of individual characteristics that may lead to a change in health status such as compassion, positive outlook, maladaptive coping mechanisms and a sense of displaced responsibility. Until research methodology is refined, it is unlikely that a consensus will be reached on the impact of religion on physical and mental health beyond the widespread recognition that patient religious identity plays a vital and complex role in their experience of health and illness and greatly influences individual healthcare related decisions. Despite this, students, health professionals and religious mentors need to continue to acknowledge the importance of religion, faith and spirituality for patients and sensitively address the subtle ways in which this may impact health service delivery and the patient-doctor relationship.

Acknowledgements: Nil

Conflicts of Interest: None to declare.

Mental health perspectives of sexual and gender identity

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October at the Australian National University Medical School marks the beginning of Reproductive and Sexual Health lectures for first year medical students. It was merely a week into these lectures, and we were already astounded by concerning health statistics affecting Lesbian, Gay, Bisexual, Transgender, Intersex and Queer/Questioning (LGBTIQ) communities in Australia. Alongside recognised health issues such as HIV, which is on the rise and largely affects the homosexual community (1), mental health concerns further burden LGBTIQ communities in Australia. Specifically, the disproportionate incidence of depression and suicide in LGBTIQ communities is a distressing reality (2-10). A prevalence study unveiled that suicide rates amongst homosexual Australians can be up to seven times greater than amongst heterosexuals (5). Over the last 50 years, youth suicide rates in Victoria, Australia have increased fourfold for males and doubled for females within LGBTIQ communities (2).

Academic literature around the relationships between medicine, law and sexual and gender identity is dense and complex. Historically, medicine and science have had wide-ranging understandings of sexual and gender-based identity. Dr. Yorick Smaal, an Australian historian and researcher in the field of sexual and gender identity, society and law, kindly agreed to be interviewed for this paper to help deconstruct the complex and multi-factorial mental health concerns affecting LGBTIQ communities in Australia today.

A national survey designed to ascertain patterns of health and wellbeing for gay, lesbian, bisexual and transgender Australians was published last year in the “Private Lives 2” report (11). The Australian Research Centre in Sex, Health and Society at La Trobe University conducted the research in collaboration with Beyond Blue, The Movember Foundation and the Victorian Department of Health. The report brings together a well-established breadth of research that clearly illustrates an increased risk of depression, anxiety, self harm and suicide for LGBTIQ Australians compared to non-LGBTIQ communities, largely arising from experiences of discrimination, prejudice and abuse (12-19). As Dr. Smaal elaborated, “historically, LGBTIQ individuals have been stigmatised as criminal, mentally ill, immoral and dangerous.” Slow-evolving changes to legal definitions and legislation regarding homosexuality further reflect discriminatory perspectives of sexuality and gender identity in Australia. Dr. Smaal acknowledged criminal law and medicine as key ingredients in this discrimination, “Australian law reform did not begin until 1972 and it took a quarter of century for all Australian jurisdictions to remove homosexual offences from the statutes. The American Psychiatric Association only declassified homosexuality as a mental disorder in 1973. Gender Identity Disorder still remains in the Diagnostic and Statistical Manual despite increasing agitation for its removal.” Today, ongoing stigmatisation, social labeling, and homophobic and trans-phobic attitudes towards LGBTIQ communities remain sources of discrimination. These sources can be catalysts for reduced self-esteem, social withdrawal and isolation, all of which can contribute to the great disparity in mental health burden (20). Repeated hostility and rejection, and feelings of shame have also been shown to undermine a person’s sense of self-worth and lead to psychological distress (21).

A plethora of legal challenges and ethical debates face the LGBTIQ community in Australia, and each behave as causal and compounding determinants of discrimination. Dr. Smaal’s research efforts have touched on various legal, ethical and human rights issues pertinent to LGBTIQ health. For example, “the failure to recognise same-sex relationships reproduces homophobic attitudes of the past, carving out the LGBTIQ people as different to everyone else; an attitude that contributes to continued mental health concerns”(22). Although same-sex relationships are legally recognised by the Federal government, Commonwealth laws do not allow same-sex couples to legally marry. The stance of the Labor Party for example, is to support equal rights for same-sex couples yet, paradoxically, do not extend this support to same-sex marriage. Similarly the Liberal party supports equal economic and social rights for same-sex couples, but not marriage, adoption or IVF (23,24).

The subject of gender reassignment provides an additional example of a determinant of discrimination, one of many from the vast array of social, psychological and ethical challenges that arise for LGBTIQ communities. As Dr. Smaal discussed, “law around gender reassignment and hormone treatment for children is particularly complex: it involves a raft of significant legal, medical, ethical and human rights
challenges. Civil and family law issues, such as surrogacy and adoption rights for LGBTIQ individuals are other examples.” These complex issues, which are legally evolving, impinge on human rights issues as described by the Yogyakarta Principles from the International Commission of Jurists: “no one shall be forced to undergo medical procedures, including sex reassignment surgery, sterilisation or hormonal therapy, as a requirement for legal recognition of their gender identity or to undergo any form of medical treatment, procedure or testing based on sexual orientation or gender identity.”

In Australia, there are several Human Rights acts in place for LGBTIQ individuals. The Human Rights and Equal Opportunity Commission (HREOC) Act 1986 implements non-discrimination in employment and occupation on various grounds, including sexual orientation. In addition, the Fair Work Act 2009 renders employment discrimination on the ground of sexual preference unlawful. Sexual conduct involving anal intercourse between any two consenting adults (18 years or over) is legal in all Australian states and territories (of any sexual or gender identity) acting in private, under the Human Rights (Sexual Conduct) Act 1994. However, consent for heterosexual couples engaging in vaginal intercourse generally remains 16 years of age. The previous Gillard Labor Government stated a review of federal anti-discrimination laws, with the objective of developing a single equality act that would include sexual orientation and gender identity.

In addition to these pieces of legislation that endeavour to acknowledge equal rights for the LGBTIQ communities, there are additional national and international declarations that reiterate the importance of human rights specific to LGBTIQ individuals (Table 1). Despite these globally recognised declarations, surveying the current legal landscape in Australia reveals remaining inequality for the LGBTIQ population.

Targeted and effective health care support is critical for the LGBTIQ community, who represent a seriously marginalised group possessing an over-representation of mental health inequities. Primary health care professionals, in particular, can have great influence over bettering the wellbeing of LGBTIQ individuals. Appreciating the multi-factorial causal determinants behind LGBTIQ health is critical to providing greater support and understanding for LGBTIQ individuals (25, 26). Table 2 outlines how health professionals can improve health care access for LGBTIQ individuals (26).

In addition to educating health professionals, public health campaigns that speak to the general population are also in place. The Stop.Think.Respect Campaign was launched by Beyond Blue in May of 2012 for example, with the aim of raising awareness around issues of LGBTIQ health: “STOP the discrimination, THINK about how the things you say and do can cause real pain, and RESPECT people who are different from you.” Studies suggest a positive correlation lies between public health initiatives and reduced mental health issues for LGBTIQ individuals (27, 28). Thus their continued exposure in public spaces such as medical clinics, schools and universities may contribute to better health outcomes.

Medical students and future health professionals fall along the health care continuum of those who can fight against the poor mental health status and multitude of challenges facing the LGBTIQ community. Given a substantial factor in the poor wellbeing of many LGBTIQ individuals is a sense of isolation and segregation; providing a supportive, compassionate and non-judgemental environment for LGBTIQ patients is absolutely necessary. In fact, this

Table 1 Declarations that speak to the protection of LGBTIQ humans rights.

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<thead>
<tr>
<th>Declaration</th>
<th>Statement</th>
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<tbody>
<tr>
<td>The Universal Declaration of Human Rights, UDHR (United Nations, 1948)</td>
<td>“Everyone has the right to be respected and safe.”</td>
</tr>
<tr>
<td>The International Covenant on Civil and Political Rights, ICCPR (United Nations, 1966)</td>
<td>“Regardless of their sexual orientation, the government has an obligation to prohibit and prevent torture and other cruel, inhuman or degrading treatment or punishment, including for reasons relating to sexual orientation or gender identity.”</td>
</tr>
<tr>
<td>The International Covenant on Economic, Social and Cultural Rights, ICESCR (United Nations, 1966)</td>
<td>“The right of everyone to the enjoyment of the highest attainable standard of physical and mental health... any discrimination in access to health care and underlying determinants of health, as well as means and entitlements for their procurement, on the grounds of...health status (including HIV/AIDS), sexual orientation...or other status, which has the effect of nullifying or impairing the equal enjoyment or exercise of the right to health.”</td>
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<td>The International Commission of Jurists (Yogyakarta Principles on the Application of International Human Rights Law in relation to Sexual Orientation and Gender Identity, 2006)</td>
<td>“Sexual orientation and sex and/or gender identity are integral to every person’s dignity and humanity and must not be the basis for discrimination or abuse. Everyone, regardless of sexual orientation or gender identity, has the right to security of the person and to protection by the government against violence or bodily harm. Everyone is entitled to the enjoyment of privacy without arbitrary or unlawful interference. This includes the right to disclose or not to disclose information relating to one’s sexual orientation or gender identity.”</td>
</tr>
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<td>2009 ACON‡ submission to the House of Representatives Standing Committee, on Family, Community, Housing and Youth inquiry into the impact of violence on young Australians</td>
<td>“All persons, regardless of sexual orientation or sex and/or gender identity, are entitled to the full enjoyment of all human rights. Protection from violence, harassment and bullying is essential to ensure that all persons can fully enjoy all human rights. In many respects, the impact of verbal abuse, bullying and harassment is just as serious as physical violence.”</td>
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</table>

‡Australia’s largest community-based gay, lesbian, bisexual and transgender (GLBT) health and HIV/AIDS organisation.
A paradigm of medical practice should apply to all patients. Dr. Smaal spoke to this notion, “possessing sensitivities around the historical and cultural factors that shape the lives of LGBTQI individuals brings about better practice. Medicine does not occur in a social vacuum.” Studies have in fact documented a reduced utilisation of mental health services by the LGBTQI community as a result of neglect attitudes from health professionals towards homosexuality and trans-genderism. A high rate of ‘dissatisfaction’, ‘fear of discrimination and abuse’ and ‘reduced standards of care’ was shared by the LGBTQI community (29). Evidently, doctors who are able to leave their own judgements and beliefs aside when treating their patients can provide the best care. This sentiment promotes good practice in upholding the medical ethics of beneficence, non-maleficence and the right to be treated with dignity.

In summary, while there is a concerning prevalence of mental health concerns for the LGBTQI community, many of the causal determinants can be combated. Social and psychological determinants such as threatened social connectedness and acceptance; discrimination and stigmatisation have been strongly correlated with poor mental health. Raising awareness about these issues and working to reduce the discrimination is one way to move towards eradicating these determinants. In direct opposition to allowing further social isolation, medical students and future doctors can facilitate social inclusion for LGBTQI individuals by recognising and celebrating diversity, and offering a safe and non-judgemental space for all patients.

Acknowledgements: Many thanks to Dr. Yorick Smaal for his time, and for discussing his research interests. (Dr. Smaal is a Postdoctoral Fellow at the ARC Centre of Excellence in Policing and Security, Griffith University, Brisbane Qld. y.small@griffith.edu.au).

Thanks are also extended to Ruth Townsend, lecturer of the Professionalism and Leadership course as part of the MBS program at the ANU, for always challenging the medical students to think about issues of people, community, society, politics and law.

Conflicts of Interest: None to declare.

Stock image: Vince Mig (publicdomainpictures.net)

Table 2
The Australian Medical Association stance on health care improvements for the LGBTQI community through primary care health.

Promote non-judgmental acknowledgment of a patient’s sexual orientation, gender identity and behaviour to enhance clinical care.

Practice healthcare with a commitment towards equal access to health care for all Australians.

Acknowledge that the use of language that assumes an individual’s sexuality and gender makes it harder for a person to disclose their identity.

Ensure continuing education for both medical students and practicing health professionals. Specifically, issues of sexuality and gender identity should be incorporated into the medical education curriculum, including information on the coming-out process, education regarding discrimination, health needs of LGBTQI subgroups and information about referral networks. This should start in medical school and be a part of continuing medical education at all levels.


Gendered access to methadone maintenance treatment

Methadone maintenance treatment (MMT) has been shown to be an effective and safe treatment for opioid addiction and with 30,000 Australians undertaking methadone treatment currently; it is considered by many to be a successful public health initiative (1). In addition to lowering rates of heroin use, methadone treatment plays an important role in minimising other ill effects associated with substance abuse, such as reducing the spread of infectious diseases, decreasing criminal behavior and increasing employment and stable family relationships (2). The NSW Bureau of Crime Statistics and Research (BOCSAR) and the National Drug and Alcohol Research Centre (NDARC) have shown that dependent heroin users also commit significantly less crime while in MMT than when they are out of it. A reduction in officially recorded offending rates was found for all age groups, and for both men and women, but the reduction was much more substantial for young women. For every 100 females under the age of 30 on the methadone program for one year, there is a reduction of 44 charges of any type and 23 theft charges (3).

As part of my urban GP rotation I spent some time at the health clinic in the Alexander Maconochie Centre, where many of the detainees, both men and women, are on the methadone program. The prison offers an ideal environment for detainees to undertake MMT as the common barriers to maintenance in the community do not exist, such as the inconvenience of daily dosing at a pharmacy or outpatient clinic during specific hours. Other common barriers to MMT from a patient’s perspective include cost of treatment, cost of transportation to dosing facilities, lack of access to facilities in rural or remote areas, embarrassment and fear of judgment from health professionals and members of the public at dosing facilities (4). I wanted to know whether women experience different barriers to men in regards to accessing MMT in the community, and whether female specific services are available to minimise any obstacles.

Research shows that women have different substance abuse treatment needs to males and that these gender-specific issues can hinder access to care (5). Compared with men, women are more likely to have lower socioeconomic status, have total responsibility for child care and have difficulty with transportation to treatment. Another study showed that women require more government financial assistance and have lower rates of employment than men (6). As a result, women may not be able to pay for methadone treatment, they may not be able to pay the expenses needed to travel to treatment facilities, or they may need to work or look after children during times that treatment facilities are open for methadone dosing. Pregnant women face additional barriers to accessing MMT including embarrassment, fear of being judged as a bad parent, fear of harming the baby further by going into withdrawal and fear of losing the right to parent their newborn child. These factors can prevent pregnant women from initiating drug addiction treatment such as MMT during pregnancy (7).

Female methadone patients experience clinical depression, anxiety disorders and low self esteem to a greater degree than male methadone patients, as well as more suicidal thoughts and attempts (8). Women who use drugs are also more likely to report a history of emotional, sexual or physical abuse than their male counterparts. In addition, unlike women with psychiatric problems, men in treatment who have a history of abuse seem to recover at similar rates to men without a history
of abuse (8). The higher prevalence of these issues in women compared to men means that successful recovery is more complicated for women.

Several studies suggest that MMT for women requires awareness of these barriers and the provision of female specific ancillary services such as drug counselling, psychiatric care and vocational rehabilitation (5, 6). As a result of this research, a women-only MMT program was established in 2000 within the Beth Israel Medical Centre in New York. Services provided at the centre include MMT, drug counselling, counselling and testing for human immunodeficiency virus (HIV), hepatitis B and C and sexually transmitted infections, pap smears, tuberculosis screening and group counselling in the areas of sexual abuse and domestic violence. Workshops in parenting, employment skills and life skills are also provided (5).

There is a significant gender inequality affecting access to MMT, with female substance users being disadvantaged compared to their male counterparts. The recovery process is complex, and barriers to access further complicate this process for women. No gender specific MMT service exists in Australia and such a service is needed in order to appropriately address psychological and social factors contributing to addiction. The need for a successful recovery is compounded by the fact that it is women who are more often the primary child carer and the livelihood of others greatly depends on their carer’s recovery.

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Conflicts of Interest: None to declare.

Stock images: Microsoft Office

ACKNOWLEDGEMENTS

The MSJA board members would like to thank the following individuals for their time, support and contributions.

Special thanks are extended to

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