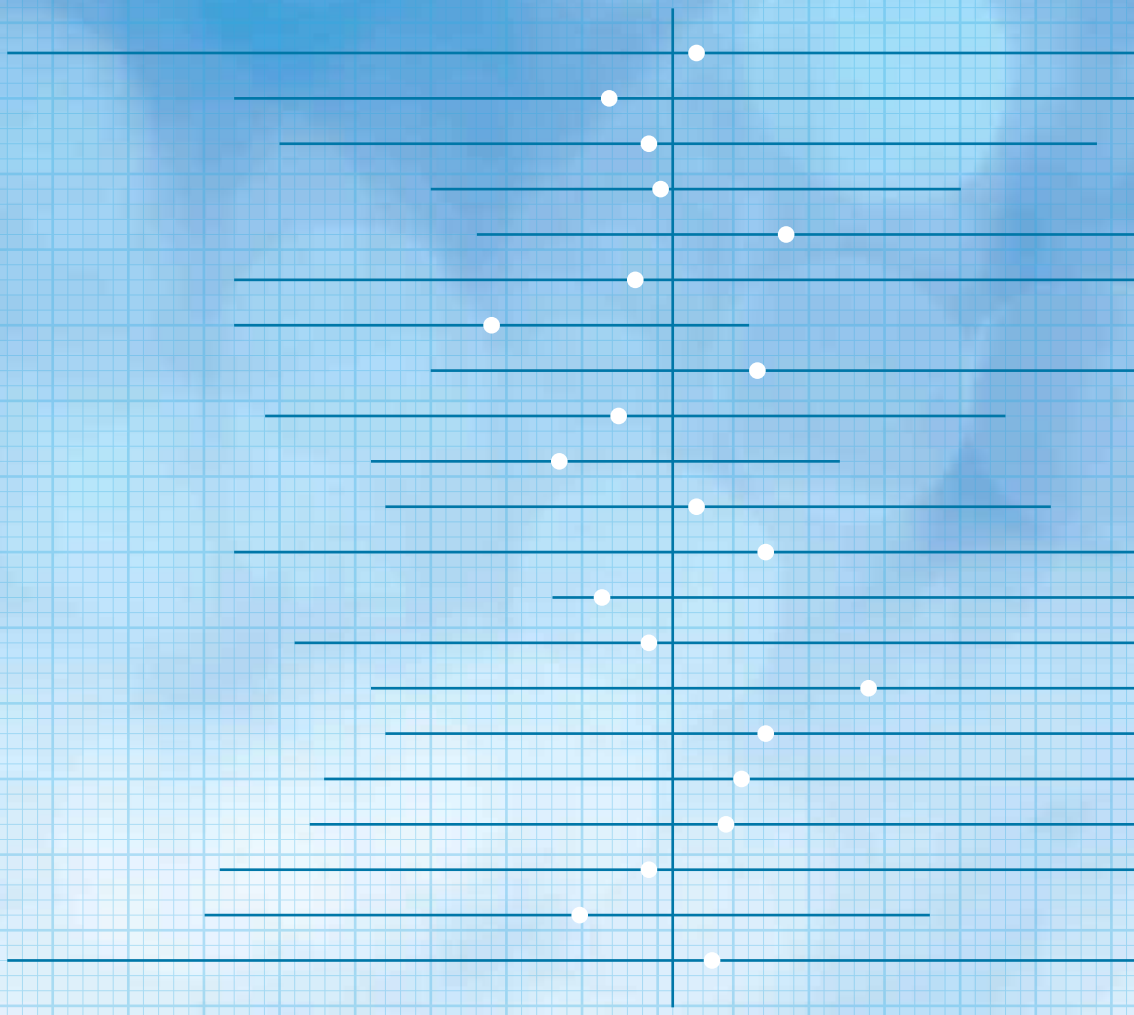

Medical Practice Variation:
Background Paper

AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

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Executive summary

Patients who have the same health concerns or problems do not necessarily receive the same health care. Depending upon where they live or which health service or health professional they consult, they may end up having different types of treatment.

For example, among a group of patients with the same condition, some may have no treatment, some may be referred for "watchful waiting", some may have treatment in the community, some may have treatment in a hospital, some may have surgery, and some may receive medication. This is commonly referred to as medical practice variation. In many cases it is unknown which of these courses of action lead to better patient outcomes.

Since the 1930s, a considerable body of evidence has developed internationally showing significant variation in medical practice.[1] Variation exists within and between countries. For example, there is evidence of variation in medical practice within Australia, and also between Australia and other Organization of Economic Cooperation and Development (OECD) countries.[2] Variation exists at a clinician level (between clinicians), at the service level (between different health services) and at a geographic level (between regions and countries). Variation in medical practice has been described as ubiquitous and persistent. Studies have documented its existence over decades, with some researchers indicating that "it is hard to find examples where there is little or negligible variation".[1]

Why variation in medical practice matters

Some variation in medical practice is warranted; it may, for example, reflect differences in the health status or need of people living in one area compared with the health of those in another area. It may reflect differences in cultural expectations or patients' personal preferences.

However, not all variation in medical practice is warranted. It may reflect structural factors that mean some people have less access to health care compared to others. It may mean that factors other than patients' need or preferences are driving treatment decisions, particularly for discretionary interventions. In some cases variation may reflect evidential uncertainty as to which type of medical intervention is best.

Variation in medical practice may mean some people are having unnecessary (and potentially harmful) tests or treatments or, conversely, that some people are missing out on tests and treatments that might be helpful.

Variation in medical practice may also mean that scarce health resources are not being put to best use. As countries face increasing pressure on health budgets, there is growing international interest in addressing unwarranted variation in medical practice, as such variation affects equity of access to appropriate services, the health outcomes of populations, and efficient use of resources.

A 2010 editorial in the *British Medical Journal* noted:

> If all variation were bad, solutions would be easy. The difficulty is in reducing the bad variation, which reflects the limits of professional knowledge and failures in its application, while preserving the good variation that makes care patient centred. When we fail, we provide services to patients who don't need or wouldn't choose them while we withhold the same services from people who do or would, generally making far more costly errors of overuse than of underuse.[3]

The situation in Australia

There is evidence of medical practice variation in Australia. The most recent evidence comes from the preliminary findings of work led by the Australian Commission on Safety and Quality in Healthcare, with analyses of inpatient hospital admissions undertaken by the Australian Institute of Health and Welfare, as part of an OECD Medical Practice Variation Study. A full report will be provided to the OECD and Australian jurisdictions later this year. The preliminary analysis examines medical practice variation in 2010–11 for a set of procedures selected by the OECD, based on where patients lived (as defined by Medicare Local boundaries). The report covers the following interventions and activities selected by the OECD: overnight hospital medical admissions, caesarean sections, revascularisation procedures, knee interventions, hip fractures and hysterectomy.

The amount of variation – the highest intervention rate for a Medicare Local population, compared with the lowest – was smallest for caesarean sections (a 1.6 fold variation) and largest for cardiac catheterisation (a 7.4 fold variation). When the same calculation was performed on the 10th and 90th percentile values (a method removing the influence of extreme high and low values), variation was still smallest for caesarean section (a 1.3 fold variation) and largest for cardiac catheterisation and knee arthroscopy (both with a twofold variation).

Sixty-seven per cent of admissions for knee replacement, and 81% of admissions for knee arthroscopy occurred in the private sector. Variation for these procedures between Medicare Locals is higher in public hospitals (seven-fold for knee replacement and eleven-fold for arthroscopy) than in the private sector (threefold difference for both procedures).

The reverse is the case for coronary angioplasty and stenting, where observed variation is eight-fold in private hospital admissions, compared with a three-fold difference in public sector rates.

It should be noted, however, that there may be some substitution between sectors (i.e. higher rates in one accompanied by lower rates in the other) for some procedures. In addition, procedures undertaken in the outpatient setting are not captured by these data, and may affect rates observed for knee arthroscopy and cardiac catheterisation.

More work is needed to better understand the findings, and to identify appropriate responses. The next phase of this work will analyse differences between comparable groups of Medicare Locals, to determine the role of underlying patterns of illness and differences in availability of medical services in contributing to such variation. The potential of analysing variation by hospital catchment population will also be explored. This work should help identify potential areas of unwarranted variation that could be prioritised for action.

Potential responses

Identifying appropriate responses to medical practice variation requires a full understanding of the reasons for and consequences of different utilisation rates, and a detailed understanding of patterns of illness and patient preferences. Potential responses include embedding appropriate incentives within health systems and mechanisms to link activity to outcomes. More information on the outcomes of care is required.

Internationally, there is a move towards detailed, public reporting of medical practice variation, and a focus on greater engagement of the community, patients, health professionals, services and managers in exploring reasons for variation. Some jurisdictions, such as Western Australia and Queensland, are employing financial incentives to reduce inappropriate practice variation, increase adherence to best practice models of care and improve patient outcomes. These initiatives are new and results are not yet available.

1 Introduction

Concerns about the extent of variation in medical practice have existed for several decades. Considerable variation continues to be documented around the world, including in Australia.

The persistence of such variation is largely a reflection of the complexity of the factors involved. Some variation is warranted, as it may reflect differences in population need, and cultural or patient preferences. However, much variation is unwarranted, and means that some patients are having unnecessary or harmful care, while others are missing out on care that may be helpful.

The challenge is to distinguish between variation that is warranted and that which is unwarranted. As respected Canadian health economist Robert G Evans has noted: "If variations represent evidence of inappropriate care, which care is inappropriate? Are the regions, or institutions, or practitioners with high rates over-providing, or are the low ones under-providing, or does the 'best' rate lie somewhere in the middle (or beyond either end)?"[8]

Consideration of the factors that can contribute to variation in medical practice demonstrates some of the complexities involved.

1.1 Multiple causes

The causes of variation in medical practice can be conceptualised broadly as being related to supply, demand or patients' health status (need)' Supply and demand factors may be embedded in national culture, healthcare education, and organisational structures, as well as cultural beliefs and traditions.

As well, some apparent variation may reflect inaccuracies in data, random variation or artefactual factors. Also, the nature of some interventions, particularly those where an organ is removed, may mean that a high rate in previous years may lead to low levels subsequently because there are fewer people able to have the procedure. This may be especially relevant in regions with smaller populations.

Need-related factors include the wide-ranging determinants of a population's health, including demographics, socioeconomic status, and environmental issues.

Demand-related impacts are more subjective. They are influenced by cultural and educational factors, by beliefs and by the information available to patients.

Supply-related factors include clinical decision-making, government policy, resource availability and service and financing configurations. Medical opinion and preferences have a substantial influence over which treatment patients will receive and are a major source of such variation.[9]

Health system factors can include referral systems, the distribution of clinicians and services, and payment and remuneration structures.

The history of variation: tonsillectomies in children

In 1938, a Scottish doctor, J. Alison Glover, published a landmark paper documenting and investigating large variation in the rate of tonsillectomies among children.[4]

Dr Glover, the son of a doctor, wrote that when he had been a schoolboy in the late 1800s, he could not recall a single boy who had undergone the operation at either of the two schools he had attended. His paper traced how the operation became so popular that by the late 1930s, about half of the boys at both of his old schools had had their tonsils removed.

Dr Glover's research showed unexplained large variation in the operation's use (boys and wealthier children were more likely to have it), and he questioned its presumed benefits. He suggested that the risk of children dying from the operation was higher than was commonly appreciated, and was especially a concern for children returning to poor living conditions after surgery.

Differences in the uptake of the operation defied any explanation, he wrote, "save that of variations of medical opinion on the indications for operation". He said: "One cannot avoid the conclusion that there is a tendency for the operation to be performed as a routine prophylactic ritual for no particular reason and with no particular result."

In recognition of his pioneering work, the term "the Glover Phenomenon" was coined in the late 1940s to describe variation in the delivery of medical services that cannot be explained by patient need. While tonsillectomies are no longer as common as in Glover's day, studies continue to show considerable variation in their use.[5]

Such variation may be more likely where there is uncertainty about the merits of an intervention, allowing more room for the varying opinions of doctors and surgeons to influence practice. Interestingly, the positive social class gradient in tonsillectomy rates observed by Glover was reversed in the 1950s.[6]

When tonsillectomy was a procedure supported by the majority of the medical profession and in the ascendancy, the affluent had the greatest access to it. But with changing clinical opinion and evidence, and with greater awareness of the potential risks, people who were more affluent, empowered, and better informed were more likely to alter their healthcare usage.

Dr Glover, who was also well known for his achievements as a soldier, has been described as a "guiding light" for other researchers who followed in his footsteps in investigating variation in medical and surgical practice.[7]

Leading US researcher Professor John Wennberg wrote: "The influence of Glover continues to be felt today. The study of variation leads naturally to questions of outcomes and the value of health care, and underlines the need to evaluate the common practices of medicine and emphasizes the importance of respecting patient opinion or preferences in the decision to utilize discretionary medical care."[7]

1.2 An evidence-based analysis

Some researchers suggest there is a relationship between the quality of evidence to support a particular intervention, and the likelihood of there being variation in its use. This approach may also help to identify whether variation is warranted or unwarranted.

- When care is effective. This means it is backed by strong scientific evidence of efficacy, is of proven value, has no significant tradeoffs, and the benefits of the intervention so far outweigh the risks that almost all patients with specific medical conditions should receive them (an example is prescribing beta-blockers for heart attack patients). However, even when there are evidence-based guidelines, clinicians may vary in their attitudes and practices about the recommendations, and there is evidence that underuse of effective care is widespread.
- When care is preference-sensitive (for example, when competing treatment options have different risks and benefits that individual patients may evaluate differently), variation may reflect differences in patient, clinician preferences or cost. It should be noted that due, in part, to information asymmetry in health care, patient preferences (or demand) can be driven by clinicians, a phenomenon referred to as 'supplier-induced demand'.
- Variation in care may also be related to supply (termed supply-sensitive care). The more resources, equipment and workforce is available, the more they will be used. Often there is no evidence that this leads to better outcomes than in areas where less intervention is practiced.

When there is uncertainty about the evidential basis for an intervention, there is more likely to be variation. Canadian health economist Professor Robert Evans has pointed out that uncertainty at a group level does not necessarily mean that individual practitioners are uncertain. Individual doctors may feel sure of the correctness of their decisions – but each makes different decisions based on their experience, knowledge and interpretation of the evidence.[8]

1.3 Other complexities

Without knowing patient outcomes it is difficult to gauge the appropriate rate for interventions. It should not be assumed that doctors in areas with low admission rates necessarily make more appropriate clinical decisions.[10,11] Equally, a high rate of a particular procedure is not necessarily better; it does not guarantee that those patients who will benefit do receive the treatment, nor that those who will not do not. The appropriate rate must rely on knowledge of clinical outcomes, which is often lacking.

Indeed, studies of discretionary admissions in the USA in the 1980s found no systematic relationship between rates of appropriateness and overall admission rates: high proportions of admissions were classed as inappropriate or equivocal for areas with both high and low admission rates.[12,13] Research in the Trent region of England found that, despite its low rates of admission for coronary angiography and coronary artery bypass operations (when compared with the USA and England as a whole), British doctors, using their own criteria, deemed only about half of these to have been appropriate.[14]

2 Overview of medical practice variation in Australia

The Australian Commission on Safety and Quality in Health Care is leading the work on medical practice variation being undertaken as part of Australia's contribution to an OECD project. The Australian Institute of Health and Welfare (AIHW) is undertaking the analyses of medical practice variation using the National Hospital Morbidity Database, which contains information on patients admitted to Australian hospitals (public and private).

Oversight of this work was provided by a jurisdictional group with representatives from each state and territory and the Commonwealth. Variation is being examined for a set of interventions selected by the OECD: overnight hospital medical admissions, caesarean sections, revascularisation procedures, knee interventions, hip fracture and hysterectomy. Results are reported according to which Medicare Local patients live in (as opposed to where they receive the intervention).

An interim analysis of these selected medical procedures found that in 2010–11, the amount of variation – the highest intervention rate for a Medicare Local population, compared with the lowest – was smallest for caesarean sections (a 1.6 fold variation) and largest for cardiac catheterisation (a 7.4 fold variation). When the same calculation was performed on the 10th and 90th percentile values (a method removing the influence of extreme high and low values), variation was still smallest for caesarean section (a 1.3 fold variation) and largest for cardiac catheterisation and knee arthroscopy (both with a twofold variation).

Some of this variation could be explained by the scope of the National Hospital Morbidity Database. For example, procedures that may be undertaken in outpatient settings, such as arthroscopy or catheterisation, would not be routinely captured.

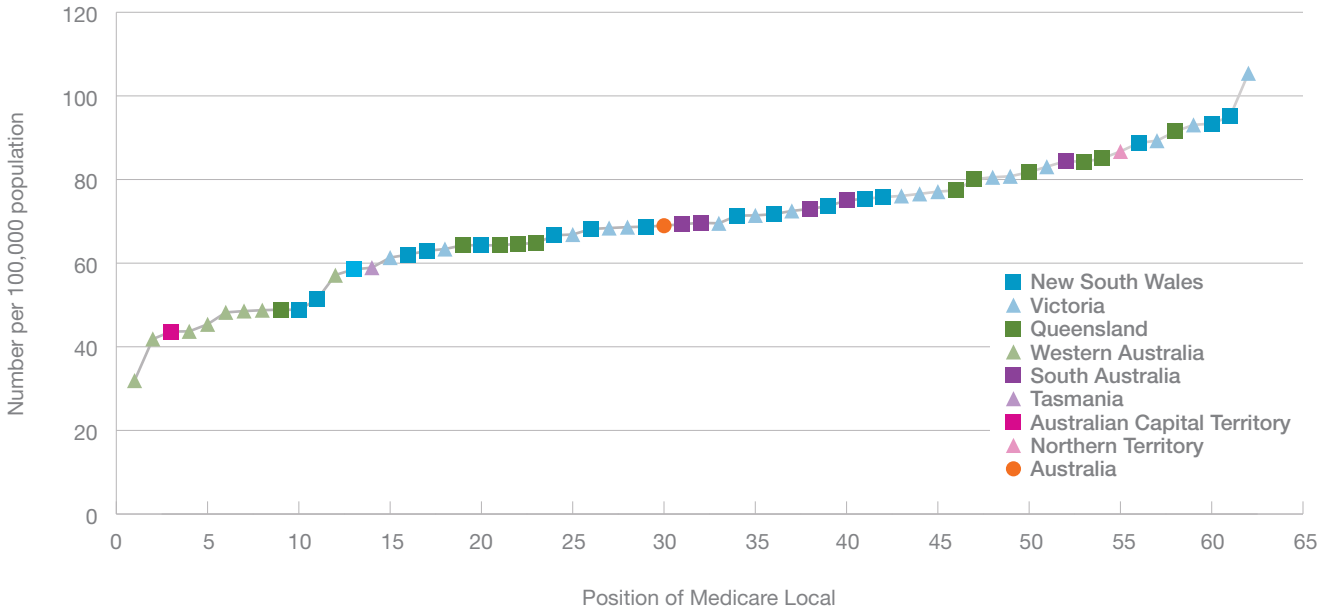
However, it is not possible at this stage to distinguish between warranted and unwarranted variation in these findings. Further work is needed to analyse differences between peer groups of Medicare Locals, to understand underlying patterns of illness, and to identify differences in availability of medical services. These initial data do not provide any groupings of Medicare Locals, which can vary markedly in size, population and demographics. Further detail will be provided in a publication planned for December 2013.

2.1 Interim findings[A]

- For hospital inpatient admissions involving coronary angioplasty and stenting, the national standardised rate was 214 per 100,000 population. Rates across Medicare Locals ranged from 135 admissions per 100,000 population (Northern Territory) to 393 admissions per 100,000 (Loddon-Mallee-Murray). For private hospital admissions, there was over an eightfold difference in the highest admission rate (219 per 100,000 population) and the lowest (26 per 100,000), compared with almost a three-fold difference in public sector rates.
- It should be noted that there may be a degree of substitution between sectors (i.e. higher rates in one accompanied by lower rates in the other) for some procedures.

[A] All data is for 2010–11.

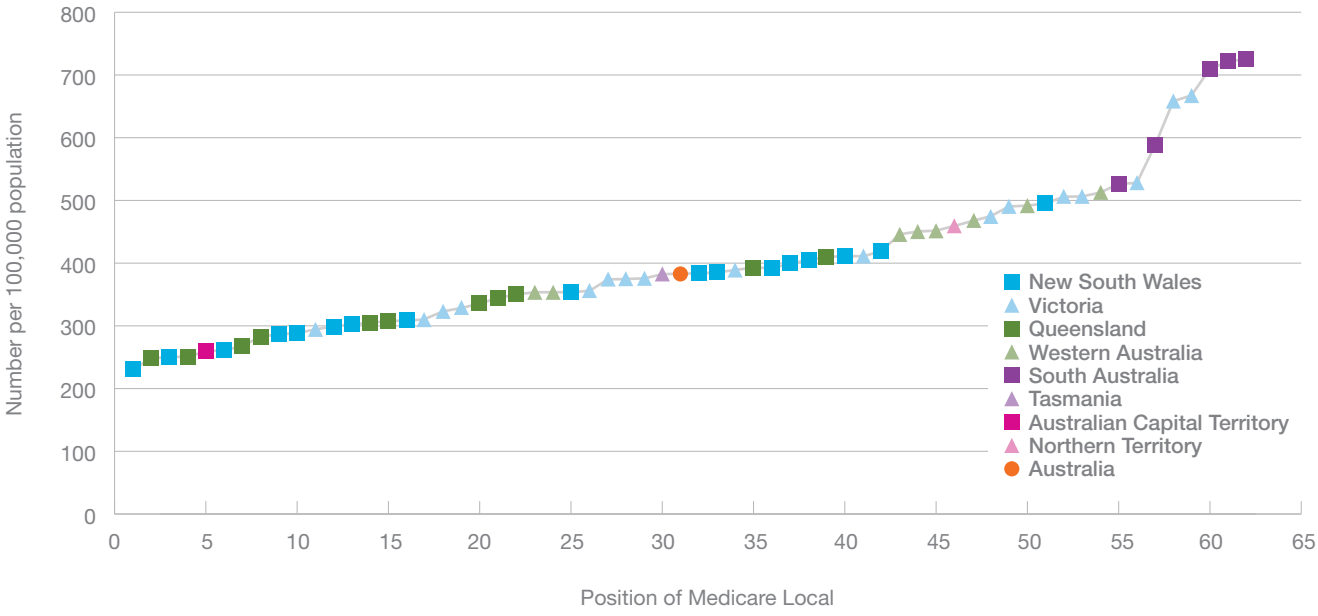
Figure 1: Separations for CABG by Medicare Local, age and sex standardised number per 100,000 population



NOTE: 'position of Medicare Local' indicates its ranking in terms of the rates for the intervention examined.

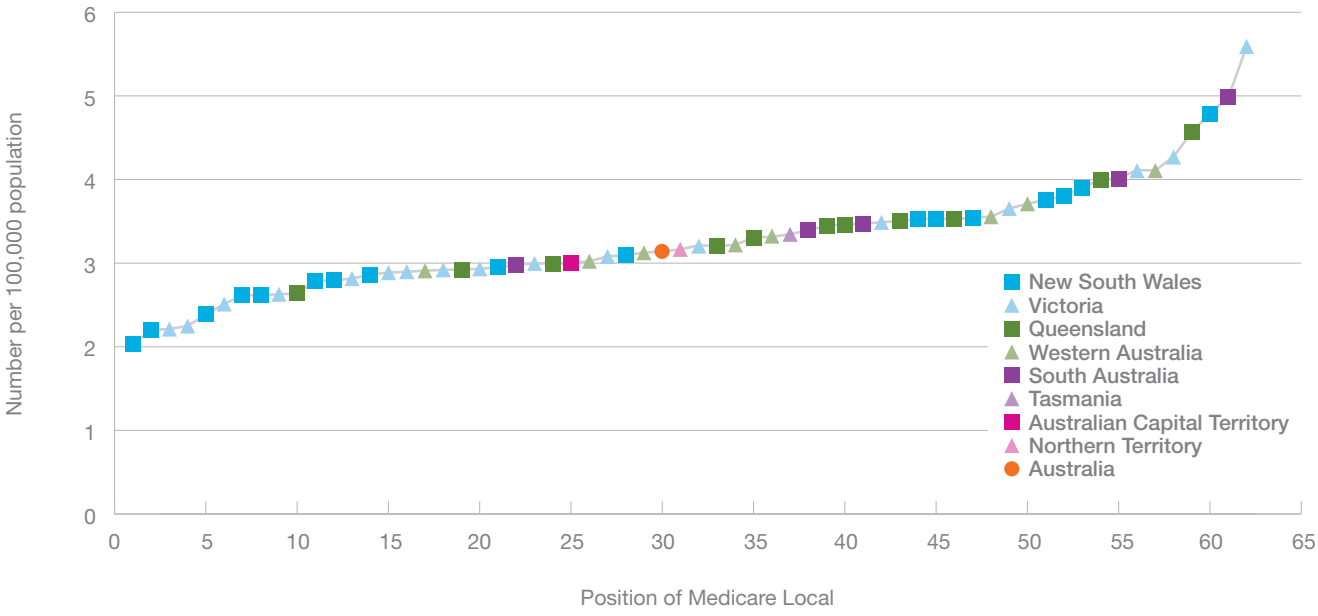
- For admissions involving coronary artery bypass graft, the national standardised rate was 70 per 100,000 population. The highest admission rate for a Medicare Local (105 per 100,000 in Grampians) was 3.3 times as high as the lowest rate (32 per 100,000 in Fremantle).
- For admissions involving knee replacements, the standardised rate was 221 per 100,000 population. Rates across Medicare Locals ranged from 140 admissions per 100,000 population (Inner North West Melbourne) to 330 admissions per 100,000 (Country North SA).

Figure 2: Separations for knee arthroscopy by Medicare Local, age and sex standardised number per 100,000 population



- The national standardised rate for admissions involving knee arthroscopy was 382 per 100,000 population. Rates across Medicare Locals ranged from 232 admissions per 100,000 population (Inner West Sydney) to 726 admissions per 100,000 (Country North SA).
- Sixty seven per cent of admissions for knee replacement, and 81% of admissions for knee arthroscopy occurred in the private sector. Variation for these procedures between Medicare Locals appears to be higher in public hospitals (seven fold for knee replacement and eleven fold for arthroscopy) than in the private sector (threefold difference for both procedures). Again, potential substitution between sectors should be noted.

Figure 3: Separations for hysterectomy by Medicare Local and age-standardised number per 100,000 population



- For admissions involving hip fracture, the national standardised rate was 111 per 100,000 population. There was almost a five-fold difference between the highest rate (392 admissions per 100,000 for Kimberley-Pilbara) and the lowest rate (80 admissions per 100,000 population for the Lower Murray).
- Hysterectomy rates ranged from 2 admissions per 1,000 female population (Inner West Sydney) to 6 admissions per 1,000 population (Grampians).

2.2 Other data sources

Variation in some aspects of medical practice has been monitored in Australia for many years, with *Australian Hospital Statistics* reporting variation in the provision of a range of selected procedures by state and territory, socioeconomic status and remoteness. NSW has provided the most detailed reporting at a state level. In 2010, a NSW Health Care Atlas analysed practice pattern variation between 1 July 2005 and 30 June 2008 using public and private hospital data, analysed according to the Area Health Service where patients lived. Substantial variation was found in preference-sensitive surgery rates, chronic medical admission rates, and readmission rates. (As noted previously, preference-sensitive care refers to services that treat conditions for which there are a range of treatment options.)

Historically other jurisdictions have not undertaken analyses of small area variation of clinical care. Most have examined variation in hospitalisation rates and death rates for various conditions according to geographical area, but analysis of geographical variation has generally tended to focus on population risk factors, and avoidable mortality. There has also been considerable work on ambulatory care sensitive conditions. Some states examine variation in care at the hospital level with a focus on indicators of safety rather than appropriateness of care. The Queensland Health Department, for example, monitors clinical outcome indicators monthly across 75 public hospitals.

A common jurisdictional and national approach is statistical exploration for high acuity, low volume procedures in order to inform policy decisions regarding service concentration at the state/territory level and at the national level. The aim is to reduce unwanted variation in outcomes, particularly patient mortality.

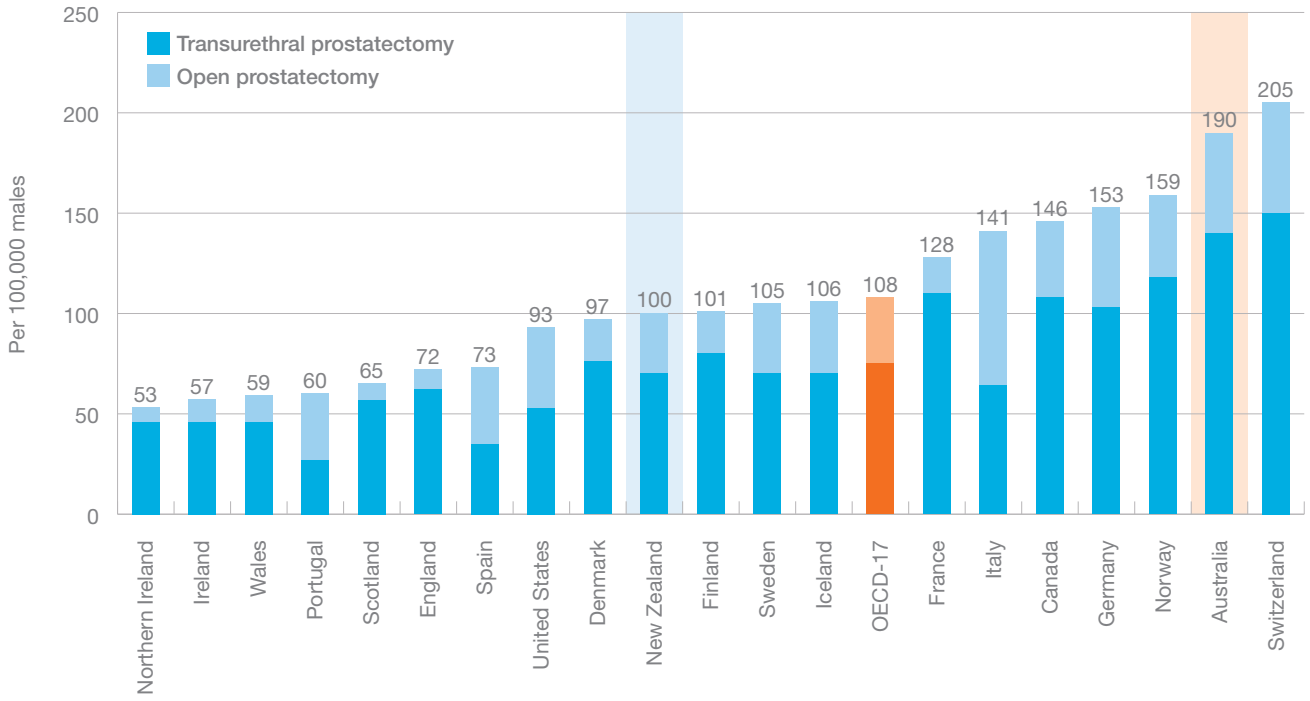
2.3 International comparisons

A recent OECD report comparing the use of five surgical procedures found substantial international variation for most procedures, including differences in trends over time.[2] For some procedures (for example, caesarean section, hip replacement and appendectomy), every country showed similar trends, whereas for other procedures (hysterectomy and prostatectomy) the picture is more mixed. While recognising the limitations of the data, the report's authors said their analyses paint a picture of widespread differences in the rates at which certain procedures are performed (e.g. hysterectomy and prostatectomy) yet, for others (i.e. appendectomy), they indicate the emergence of a growing international convergence downward.

Australia consistently reported higher rates of most of the interventions studied, including for caesarean sections, hysterectomy, prostatectomy, and appendectomy.[2] However, it should be noted that the report's authors said their findings "provide simply a stimulus to further enquiry into health services and their measurement". They said: "Where variation is observed, there is no way, using these data alone, of knowing which rate is the "right" one in any country."[2]

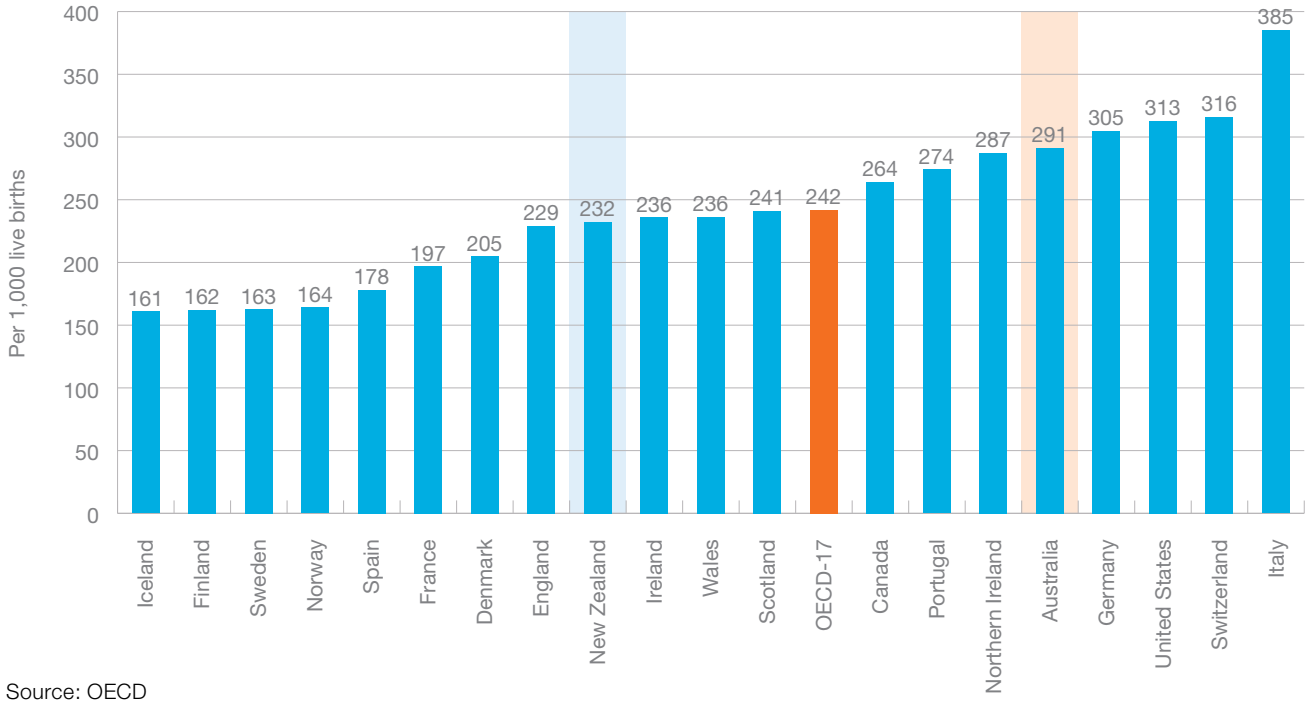
Nevertheless some of the results are of interest. For instance, the difference in prostatectomy and caesarean section rates between Australia and New Zealand is worth further exploration given that surgeons in both countries belong to the same college and undergo similar training.

Figure 4: Age-standardised rates for prostatectomy per 100,000 males



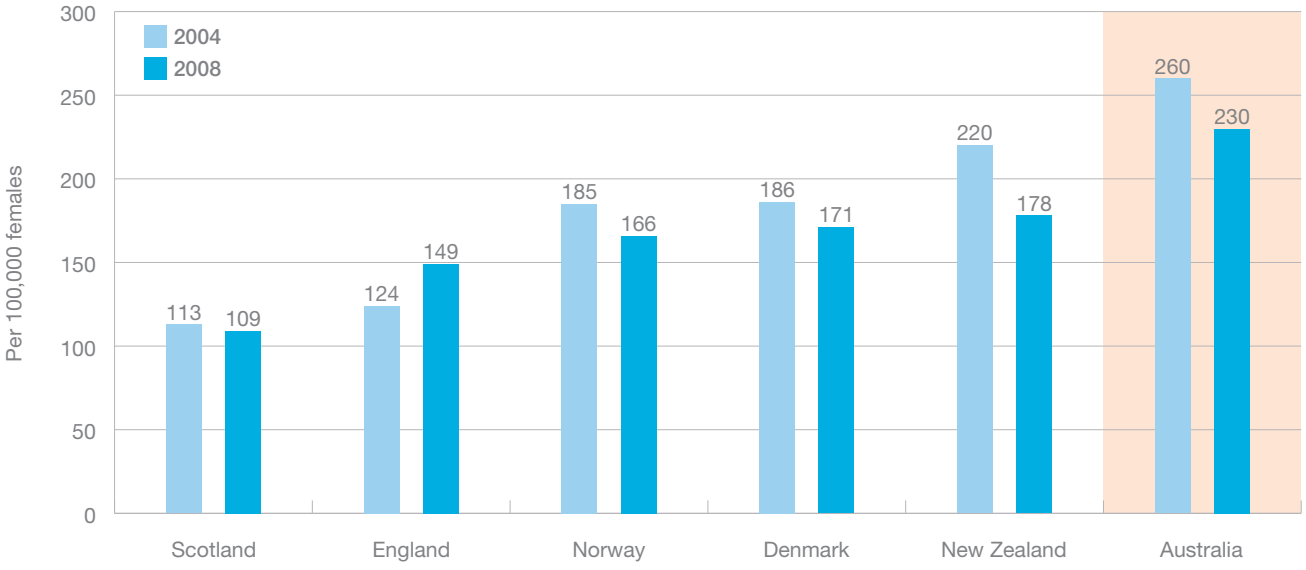
Source: OECD

Figure 5: Age-standardised rates of caesarian sections per 1000 live births



Source: OECD

Figure 6: Age-standardised rates of hysterectomy per 100,000 females



Source: OECD

3 Future Options

Further work is needed in order to better distinguish between warranted and unwarranted variation in medical practice. Critical to this is the development of effective mechanisms for linking clinical and service activity to patient and population health outcomes. There will be growing pressure to tackle unwarranted variation at international, national, jurisdictional and local levels, because of the cost and equity implications.

While this document has focused largely on variation in procedures undertaken in hospital and specialist settings, it is also important to focus on variation in community and primary care settings, not least because the pathways to specialist intervention often begin there.

3.1 Transparent public reporting

The first step in addressing unwarranted variation in health care is the systematic and routine collation, analysis and publication of such variation. The Australian Government, in the 2013–14 Budget, announced plans to develop an atlas that identifies unwarranted clinical variation.[15]

Other examples of such initiatives include:

- The NSW Health Care Atlas, which analysed practice pattern variation between 1 July 2005 and 30 June 2008 using public and private hospital data, analysed according to the Area Health Service where patients lived.
- The Dartmouth Health Atlas (www.dartmouthatlas.org), which assembles data on many aspects of health care across small geographical areas in the United States. The main purpose of examining small area variation is to identify discretionary differences in the use of health care between neighbouring areas, be they supplier induced or a matter of patient preference.
- The Atlas of Healthcare Variation (http://www.hqsc.govt.nz/our-programmes/health-quality-evaluation/projects/atlas-of-healthcare-variation/) is produced by the Health Quality and Safety Commission NZ to prompt debate and raise questions about health service use and provision amongst clinicians, users and providers of health services about why any differences exist, and to stimulate improvement through this debate.
- The NHS Atlas of Variation series (http://www.rightcare.nhs.uk/index.php/nhs-atlas) aims to support local decision making to increase the value that a population receives from the resources spent on their healthcare. Following the 2010 and 2011 publications, a series of themed atlases are focusing on specific conditions or populations in more depth (including children and young people, diabetes, kidney disease, and diagnostics testing).
- Different factors that may influence variation can operate at a country or state level (policies/planning), within hospital referral regions (impact of provider supply and behaviour) and within municipal population groupings (burden of disease/health status/population need).

3.2 Policy initiatives

Presenting and publishing the results of investigations into variation is designed to trigger discussion and debate on matters such as the possible reasons for the observed variation and whether variation is warranted. It is the first in a series of steps to identify and reduce unwarranted variation.

Policy initiatives may also be necessary to provide programs and incentives to reduce unwarranted variation. A number of Australian jurisdictions have, for example, developed initiatives to monitor and review caesarean section rates. These may have discouraged variation in practice although Australian caesarean section rates remain high. There may be advantages in a more coordinated approach. At present, for example, there is no consistent approach between state and territory jurisdictions in the use and monitoring of clinical guidelines or pathways. For most procedures investigated in the OECD study there is no systematic way of monitoring outcomes of care in Australia.

3.3 Clinical engagement

It is essential to engage clinical leaders and clinicians in efforts to address unwarranted variation in medical practice. They provide important input into the collection, analysis and dissemination of related data, as well as in developing and implementing appropriate responses, at policy, service and clinical levels. Peer review has also been shown to be an effective strategy in reducing medical practice variation.[16]

3.4 Shared decision making

Many experts also emphasise the importance of promoting and enabling shared decision making to ensure patients' preferences have a greater influence over referrals and clinical decisions, especially when the evidence is uncertain or there are multiple options. With shared decision making, patients are encouraged to think about the available screening, treatment, or management options and the likely benefits and harms of each, so that they can communicate their preferences and help select the best course of action for them. Patients who are fully informed about their options will often choose differently from their physicians, and there is some evidence that they are less likely to opt for surgery than control groups.[7] Shared decision making is widely seen as a worthwhile strategy for promoting patient centred care and reducing unwarranted variation.

For shared decision making to occur, it is important for the community, patients, clinicians and service managers to have ready access to evidence about treatment options, guidance on weighing pros and cons of different options, and for there to be a supportive clinical culture that facilitates patient engagement.[17] Future directions for work on medical practice variation should focus on how to promote and enable shared decision making within the Australian context.

3.5 Outcomes research

We need to develop a much clearer picture about population need, access to health care and the impact of clinical and service activity on the health of patients and populations. Mechanisms are needed to link clinical and service activity to outcomes. This requires research that links care inputs and processes with outcomes to determine the "right" level of intervention.

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