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In Brief – Exploring Healthcare Variation in Australia: Analyses Resulting from an OECD Study

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Contents

1. Overview 2

2. What did this study involve? 7

3. Variation for specific interventions studied 11
   3.1 Admissions for hip fracture 13
   Orthopaedic care 15
   3.2 Knee replacement 15
   3.3 Knee arthroscopy 17
   Obstetric and gynaecological care 19
   3.4 Caesarean section 19
   3.5 Hysterectomy 21
   Cardiac Care 23
   3.6 Cardiac catheterisation 23
   3.7 Percutaneous coronary intervention (PCI) 25
   3.8 Coronary artery bypass grafting (CABG) 27
   3.9 PCI and/or CABG 29

4. Responding to these findings 30

5. How you can contribute 33
1. Overview

By world standards Australia has excellent healthcare services staffed by highly qualified, dedicated and hard-working people. Yet Australians who have the same health conditions, concerns or problems do not necessarily receive the same health care.

Depending on where they live, or which health service or health professional they consult, people may be managed differently. This is referred to as healthcare variation, and it occurs around the world.

For example, among a group of patients with the same condition, some may have no active treatment; some may be treated in the community and others in a hospital; and some may have surgery, while others may receive medication.

This publication summarises a more detailed discussion paper by the Australian Commission on Safety and Quality in Health Care (the Commission) and Australian Institute of Health and Welfare, Exploring Healthcare Variation in Australia: Analyses Resulting from an OECD Study. The paper outlines variation in the rates of several common healthcare interventions across Australia. More detailed information, including references, is in the full document, which is available here: www.safetyandquality.gov.au/our-work/variation-in-health-care

The discussion paper is part of a program of work by the Commission that aims to reduce unwarranted healthcare variation and to improve patients’ care and outcomes, while also ensuring value for our health spending.

This publication aims to make general readers aware of some of the concerns and complexities surrounding healthcare variation, and to ensure people are aware of these issues when making healthcare decisions.

Why does variation matter?

Some variation in how health care is provided is desirable because of differences in the health status of populations, the preferences of individual patients and groups, or because it reflects efforts to innovate and to improve practice. However, variation also occurs that is unrelated to patients’ needs or preferences. This is called unwarranted variation, and it raises serious questions. For instance, it may mean some people have less access to health care compared with others. It may suggest that factors other than patients’ needs or preferences are driving treatment decisions. It may indicate that some people are having unnecessary and potentially harmful tests or treatments, while others are missing out on necessary interventions.

Unwarranted variation may also mean that scarce health resources are not being put to best use.

The different health ‘need’ or disease burden of populations will drive rates of various medical procedures and interventions. It cannot be assumed that more appropriate clinical decisions are necessarily made in areas with low admission rates. 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 benefit do not receive the treatment. 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.

To determine what an appropriate rate is requires knowledge of clinical outcomes of treatment, which is often lacking and is an area that needs much more work. Information on patients’ needs and preferences is also important.
What were the findings?

The findings are covered in more detail from page 11, but in summary, variation in admission rates for several common procedures undertaken in Australian hospitals in 2010–11 was examined. Variation was measured according to where the patients lived – the geographic areas defined by the primary healthcare organisations known as Medicare Locals. However, the approach can be used to explore variation across any specified geographical boundaries.

Variation occurred with all interventions, although it is not possible to know how much of this is unwarranted, or to comment on the relative performance of health services in one Medicare Local compared with another. The findings may be of particular interest for those who have suffered a hip fracture or require orthopaedic, obstetric and gynaecological, or cardiac care. The amount of variation among Medicare Locals – expressed by the ‘fold-difference’ or ratio of the highest to lowest admission rate – was smallest for caesarean sections (a 1.6-fold variation) and largest for cardiac catheterisation, a procedure used to diagnose coronary heart disease conditions (a 7.4-fold variation).

The study also found that the amount of variation differed between the public and private hospital sectors. For example, variation for knee replacements and knee arthroscopy was higher in public hospitals (7-fold for knee replacement and 11-fold for arthroscopy) than in the private sector (a 3-fold difference for both procedures). Sixty-seven per cent of admissions for knee replacement and 81 per cent of admissions for knee arthroscopy occurred in the private sector.

The majority (55 per cent) of admissions for cardiac catheterisation took place in the private sector. The reverse was observed for revascularisation interventions performed to address coronary heart disease; approximately 60 per cent of admissions for coronary artery bypass grafting and 55 per cent of those for coronary angioplasty and stenting took place in public hospitals.a

The findings raise questions about how health care is delivered, and point to areas requiring further work and research, notably the need to address the lack of systematic monitoring of the outcomes of common healthcare interventions. A more coordinated, national, approach to tracking outcomes of care across a variety of interventions is likely to be helpful for patients, health service managers, clinicians, funders and policy makers. At present there is no consistent approach between state and territory jurisdictions in the use and monitoring of healthcare interventions or pathways. Mechanisms such as clinical quality registries link clinical and service activity to outcomes.

Linking care inputs and processes with outcomes can provide information to help determine the appropriate rate for an intervention. It can also inform a better understanding of patient preferences in health care.

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a Procedures undertaken in outpatient settings were not included, and that may affect the rates observed for knee arthroscopy and cardiac catheterisation, procedures which can occur in both admitted and non-admitted care.
1. Overview

What does healthcare variation mean for patients?

Healthcare variation occurs when patients with similar conditions or health problems receive different treatment. This may reflect differences in the availability of some services in some locations or differences in the way in which the healthcare professional consulted works or differences in the preferences expressed by the patient.

Variation is deemed unwarranted when it reflects differences in availability of care and/or differences in the personal preferences of the clinician providing treatment rather than differences in the health needs and preferences of the patient. When care is not tailored to the specific needs of the patient it may result in unexpected outcomes, or in expected outcomes not being met.

For example, patients might find that their mobility is not improved by the surgery as they expected, or that their pain returns relatively soon after a procedure when their expectation was that it would be gone for good. Or the patient may not be aware that the same or better outcome could have been achieved if a different treatment approach was used.

Reducing unwarranted variation through shared decision making

Patients may wish to play a more active role in making decisions about their health care and ensuring that it is appropriate.

Patients who are fully informed about the implications of various options and how these align with their own values will often make different choices about their care. For example, there is some evidence that they are less likely to choose surgery.

Shared decision making is widely seen as a strategy for improving patient care and reducing unwarranted variation. This is a process that supports patients to examine the likely benefits and harms of available screening, treatment, or management options, to communicate their values and preferences, and to select the best course of action for their own circumstances. This is particularly important when the evidence is uncertain, or there are multiple options (see Figure 1).

It is particularly important to have shared decision making and a full discussion of the likely benefits and harms of various options when consulting your GP or other primary care provider, as this is where decisions are often made that lead to referral for the sorts of interventions examined.

If shared decision making is to occur, tools based on the best clinical evidence should be made available to support patients and clinicians.

The Commission is starting a program of work to increase access to tools and resources that will assist with shared decision making.

Figure 1 The key factors of shared decision making

The values **this** patient places on benefits and harms of the options

Evidence, derived from the study of groups of patients

The clinical condition of **this** patient; other diagnoses and risk factors, including their genomic profiles

Choice → Decision

1. Overview

What drives variation in health care?

Variation in healthcare is related to differences in patients’ needs for health care, which may reflect variation in the wide-ranging determinants of population health, burden of disease, demographics, socioeconomic status, and environmental issues.

It is also related to factors that drive the demand for and supply of health services, such as culture, healthcare education, and organisational structures, as well as beliefs and traditions. Demand for health care can be influenced by the information available to patients.

The more resources, equipment and workforce that are available, the more they will be used. Often there is no evidence that more care leads to better outcomes.

Other supply-related and health system factors include clinical decision making and referral patterns, and payment and remuneration structures. For instance, in the United States, regions where medical procedures are performed in centres owned by physicians have interventions rates that are twice as high as those performed in centres where physicians have no direct financial interest.

The fact that variation is observed may also be driven by chance (random variation), or simply reflect data inaccuracies such as incorrect coverage, coding or data processing errors.

Uncertainty about the merits and outcomes of interventions can also contribute to healthcare variation. While there should be little variation where a healthcare intervention is known to be effective, of clear benefit for patients, and of proven value, for many healthcare interventions, there is considerable uncertainty about their merits.

As well, where competing treatment options have different risks and benefits that individual patients may evaluate differently, variation may reflect differences in patient or clinician preferences, cost or affordability.
2. What did this study involve?

In 2012 the Organisation for Economic Cooperation and Development (OECD) undertook an international study of medical practice variation involving a number of countries. It is a starting point for more detailed work aimed at identifying unwarranted practice variation in a range of condition, treatment and population groups.

The Australian Commission on Safety and Quality in Health Care coordinated Australia’s participation in this study, with support from all states, territories and the Commonwealth and technical input by the Australian Institute of Health and Welfare. The final report on this international study will be published by the OECD in 2014.

This document summarises the key findings from a discussion paper presenting a more detailed picture of the Australian results and includes some additional analysis of cardiac care data, and data for hysterectomy (excluding admissions with any cancer diagnosis).

Results are provided as age-and sex-standardised admission rates, and are for the year 2010–11. This paper uses hospital admission data, sourced from the National Hospital Morbidity Database, analysed by the Medicare Local of the patient’s residence (i.e. according to where they lived, rather than where they were treated).

Data for each of the interventions measured is selected based on the procedure undertaken in a hospital admission. Data for hip fractures is based on the principal diagnosis recorded for a patient’s hospital admission.

Medicare Locals were chosen as the geographic unit of analysis because, in the majority of cases, the chain of events leading to the intervention in hospital are often initiated by a referral from the primary care sector. The consultation between patient and primary care provider is therefore a key point for discussion of treatment options and alternatives.

While this particular set of analyses uses Medicare Local of patient residence to explore patterns of variation within Australia, the approach can be used to explore variation across any specified geographical boundaries.

In a recent analysis of the performance of primary healthcare organisations, the National Health Performance Authority identified seven clusters of Medicare Locals (called peer groups) to enable more comparable reporting. The peer groups were established based on three criteria: proximity of each Medicare Local to major metropolitan cities; proximity to major hospitals; and socioeconomic status.

This grouping enables fairer comparisons of Medicare Locals and also allows summary comparisons between peer groups to be made. The seven peer groups and their respective Medicare Locals are presented on page 9. These peer groups are used to present data throughout this publication.
2. What did this study involve?

Figure 2 Map of Medicare Locals

New South Wales – 17
1 Eastern Sydney
2 Inner West Sydney
3 South Eastern Sydney
4 South Western Sydney
5 Western Sydney
6 Nepean – Blue Mountains
7 Northern Sydney
8 Sydney North Shore and beaches
9 Central Coast NSW
10 Illawarra – Shoalhaven
11 Hunter
12 North Coast NSW
13 New England
14 Western NSW
15 Murrumbidgee
16 Southern NSW
17 Far West NSW

Northern Territory – 1
60 Northern Territory

Australian Capital Territory – 1
61 Australian Capital Territory

Victoria – 17
18 Inner North West Melbourne
19 Bayside
20 South Western Melbourne
21 Macedon Ranges and North Western Melbourne
22 Northern Melbourne
23 Inner East Melbourne
24 Eastern Melbourne
25 South Eastern Melbourne
26 Frankston – Mornington Peninsula
27 Barwon
28 Grampians
29 Great South Coast
30 Lower Murray
31 Loddon – Mallee – Murray
32 Hume
33 Goulburn Valley
34 Gippsland

South Australia – 5
46 Northern Adelaide
47 Central Adelaide and Hills
48 Southern Adelaide – Fleurieu – Kangaroo Island
49 Country South
50 Country North

Queensland – 11
35 Metro North Brisbane
36 Greater Metro South Brisbane
37 Gold Coast
38 Sunshine Coast
39 West Moreton – Oxley
40 Darling Downs – South West QLD
41 Wide Bay
42 Central Queensland
43 Central and North West QLD
44 Townsville – Mackay
45 Far North QLD

Western Australia – 8
51 Perth Central East Metro
52 Perth North metro
53 Fremantle
54 Bentley – Armadale
55 Perth South Coastal
56 South West WA
57 Goldfields – Midwest
58 Kimberley – Pilbara

Tasmania – 1
59 Tasmania

Table 1 Medicare Locals by peer group with identification number

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<thead>
<tr>
<th>1. Metro 1</th>
<th>No.</th>
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<tr>
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<td>Northern Sydney</td>
<td>7</td>
<td>Inner East Melbourne</td>
</tr>
<tr>
<td>Sydney North Shore and Beaches</td>
<td>8</td>
<td>Australian Capital Territory</td>
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<td>Central Adelaide and Hills</td>
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<td>Gold Coast</td>
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<td>Bentley–Armadale</td>
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<td>West Moreton–Oxley</td>
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<td>Northern Adelaide</td>
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<td>Northern Melbourne</td>
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<td>4. Regional 1</td>
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<tr>
<td>Nepean–Blue Mountains</td>
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<td>Central Coast NSW</td>
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<td>Barwon</td>
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<td>Illawarra–Shoalhaven</td>
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<td>Hunter</td>
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<td>Perth South Coastal</td>
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<td>5. Regional 2</td>
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<td>North Coast NSW</td>
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<td>New England</td>
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<td>Hume</td>
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<td>Western NSW</td>
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<td>Wide Bay</td>
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<td>Grampians</td>
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<td>Country South SA</td>
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<tr>
<td>Great South Coast</td>
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<td>South West WA</td>
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<tr>
<td>Loddon–Mallee–Murray</td>
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<td>Tasmania</td>
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<td>6. Rural 1</td>
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<td>Far West NSW</td>
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<td>Townsville–Mackay</td>
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<td>Lower Murray</td>
<td>30</td>
<td>Country North SA</td>
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<tr>
<td>Central Queensland</td>
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<td>7. Rural 2</td>
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<tr>
<td>Central and North West Queensland</td>
<td>43</td>
<td>Kimberley–Pilbara</td>
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<tr>
<td>Far North Queensland</td>
<td>45</td>
<td>Northern Territory</td>
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<tr>
<td>Goldfields–Midwest</td>
<td>57</td>
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</tbody>
</table>
2. What did this study involve?

Analysis was undertaken for all hospital admissions and by hospital sector. Public hospital data include care and/or treatment of a patient in a public hospital (including public and private patients) and private data include any care and/or treatment in a private hospital (including public and private patients).

With the exception of caesarean section, all rates by Medicare Local have been calculated with the Medicare Local population as the denominator. This is because the focus is variation in practice among Medicare Locals, measured as the number of hospital separations or procedures per 1,000 population (age standardised).

For caesarean section, a count of live births is used as the denominator for all rates (public hospitals, private hospitals and total). This count is based on the total number of hospital (public and private) birth episodes of mothers living in each Medicare Local, which included at least one live birth. The number of births is used as the denominator for caesarean sections as this effectively adjusts for the variation in the number of births per 1,000 population among Medicare Locals. This means the variation in caesarean section rates shown for Medicare Locals is due to factors other than variation in birth rates.

Hospital data presented here and in the discussion paper do not include episodes of non-admitted care provided in outpatient clinics. As there is no standardised admissions policy across states and territories, analysis of variation across Medicare Locals for some procedures should take into account possible differences in admission practice and policies among providers and/or states and territories. For example, procedures such as knee arthroscopy or cardiac catheterisation can be provided as either non-admitted or admitted care.
3. Variation for specific interventions studied
3. Variation for specific interventions studied

Map 1 Admissions for hip fracture

Note: The five groups are based on age and sex standardised rates. The range within each group is as follows: Lowest (50.0–93.9); 2nd (94.0–101.0); 3rd (101.1–105.9); 4th (106.0–113.5); Highest (113.6–253.0).

Source: AIHW analysis of National Hospital Morbidity Database.

Map 1 Admissions for hip fracture per 100,000 population by Medicare Local, 2010–11
3.1 Admissions for hip fracture

A hip fracture is a break occurring at the top of the thigh bone (femur), near the pelvis. More than 17,000 Australians aged 40 years and over broke their hip in 2007–08. Hip fracture will most often result in surgery, either internally ‘pinning’ the fracture, or performing a hip replacement. This will depend on the precise location and extent of the break, and other factors such as the patient’s age, other health problems and functional status, as well as the preference of the patient, and of the clinical team.

Admission for hip fracture was selected by the OECD as a useful ‘calibration’ indicator because discretionary factors relating to patient preference, clinician practice or health service organisation are unlikely to influence admission rates as much as for the other, more discretionary interventions in the study.

The findings include:

- In 2010–11, the national standardised rate of admission for hip fracture was 102 per 100,000 population.
- There was a 5-fold difference between the highest admission rate (253 admissions per 100,000 population for Kimberley–Pilbara, in north-west Western Australia) and the lowest (50 per 100,000 for Perth South Coastal). If the Kimberley-Pilbara result was removed from the calculation, there was still a 2.7-fold variation between the lowest and highest admission rates.
- Variation was evident within groups, particularly regional and rural areas. The Australian Capital Territory, Tasmania and most Medicare Locals in Victoria had the lowest rates of admission for hip fracture compared with other Medicare Locals.
- The variation could be due to a range of demographic, epidemiological and environmental factors (for example, levels of osteoporosis and obesity). The WA Department of Health is currently exploring the potential reasons for this higher than expected rate of hip fracture in the Kimberley-Pilbara Medicare Local. One factor may be that about 30 per cent of the population in this Medicare Local are Indigenous Australians, and Indigenous Australians are more likely than other Australians to fracture their hips.

Figure 3 Hip anatomy and hip fracture types

3. Variation for specific interventions studied

Map 2 Admissions for knee replacement

Note: The five groups are based on age and sex standardised rates. The range within each group is as follows: Lowest (140–182); 2nd (183–217); 3rd (218–241); 4th (242–261); Highest (262–330).

Source: AIHW analysis of National Hospital Morbidity Database.

Map 2 Admissions for knee replacement per 100,000 population by Medicare Local, 2010–11
Orthopaedic care

3.2 Knee replacement

Knee replacement (also known as knee arthroplasty) is a surgical procedure that removes diseased parts of the bones forming the joint, and replaces the joint with a prosthesis. The most common reasons for the procedure are pain or mobility problems caused by osteoarthritis. Other types of arthritis, haemophilia or disorders of bone growth may also cause problems leading to knee replacement. Without replacement surgery, a severely osteoarthritic knee joint may continue to deteriorate until it is very difficult to perform normal weight-bearing activities.

Alternative treatments include: weight loss; physiotherapy or other physical therapies; hydrotherapy; use of walking aids; non-steroidal anti-inflammatory drugs (NSAIDs); and corticosteroid injections.

The findings include:

- In 2010–11, the national standardised rate of admission for knee replacement was 221 per 100,000 population.
- Rates for Medicare Locals ranged from 140 admissions per 100,000 population (Inner North West Melbourne) to 330 admissions (Country North SA), a 2.4-fold variation. Medicare Locals with the lowest overall rates (lowest fifth) were predominantly in metropolitan areas, and those with the highest rates (highest fifth) were in regional and rural areas. Variation in rates was similar in all seven Medicare Local peer groups.
- Two-thirds of admissions for knee replacements occurred in private hospitals. Variation in public sector admissions by Medicare Local was 7-fold, compared with 2.8-fold in private sector admissions.
- Variation in admissions for knee replacement between Medicare Local populations was low compared with the other interventions. Factors that may drive variation in this intervention include burden of disease, particularly osteoarthritis, as well other determinants of health, such as obesity. Previous research has found that males and females living in the most disadvantaged areas were more likely than those living in least disadvantaged areas to have a knee replacement for osteoarthritis.
- Because we do not have reliable information about the outcomes of this treatment or patient preferences, it is difficult to identify the appropriate rates for knee replacement compared with other alternatives. Future work may focus on gathering information linking the intervention with patient outcomes to help identify unwarranted variation and inform policy action to reduce it.
Map 3 Admissions for knee arthroscopy per 100,000 population by Medicare Local, 2010–11

Note: The five groups are based on age and sex standardised rates. The range within each group is as follows: Lowest (232–300); 2nd (301–354); 3rd (355–406); 4th (407–491); Highest (492–726).

Source: AIHW analysis of National Hospital Morbidity Database.

3. Variation for specific interventions studied
Orthopaedic care continued

3.3 Knee arthroscopy

Knee arthroscopy is a procedure used to examine and, if necessary, repair the inside of the knee joint. During arthroscopy two thin probes are inserted into the joint through two separate punctures at the front of the knee. One is a fibre-optic telescope with an attached camera so that a picture can be projected on a monitor. The other probe usually has an attached cutting device to enable trimming and removal of loose or floating tissue if necessary.

In isolation, arthroscopy can be used to evaluate and treat cartilage problems, such as a torn meniscus, or removal of loose bodies from the knee joint. Arthroscopy is also used to guide more extensive procedures such as reconstruction of the knee.

Scientific evidence-based reviews have shown that arthroscopy is of little benefit if the underlying cause of the problems is osteoarthritis. A more recent trial showed no benefit from arthroscopic removal of torn meniscus fragments in patients without knee osteoarthritis but with a degenerative meniscal tear. Alternatives to diagnostic arthroscopy include imaging such as magnetic resonance and X-ray. Therapeutic alternatives include conservative treatment such as exercise and physiotherapy.

The findings include:

- In 2010–11, the Australian standardised rate of admission for 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), a 3-fold variation. Five out of eight of the Medicare Locals with the highest rates were in South Australia.
- Four out of five admissions for knee arthroscopy occurred in private hospitals. Waiting times in the public sector may influence private sector rates. No clear relationship between the overall Medicare Local rate and the proportion reported by sector was observed. That is, there was no clear pattern that one sector was contributing more to the overall variation observed. However, these results should be interpreted with caution as data do not include patients who underwent knee arthroscopy in an outpatient setting (day cases) and do not count private patients in public hospitals as private, and vice versa.
- Variation in admissions for knee arthroscopy was comparatively high and warrants further investigation, particularly as the efficacy of arthroscopy in managing osteoarthritis has been questioned and a range of alternatives exist.
- In the absence of routine measurement of outcome, it is difficult to identify the appropriate rates for this intervention compared with other alternatives. Future work may focus on gathering information linking knee arthroscopy with patient presentation and outcomes to help identify unwarranted variation and inform efforts to reduce it. In the case of knee arthroscopy, investigating variation in rates where it is used to treat osteoarthritis or degenerative disease may be indicated.
3. Variation for specific interventions studied

Map 4 Caesarean section

Note: Three Medicare Locals (Far West New South Wales; Lower Murray; Central and North West Queensland) are not shaded. Data for these three Medicare Locals were not published because of the small number of live births in those Medicare Locals.

Note: The five groups are based on age standardised rates. The range within each group is as follows: Lowest (243–286); 2nd (287–298); 3rd (299–323); 4th (324–336); Highest (337–392).

Source: AIHW analysis of National Hospital Morbidity Database.

Map 4 Caesarean sections per 1,000 live births by Medicare Local, 2010–11
Obstetric and gynaecological care

3.4 Caesarean section

A caesarean section is a surgical procedure to enable birth through a cut made in the mother’s abdominal wall and the wall of the uterus. A caesarean section may be planned (elective), or unplanned (emergency) if there are problems during labour. Both elective and emergency caesareans are included in the results presented here.

Mothers and their obstetricians may decide on elective caesarean birth for several reasons. The decision will be based on a combination of the particular situation and personal preferences. Reasons may include a previous caesarean section, pre-existing health problems, position of the baby in the womb, or birth involving three or more babies. An unplanned (emergency) caesarean birth may be due to the baby’s position in the womb, lack of progression of labour, distressed baby or a prolapsed umbilical cord.

Australia has a high rate of caesarean section compared with the OECD average. The main factors known to be associated with variation in rates of caesarean section include the mix of public and private care, models of maternity care, socioeconomic status (independent of whether the patient is treated in a public or private hospital), age, obesity, access to specialist care, and variation in thresholds for performing operative delivery by individual practitioners (e.g. breech delivery, rotational instrumental delivery, previous caesarean delivery).

In this paper, the number of live births is used as the denominator for all rates (public, private and total) as this effectively adjusts for the variation in the number of births per 1,000 population among Medicare Locals. That is, the variation in caesarean section rates shown for Medicare Locals will be due to factors other than variation in overall birth rates.

The findings include:

- In 2010–11, the national standardised rate for caesarean section was 313 per 1,000 live births.
- Rates in Medicare Locals ranged from 243 caesarean sections per 1,000 live births (Goldfields-Midwest) to 392 per 1,000 (Fremantle), a 1.6-fold national variation. Compared with other interventions analysed, variation among Medicare Locals was low. There was no clear relationship between rates of caesarean section and geographic location, and a similar degree of variation was observed in all Medicare Local peer groups.
- Approximately two-thirds of all caesarean sections occurred in public hospitals. Variation in private hospital admissions by Medicare Local was 36.5-fold. Rates across most Medicare Locals were similar despite different proportions being reported for public and private sectors.
- Of the interventions examined in this paper, variation was lowest for caesarean sections rates, although Australia’s overall rate for this procedure is high compared with other developed countries.
- Previously, examination of caesarean section rates by hospital of birth (rather than Medicare Local of patient residence) has found a different level and pattern of variation. For example, a 2013 study found a 4-fold variation in case mix-adjusted caesarean section rates by hospital in New South Wales.
- Further investigation is required to determine the specific drivers of the relatively high caesarean section rates in Australia. Future work could examine variation in elective and emergency caesarean section rates, and the effect of factors such as maternal obesity and maternal requests as drivers of variation in the rates of this procedure.

Figure 6 Caesarean section

Horizontal incision

Vertical incision
3. Variation for specific interventions studied

Map 5 Admissions for hysterectomy

Note: The five groups are based on age standardised rates. The range within each group is as follows: Lowest (1.68–2.41); 2nd (2.43–2.68); 3rd (2.71–2.99); 4th (3.00–3.26); Highest (3.35–5.20).

Source: AIHW analysis of National Hospital Morbidity Database.

Map 5 Admissions for hysterectomy without any diagnosis of cancer per 1,000 population by Medicare Local, 2010–11
3.5 Hysterectomy

A hysterectomy is an operation to remove the uterus. The operation is performed through a surgical incision or cut to the abdomen, by ‘keyhole surgery’ or through the vagina. It can be recommended for a number of uterine conditions. Some are benign, others malignant. Benign, or non-cancerous conditions, include uterine fibroids, endometriosis, adenomyosis, uterine prolapse, and heavy periods that cannot be controlled by other treatments. Malignant, or cancerous conditions, include cancer of the cervix, and cancer of the uterus.

Although the OECD study examined variation in all hysterectomies, the analysis here focuses mainly on analysis of hysterectomies without any diagnosis of cancer. This is because for patients with specific cancers, hysterectomy is generally considered the preferred treatment.

Australia has a higher rate of hysterectomy (including any diagnosis of cancer) than many other OECD countries, although rates have decreased over the last 20 years. This decrease may be due to the use of alternative treatments. A hysterectomy is a major operation, and is recommended when other surgical treatments or medication treatments may not be possible, or have not helped alleviate the patient’s symptoms.

The findings include:

- In 2010–11, the national standardised rate of admission for hysterectomy without any diagnosis of cancer was 2.8 per 1,000 female population.
- Rates for Medicare Locals ranged from 1.7 (Inner West Sydney) to 5.2 admissions per 1,000 females (Grampians), a 3-fold variation. The group of Medicare Locals with the lowest overall rates were all situated within the greater metropolitan Sydney and Melbourne areas. Most Medicare Locals with the highest overall rates were situated in non-metropolitan areas of Australia. The finding of higher rates of hysterectomy in non-metropolitan populations has been found in previous studies.
- Just over half the admissions for hysterectomy without any diagnosis of cancer occurred in the private sector. There was no clear pattern between overall admission rates and proportions performed by sector.

Figure 7 Female reproduction anatomy
3. Variation for specific interventions studied

Map 6 Admissions for cardiac catheterisation

Note: The five groups are based on age and sex standardised rates. The range within each group is as follows: Lowest (210–471); 2nd (472–556); 3rd (557–645); 4th (646–719); Highest (720–1,551).

Source: AIHW analysis of National Hospital Morbidity Database.

Map 6 Admissions for cardiac catheterisation per 100,000 population by Medicare Local, 2010–11
Cardiac care

Coronary heart disease is a chronic disease during which plaque builds up inside the coronary arteries, which supply oxygen-rich blood to the heart. Over time, this plaque can harden or rupture. Hardened plaque narrows the coronary arteries and reduces the flow of oxygen-rich blood to the heart. This can cause chest pain or discomfort (angina). If the plaque ruptures, a blood clot can form on its surface. A large blood clot can mostly or completely block blood flow through a coronary artery. This is the most common cause of a heart attack. Over time, ruptured plaque also hardens and narrows the coronary arteries.

3.6 Cardiac catheterisation

Cardiac catheterisation is a procedure used to diagnose heart conditions. A long, thin, flexible tube (catheter) is put into a blood vessel in the arm, groin or neck and threaded to the heart. A dye is injected through the catheter to show any restrictions in blood flow on a monitor using x-ray. Cardiac catheterisation is a diagnostic procedure, which may be performed in the outpatient setting. As the data used in this analysis are for admitted patient episodes only, procedures performed in the outpatient setting are not captured here.

The findings include:

- In 2010–11, the national standardised rate of admission for cardiac catheterisation was 596 per 100,000 population.
- There was over a 7-fold difference between the highest rate (1,551 admissions per 100,000 in Murrumbidgee) and the lowest rate (210 admissions per 100,000 population in Inner West Sydney).
- There was variation in all Medicare Local peer groups, and no clear relationship between remoteness and admission rates was observed.
- Just over half (55 per cent) of all admissions for cardiac catheterisation occurred in private hospitals. There was no clear pattern between the overall Medicare Local admission rate and the proportion of patients admitted by sector.
- Variation in cardiac catheterisation rates between Medicare Local populations was the highest of all interventions examined here.
- The results indicate, approximately, that more than two catheterisations took place for every revascularisation intervention performed to address coronary heart disease (that is, a percutaneous coronary intervention and/or coronary artery bypass graft).
- A considerably higher admission rate for this intervention was observed in the Murrumbidgee, a NSW Medicare Local.

Cardiac catheterisation is an invasive procedure that carries both a small procedural risk and a radiation burden because of the x-ray used in the procedure. While it is a diagnostic test, expert clinicians consulted in relation to these results suggest it should be approached more as an essential prerequisite to revascularisation – patients should only undergo invasive coronary angiography when there is a high likelihood, based on clinical criteria and non invasive testing, that revascularisation will be the best option for the patient. Local healthcare planners may wish to investigate the ratio between catheterisation and revascularisation.

- A mix of factors can influence geographical variation in rates of cardiac catheterisation. These include the burden of coronary heart disease in populations, supply of services and clinical preference.
- Additional work should examine if admission rates for these procedures correlate with levels of coronary heart disease in given populations or geographic areas.

Figure 8 Cardiac catheterisation
3. Variation for specific interventions studied

Map 7 Admissions for percutaneous coronary interventions (PCI)

Note: The five groups are based on age and sex standardised rates. The range within each group is as follows: Lowest (135–171); 2nd (172–193); 3rd (194–213); 4th (214–243); Highest (244–393).

Source: AIHW analysis of National Hospital Morbidity Database.

Map 7 Admissions for PCI per 100,000 population by Medicare Local, 2010–11
Cardiac care continued

3.7 Percutaneous coronary intervention

Percutaneous coronary intervention (PCI), also called a percutaneous transluminal coronary angioplasty (PTCA) or stenting, is a much less invasive revascularisation procedure than a coronary artery bypass graft. During PCI a catheter (a thin flexible tube) is used to place a small structure called a stent that opens up narrowed blood vessels in the heart. The catheter is inserted into blood vessels either in the groin or in the arm, and threaded to the heart where the coronary artery is narrowed (see cardiac catheterisation).

When the tip is in place, a balloon tip covered with a stent is inflated. The balloon tip compresses the plaque and expands the stent. Once the plaque is compressed and the stent is in place, the balloon is deflated and withdrawn. The stent stays in the artery, holding it open.

PCI can be conducted at the same time as a cardiac catheterisation. In this case, the admission is counted once in the data for catheterisation (presented above and once in the data for PCI below).

The findings include:

- In 2010–11, the national standardised rate for admissions for PCI was 214 per 100,000 population.
- Rates for Medicare Locals ranged from 135 admissions per 100,000 population (Northern Territory) to 393 admissions per 100,000 (Loddon–Mallee–Murray), a 3-fold variation.
- Just over half (55%) of the admissions occurred in the public sector. There was no clear pattern between the total Medicare Local admission rate and the proportion of patients admitted by sector. There was considerable variation in private sector rates between Medicare Locals.

*A stent is not always put in place during a PCI.
3. Variation for specific interventions studied

Map 8 Admissions for coronary artery bypass grafting (CABG)

Note: The five groups are based on age and sex standardised rates. The range within each group is as follows: Lowest (32–58); 2nd (59–67); 3rd (68–73); 4th (74–82); Highest (83–105).

Source: AIHW analysis of National Hospital Morbidity Database.

Map 8 Admissions for coronary artery bypass grafting per 100,000 population by Medicare Local, 2010–11
Cardiac care continued

3.8 Coronary artery bypass grafting (CABG)

Coronary artery bypass grafting (CABG) is a type of surgery that improves blood flow to the heart. Surgeons use CABG to treat people who have severe coronary heart disease. During CABG, a healthy artery or vein from the body is connected, or grafted, to the blocked coronary artery. The grafted artery or vein bypasses the blocked portion of the coronary artery. This creates a new path for oxygen-rich blood to flow to the heart muscle. Surgeons can bypass multiple coronary arteries during one surgery (e.g. ‘triple bypass’).

CABG is one treatment for coronary heart disease. Other options include percutaneous coronary intervention (PCI). The decision to opt for CABG will depend on factors such as the anatomical extent of the disease (if several vessels are involved, a CABG is clinically more indicated), clinician preference and training, as well as patient preferences and access to required services.

The findings include:

- In 2010–11, the national standardised rate for admission for coronary artery bypass grafting was 69 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 (32 per 100,000 in Fremantle). Compared with most other Medicare Locals, rates of admissions for coronary artery bypass graft were lower for Medicare Locals in Western Australia (including the greater Perth metropolitan area) and the Australian Capital Territory.
- Variation was evident in all seven Medicare Local peer groups.
- Around 60 per cent of admissions for coronary artery bypass grafting occurred in the public sector. For most of the Medicare Locals with the lowest overall rates, rates were similar despite different proportions of admissions being reported for private and public hospitals.
Map 9 Admissions for revascularisation (CABG and/or PCI) per 100,000 population by Medicare Local, 2010–11

Note: The five groups are based on age standardised rates. The range within each group is as follows: Lowest (203–242); 2nd (243–257); 3rd (258–272); 4th (273–303); Highest (304–447).

Source: AIHW analysis of National Hospital Morbidity Database.
Cardiac care  continued

3.9 Admissions for revascularisation (PCI and/or CABG)

These are both interventions aimed at coronary heart disease and there may be a degree of substitution between the two. It is therefore useful to examine variation in combined admission rates for the two revascularisation interventions. This analysis includes admissions where at least one of either intervention was undertaken. In a very small number of cases (less than 0.05%) both types of procedures were undertaken in the same admission.

The findings include:

- In 2010–11, the national standardised rate for admission for PCI and/or CABG was 280 per 100,000 population.
- Rates in Medicare Locals ranged from 203 (Kimberley-Pilbara) to 447 (Loddon-Mallee-Murray) per 100,000 population, a 2-fold national variation. This variation was smaller than that observed for PCI only and CABG only (both a 3-fold variation).
- Fifty-eight per cent of these admissions were performed in the public sector. Most Medicare Local rates were similar, despite different proportions being reported for public and private sectors.
- A complex mix of factors can influence geographical variation in rates of revascularisation interventions. These include burden of coronary heart disease in populations (including the anatomical extent of disease, that is, how many coronary vessels are involved), comorbidities, remoteness and clinical preference. Rates of revascularisation procedures in Australia are similar to the OECD average.
- These results suggest that in 2010–11, around three PCI were performed for every CABG in Australia. The highest observed ratio of PCI to CABG in a Medicare Local population was 6.8.
- Local healthcare planners and clinical care networks may wish to review whether the PCI to CABG ratio is appropriate in their area. Some studies demonstrate that patients with diabetes and multi-vessel coronary disease and patients with complex multi-vessel disease have better outcomes with CABG than with PCI but such patients often end up having PCI. Similarly, there is evidence of limited benefit of elective PCI versus medical therapy. High rates of PCI and high PCI to CABG ratios may need further investigation to determine appropriateness.
- Based on the data analysed here, there is little evidence of a substitution effect between the two revascularisation interventions examined; rates of admission for PCI in Medicare Local populations appear to be independent of admissions for CABG, and vice versa.
- Future work could examine if admission rates for these procedures correlate with levels of coronary heart disease in given populations or geographic areas.
4. Responding to these findings

Internationally, there is a move towards detailed, public reporting of healthcare variation, and a focus on greater engagement of the community, patients, health professionals, services and managers in exploring reasons for variation.

The first step in reducing unwarranted variation in health care is the systematic and routine collation, analysis and publication of variation. This document has focused on variation in procedures undertaken in hospital admissions, and does not consider episodes of non-admitted care provided in outpatient clinics.

Consistency in how patient admissions are defined is important in order to enable accurate comparisons in true admission rates across the country. At the moment there may be inconsistent practice in this regard between states and territories, potentially influencing the results of national studies such as this one.

As there is no standardised admission policy across states and territories, some procedures, such as knee arthroscopy or cardiac catheterisation, may be provided as either admitted or non-admitted care. Therefore, information on procedures conducted outside hospital admissions could provide a more complete picture of healthcare variation. It is also important to focus on variation in community and primary care, not least because the pathways to specialist intervention often begin there.

At present there is no consistent approach between state and territory jurisdictions in the use and monitoring of healthcare interventions or pathways. Mechanisms such as clinical quality registries link clinical and service activity to outcomes. Linking care inputs and processes with outcomes can provide information to help determine the appropriate rate for an intervention. Patient outcomes should begin to be integrated into routine data collection processes, and there may be advantages in a more coordinated, national, approach to tracking outcomes of care in a variety of modalities, treatments and interventions.

It is also important for information on various aspects of medical practice to be fed back to the clinical organisations, and healthcare professionals who are responsible for referring patients for treatment or testing, and who are responsible for planning and (shared) decision making about treatments and to consumers. Access to information can be a powerful driver of quality improvement in health care, provided it is timely, reliable and meaningful, and presented in a manner that can be understood by the intended audience.

Involvement of clinical leaders and clinicians in efforts to inform the analysis of variation is essential. 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, for example, has been shown to be an effective strategy in reducing unwarranted healthcare variation.

Shared decision making allows patients to examine the likely benefits and harms of available screening, treatment, or management options, communicate their values and preferences and select the best course of action for their own circumstances. This is particularly important when the evidence is uncertain, or there are multiple options with different probabilities of risk and benefit.
How jurisdictions are addressing healthcare variation

- The Australian Government, in the 2013/14 Budget, identified funds to work with the Commission on exploring variations in community care as part of an Australian Atlas of Healthcare Variation. The Commission will investigate and map healthcare variation in a range of conditions, treatments and investigations across healthcare settings and sectors starting in 2014.

- The Commonwealth Reviews of the Medicare Benefits Schedule (MBS) systematically examine MBS items to ensure that they reflect contemporary evidence, improve health outcomes for patients and represent value for money. Although these are not initiatives solely directed at identifying and addressing unwarranted variation, they contribute to this goal. The Reviews have a primary focus on improving health outcomes and the financial sustainability of the MBS, through consideration of patient safety risk, the health benefit, and/or inappropriate use (under or over use). More information is available at www.m sac.gov.au/internet/msac/publishing.nsf/Content/reviews-lp

- The Australian Capital Territory currently does not have any ongoing local activity which measures or targets healthcare variation. The jurisdiction is currently examining approaches to improve patient flow through its hospital systems and expects to examine variation as a potential factor in hospital access in the near future.

- A number of New South Wales statutory authorities, including the NSW Cancer Institute, NSW Bureau of Health Information and the Clinical Excellence Commission, publish reports on variation in processes and outcomes of care annually. Publication is seen as an important lever to ensure appropriateness of care and address variations in clinical outcomes. Additionally, the NSW Agency for Clinical Innovation uses this information to develop strategies to support and reinforce these improvements. The current program of work includes action to reduce variation in outcomes for rare cancer surgeries, acute myocardial infarction and stroke mortality and outcomes for patients admitted with fractured neck of femur. Following a NSW Bureau of Health Information report in December 2013 pneumonia will now be added to the work program.

- The Northern Territory (NT) is following with interest work happening in other jurisdictions to understand variation across specific procedures and preventable hospitalisations. As the NT comprises one Medicare Local, it relies on identifying other Medicare Locals with similar socio-demography to understand variation. The NT now intends to undertake work to identify variation in selected procedures across its healthcare facilities.

- Queensland has targeted a reduction in unwarranted variation, particularly in adverse patient outcomes to ensure Queenslanders receive safe and high-quality care. Several initiatives exemplify these efforts, including the monitoring of patient outcomes and utilisation through the Variable Life Adjusted Display (VLAD) program, establishment of 18 statewide clinical networks, and statewide clinical guidelines and pathways.

- South Australia is focusing on reducing unwarranted variation and the volume of unsafe, avoidable and low priority public hospital service utilisation to maximise value across the healthcare system and improve patient outcomes. The aim is to redirect resources to the clinical activities that generate the best value for the population, preserving access to treatment for those who are most in need and could most benefit and reducing unnecessary risks associated with hospital stays. A Clinical Commissioning Advisory Committee has been established, comprising clinical leads from across the health system, and representatives from the Clinical Networks and Clinical Senate and Surgical Services Task Group to provide clinical advice and leadership across the health system on clinical service redesign, and guide consistent clinical practice in accordance with agreed commissioning priorities.

- Tasmania has commenced a comparative analysis of mortality and preventable hospitalisations between local health networks (Tasmanian Health Organisations). It is expected that this will assist with interpreting the findings of healthcare variation presented here as part of the OECD study.
• Victoria has identified clinical practice variation as potentially a useful tool to improve the efficiency and effectiveness of the public hospital system. The first step is using the OECD/AIHW methodology to re-analyse the results using public hospital catchments. This work is currently under way. This re-analysis will facilitate better engagement with clinicians about this variation and the underlying drivers. The next step will be to further extend the analysis using other interventions and conditions, and will be guided by clinician feedback.

• Western Australia has been working towards decreasing unwarranted variation in care by using a number of different methods aimed at improving evidence-based care. For a number of years, WA Health has had a strong focus on a network approach to developing evidence-based models of care for use within the public health system. Over 70 models of care have been developed to date, including models for acute coronary syndromes and elective joint replacement. WA Health has recently introduced an incentive payment program for the provision of evidence-based care in priority safety and quality areas. The Performance-based Premium Payment Program was piloted in 2012/13 and is being run in 2013/14 with payments for fragility hip fracture, acute stroke unit care, and management of acute myocardial infarction.
This paper forms a key part of the Commission’s efforts to assist health services and jurisdictions to continue to improve the quality and appropriateness of care, and builds on the reporting of aspects of healthcare variation over many years by various agencies and jurisdictions, notably the Australian Institute of Health and Welfare.

Feedback and comment on this paper will enable the Commission to build on the preliminary work presented here. This will include investigating variation in a broader range of clinical topic areas. The Commission will work with consumers, clinicians, jurisdictions and health services to develop a suite of programs, resources and tools.

You are invited to address the questions below.

Please use the following questions to guide your response.

Consultation questions

1. What is your position/role and your area of interest or expertise?
   (e.g. consumer, clinician, cardiology, policy)

2. Is the information provided on the selected interventions in this paper useful in helping to identify variation? What further information or analysis is needed to identify potentially unwarranted variation?

3. Is the presentation of the information, the tables and graphs, useful? How could the presentation be improved?

4. How should geographic groupings of patient residence be made in future – which units of analysis would be most helpful to explore healthcare variation in future?

5. What can the Commonwealth, state and territory governments, private healthcare providers, primary and community health care providers and Local Hospital Networks do to reduce unwarranted variation?

6. What role can clinicians and clinician organisations play to reduce unwarranted variation?

7. What role can consumer organisations play to reduce unwarranted variation?

8. Are you aware of any local activity to identify and reduce unwarranted healthcare variation?

9. Production of a national Atlas of Variation is planned for 2014–15. Which groups and organisations should be involved?

10. What areas or themes (conditions, treatments, interventions) should be explored for the atlas? What specific aspects or activity in these areas should be explored?

You can provide your comments and feedback by email or post by 20 July 2014.

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