

Mature use of casemix — are we there yet?

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Abstract

In this paper we consider the progress made in using casemix in Australia. We argue that while the casemix infrastructure has been highly developed and the casemix-based funding systems of some states are mature, there is still more development needed to use the data for clinical questions such as quality improvement activities. Further research is needed to establish what is needed to describe the impact of casemix on clinicians and hospitals in a context of increasing accountability and transparency and where questions of efficiency cannot be ignored.

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IT IS WIDELY ACCEPTED now that casemix is a tool and a means to an end rather than an end in itself.¹ The implementation of casemix in Australia can be traced back to the demonstration projects in the mid 1980s, and over a decade has passed since the earliest implementations of casemix-based funding in Victoria and South Australia. It is timely then to consider the progress we have made and to ask whether we are using the casemix tool in the best way.

The body of this paper is divided into four areas of discussion: technological issues concerned mainly with grouper development and performance; casemix-based funding systems; the diffusion of casemix information into clinical issues especially concerning quality of care and patient safety; and the organisational impact of casemix especially through clinical directorates.

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What is known about the topic?

While Australia has become a world leader in the design and production of casemix groupers and the underlying clinical classification system, the use of casemix information at the grass roots level is still limited to mainly administrative and managerial staff.

What does this paper add?

This paper suggests that there is still scope for further development in the use of casemix information in the clinical domain, suggesting that maturity will be achieved when the casemix data and the hospital discharge data on which they are based are used routinely to underpin a wide range of clinical issues including quality of care and safety issues.

What are the implications for practitioners?

There is a need for greater engagement of clinicians to enhance the use of casemix data in clinical decision making.

For the purposes of this paper, the mature use of casemix is defined as using casemix information to its full potential. This will necessarily mean different things for each of the four areas. The Box shows the characteristics that indicate a mature use of casemix for each of the four areas under discussion.

Casemix infrastructure — coding, groupers, and information systems

Australia has become a world leader in the design and production of casemix groupers and the underlying clinical classification system. The evidence for this assertion is the use over the last decade or more of the Australian National or Refined Diagnosis Related Groups (ARDRGs) as the starting system for several countries including Singapore and Germany. Most recently, ARDRGs have been implemented in casemix initiatives in Turkey² and Ireland.³ The ICD-10-AM classification system has been a great success, and its acceptance internationally has underpinned the

Characteristics of the mature use of casemix for each of the four areas

Area under discussion	Characteristics that indicate mature use of casemix
Grouper development and performance	<ul style="list-style-type: none"> ■ The grouper is robust and stable. For example, the system for making changes to the grouper is well known and the change process is regular and well planned ■ The grouper is used to produce readily available casemix information ■ Groupers are developed for use beyond the acute inpatient setting
Casemix-based funding systems	<ul style="list-style-type: none"> ■ Casemix information is used for the distribution of funds for acute inpatients but also for other types of patients such as ambulatory and non-acute patients
The diffusion of casemix information into clinical issues	<ul style="list-style-type: none"> ■ Widespread and routine use by clinicians of casemix information to shed light on clinical issues such as quality care and patient safety
The organisational impact of casemix	<ul style="list-style-type: none"> ■ Widespread and routine use internally in hospitals (at clinical directorate level) of casemix information

use of the ARDRGs, although some countries such as Singapore used the older versions of grouper that were based on ICD-9-CM. International interest in ICD-10-AM may be due, at least in part, to the fact that ICD-10-CM is not implemented yet in the United States, and so ICD-10-AM is filling that vacuum.

Several authors have compared the performance of the ARDRGs with other groupers.^{4,5} In summary, these comparisons tend to show that the ARDRGs perform at least as well, or better, than others, although factors such as the quality of the data used for the test have some impact on the results.⁶

Spectacular progress was made by the Commonwealth Department of Health and Aged Care* in the 1990s under the banner of the Casemix Development Program (CDP) in implementing a national casemix infrastructure. Since those heady days, the CDP was superseded by the Hospital Information, Performance Information Program (HIPPI) in 2003, and the scope of the program has narrowed to managing national data collections and the process of updating the DRG classification system. The updating process for ARDRGs run by the Department of Health and Ageing and the National Centre for Classification in Health has been regular, consultative and well planned. However, work is still continuing to introduce and refine emergency, non-acute, sub-

acute and community patient classification systems. The size of the national database is impressive (it currently contains about 39 million de-identified records) and consists of a mix of demographic, administrative and clinical (diagnoses and procedures) data. More publicly available data are available than ever before on hospital care in the various states.

We conclude that grouper development and performance using the criteria in the Box is at a mature level, although groupers for settings other than the acute inpatient setting still require further development before national consensus on their use is achieved. The recent Patient Classification Systems International Conference confirmed that Australia is highly regarded for its leadership in these technical matters.

However, in the next phase of casemix information system development Australia risks falling behind other countries where all the contacts with the patient are linked into episodes. Several countries are now turning their attention to charting the patient's journey through the health care system to identify discontinuities in care. It is widely recognised now that there is a need for more coordinated care and better access to information. Recently in the United States it was reported that 42% of Americans had experienced uncoordinated or inefficient care in the past 2 years.⁷

The next generation of casemix information systems are based on the information systems needed to support better care coordination. For

* In close partnership with the states/territories, clinicians and the private sector.

example, colleagues in Blekinge county, Sweden implemented a new approach using a “flow model” to visualise graphically all the steps in the journey of patients through the health care system.⁸ This generic process model was designed in response to Sweden’s new national care guarantee of the speed of treatment when a health problem is identified. This guarantee requires no delay in telephone contact with a health professional, a visit to a general practitioner within 7 days, a visit to a specialist practitioner, if needed, within 90 days after the GP visit, and action by the specialist within another 90 days. The “flow model” is an impressive information system available through the hospital’s intranet that allows staff to identify reasons for bottlenecks by identifying the person responsible for the delay, that is, the referring doctor, the patient or the hospital. The system can focus on individuals or groups of patients aggregated into casemix classes such as hip prosthesis. While these systems may chart an individual patient’s journey, their value for casemix work is not at the level of the individual patient but in providing an aggregated view of the journey for different casemix types.

Countries like The Netherlands with its universal identifier are in a much better position than Australia to create casemix information systems that cross the boundaries between inpatient and other parts of the health care sector. The DBC system in The Netherlands is still under development, but its striking difference to the Australian ARDRG system is that it includes data from both the inpatient and outpatient contacts with the patient.⁹

Progress is being made in Australia toward a universal patient identifier, and Western Australia has been linking data for research purposes for many years with impressive results. Linked data can be used to better coordinate care and enrich the casemix information. Thus, linked data are necessary to move to the next generation of information systems.

Casemix-based funding systems

The main policy objective for the introduction of casemix-based funding systems is to improve the

technical efficiency of hospitals, and a further objective is to improve the equity of payments between hospitals.¹⁰ Of course, if the funder has a different policy objective then it is understandable that they would choose another funding model and avoid a casemix-based approach. Palmer¹⁰ was more concerned that the avoidance of using casemix-based funding would be due to other factors than a clear-eyed assessment that the policy objectives were different. The other factors have been identified as opposition from powerful groups, fear of the Americanisation of the health system, and concern about disadvantaged hospitals or more severely ill patients.¹⁰ It may be argued that the use of casemix in a national casemix-based funding system is a necessary condition for claiming that our use of casemix is indeed mature. We do not think this is a realistic requirement. Under current Commonwealth/state financial arrangements casemix-based funding systems are necessarily state based. The variations between the states in how they use casemix for funding are not evidence by themselves of a lack of maturity. Rather, some states are mature in their use of casemix for funding and others are not.

All Australian states use casemix data to some extent to inform their funding of the public inpatient sector. However, only a few states, such as Victoria and South Australia, can be said to have mandated the adoption of a fully fledged casemix-based funding model. In Victoria, this system has been in place since 1993 with various developments over the years. Judged using characteristics contained in the Box, the use of casemix-based funding is certainly mature in Victoria and South Australia where casemix is used to fund acute inpatients and, in Victoria, the funding system has been expanded to incorporate other patient types. Queensland, on the other hand, will implement casemix-based funding from 2007. This supports our assertion that some states are mature in their use of casemix-based funding and others are not.

It is difficult to know why some states avoided using a casemix-based approach. During the 1990s, NSW was clear that its policy objective was equity in the distribution of resources on a

population basis.¹¹ This led in 2000 to the implementation of a two-stage approach whereby funds are distributed to areas on a population basis, and then casemix is used in the area distribution to hospitals.¹² The use of a casemix-based approach is not mandated but areas are bound by funding and reporting requirements to provide information that allows the Department of Health to compare the cost of their acute inpatients.^{13,14} These guidelines mean that the areas do not have the same freedom to develop different funding models as is found at the state level.

Duckett,¹⁵ in 1998, compared key elements of inpatient funding models in several Australian states and noted that there are many points of difference, such as how outliers are defined and paid. We reviewed Duckett's table recently and found that these differences still exist. To some extent the differences are understandable in light of the history and organisational differences in the states. Furthermore, casemix funding is complex and there is considerable scope for model builders to take different approaches. The infrastructure needed to support funding by casemix goes beyond groupers and information systems to include cost weights, trimming algorithms, peer grouping and costing methodologies. These technical elements allow for many differences in the models used. However, the years of experience in some states and the increasing sophistication of their funding models supports the assertion that these technical elements are now highly developed.

So yes, we conclude that the use of casemix-based funding is mature at least in some states. Its use is concentrated mainly in the acute care setting, but as evidenced in Victoria, other settings, such as the ambulatory setting, are being included in output-based casemix funding systems. It is likely that the state health authorities are evaluating carefully the impact of their casemix-based funding systems. However, there is little in the published literature that shares information on those impacts. The impact in Victoria has been evaluated,¹⁶ but such studies are not available in all jurisdictions. More discussion and reflection is needed on the success or

otherwise of the different models used in the different states, although it is possible that this is happening in exchanges between the states and just not being published. Indeed, little is known about the impact of the funding arrangements in states that have delayed using casemix-based models.

It is now recognised that countries have several objectives that they have to balance. The big three that are commonly cited are to contain costs, improve quality and ensure access.^{17,18} It is difficult if not impossible to achieve all three, and casemix-based funding alone cannot achieve all these objectives.

Covaleski and his colleagues¹⁹ provided some insight into the key reason why casemix has had success when used to underpin a funding system. According to them, from an institutional theorist's perspective, the survival of a given organisation (in our case, the hospital or Area Health Service) requires it as much to conform to society's expectation of acceptable practice as to actually achieve high levels of efficiency and effectiveness. Cost containment is a societal expectation that can reasonably be fulfilled by the implementation of a casemix-based funding system. The article also examined the role of casemix accounting systems and their ability to penetrate and influence internal organisational practice. Their conclusions, because of the differences between the Australian and American health systems, are not easily transferable to the Australian setting. But it is noteworthy that they found a social and behavioural framework to be most helpful to their understanding of how casemix accounting systems influenced internal organisational practice.

Diffusion into clinical applications

Casemix has provided a language with which to summarise the typically diverse range of treatments offered to patients in a clinically coherent way, and a language that bridged the clinical and management divide. Given the level of sophistication in our casemix tools it is worth asking to what extent these are useful in more clinical rather than managerial domains.

A search of the proceedings from several years of casemix conferences showed that there are many examples of casemix information being used by clinicians to gain insight into questions about how patients are managed. However, while these are good examples of how to use the information, we discuss below why the engagement with clinicians has not become even more widespread.

One obvious area where clinicians can use casemix information is its use to support quality activities. Smyth¹ pointed out that the quality agenda could learn several lessons from the success of the implementation of casemix in Australia. While admitting that improving quality and safety is more complex than casemix development, he argued that the results achieved with casemix showed what could be achieved. Casemix and quality activities share many common features including the need to use data to provide evidence (or not) for change. In the acute care hospital setting, casemix information is based on routine hospital discharge data and these data are also needed for many quality activities. The Australian Commission on Safety and Quality in Health Care is reviewing how we can use routine data for questions of safety and quality. Smyth¹ discusses the need for more creative ways to use the hospital discharge data for quality activities, and this would also enrich the use of casemix information for purposes other than for funding.

The states are working on quality questions. For example, Queensland is implementing the Variable Life Adjusted Display which uses routine data for 24 quality indicators.²⁰ The display is a plot of the cumulative difference between the expected and actual outcomes over time. What is exciting about this system is its ability to use a click and display approach to reveal to clinicians which patients lie behind a change in the indicator. The clinicians may argue that the data are wrong, but since these are the discharge data from their own hospital any errors can be followed up. Thus the “use to improve” nexus used with success in casemix activities will be reinforced.

It does not matter if the data used in quality projects are based on groups of patients (casemix classes) or individual disease and procedure codes. Whatever is appropriate for the application should be used.

The contribution that casemix has made was summed up well by Kimberly¹⁸ when he said that the most important contribution of the implementation of casemix is to change thinking so that efficiency, accountability and transparency in the production system are now expected and there is no turning back. Accountability and transparency are intrinsic to the quality agenda, and thus it should be able to build on the casemix work in improving the quality and use of the routine hospital data. There is much more that can be done in the quality area by using the available data rather than waiting for it to improve.¹

It may be argued that evidence is needed of the use of casemix information in making clinical decisions transparent and accountable before we can say that we are using the information to its full potential. However, there is a paucity of literature on this topic, perhaps because of a reluctance to publish sensitive information. Casemix conference presentations commonly describe the methods used to prepare and analyse the information, and those responsible for progressing the quality agenda would be wise to ensure that there are channels to communicate both the methods and results of efforts to use information for quality and safety activities.

Thus we conclude that, despite the evidence presented in casemix conferences, there is still scope for further development in the use of casemix information in the clinical domain. Maturity will be achieved when the casemix data and the hospital discharge data on which they are based are used routinely to underpin a wide range of clinical issues including quality of care and safety issues. How well the information is used depends, in part, on the impact of the implementation of casemix on the hospital organisation, and this issue is explored in the next section.

The impact of casemix on hospital organisations and the production process

For all the progress that Australia has made on casemix infrastructure, and to a lesser degree casemix funding, the use of casemix information at the grass roots level is still limited to mainly administrative and managerial staff. Diers and Pelletier²¹ decried the lack of progress made in providing the knowledge and forums to encourage the generation and use of meaningful information by multiple stakeholders. They believed that part of the problem could be traced to the traditional administrative and clinical structures of a hospital which impede initiatives that require interdisciplinary cooperation. This structural impediment has been removed in recent times with the implementation of clinical directorate service structures (CDs)²² which serve to cluster the traditional wards, units and departments into streams of care that provide services to patients with similar disease profiles (eg, cardiovascular and respiratory directorate).

Braithwaite and his colleagues²³ attempted to understand the hospital-wide culture around the implementation of CDs in a comparative ethnographic study of two large public teaching hospitals[†] with matched structures, caseloads and profiles in major cities. They found that the perceptions of staff as to how successful CDs are at enhancing efficiency and patient care by devolving management to clinicians will be dependent on the cultural attributes of the particular organisation. This is intuitive and perhaps unsurprising.

The comparative study also reported that, even though there were negative views among staff at the metropolitan hospital about CDs, both hospitals exhibited an overall preference for the CDs structure over the traditional hospital structures. Given that CDs are perceived to be the preferred structure, of interest to our paper is the conclusion from the detailed observational work that resulted in six main themes, of which finance is

one. Under the finance theme, the need for better financial and management systems was identified in both hospitals. The Royal hospital identified the need to devolve budgets further so that there is "more clinical responsibility for budgetary performance". The Metropolitan's problem is a more basic one of a lack of human resources to extract and make sense of the information. Both the hospitals identified investment in technology to be a core challenge.²³

For a detailed description of the organisational impact of casemix information systems, we looked to neighbouring New Zealand. A purchaser/provider framework was established there as part of the 1993 health reforms in an attempt to strengthen the positions of funders and purchasers.²⁴ Casemix information systems were implemented as a tool to assist in providing data for the purpose of contracting between hospitals and their Regional Health Authority. Lowe^{25,26} used a sociology of science (actor network theory) paradigm to describe the impact of the casemix information system on the behaviours of individuals at the organisational level within a large public hospital.

Lowe,²⁶ in his assessment of the impact of casemix, reported that, due to the complexity of DRG technology, clinicians who were unhappy with the output of the systems and the way these were used could do very little to challenge the systems (which is likened to a "black box"). Doolin²⁷ later found that clinicians were not as compliant as the steamroller metaphor implied. Instead, doctors played a very active part in redefining and subverting the casemix information system that was supposed to monitor, scrutinize and increase the visibility of their clinical practice. The role of the information system was re-interpreted and relegated to one that is less significant than what was originally intended. It is interesting to observe how casemix information systems (comprising medical coding and accounting information) influenced the human "actors" within the organisation, as described in Lowe's and Doolin's work.²⁸

Doolin's conclusion was in the main pessimistic in that he was of the opinion that making information systems available did not represent a

[†] These were given assumed names of "Royal" and "Metropolitan" Hospitals.

“sufficient solution to whatever management problem has been articulated”.²⁷ (p. 359). But in coming to this conclusion, he is perhaps placing an unrealistic expectation on what casemix information systems are expected to achieve. Of note in Doolin’s analysis are the following.

- Clinician managers had started to use the casemix system in their daily work, and there was evidence that DRGs were the vocabulary of choice between the clinical units or with the regional health authority.
- Even skeptical doctors could recognise the potential use of the information within the system to argue for more resources.

Doolin and Lowe give the impression that they expect casemix information systems to be used by all doctors in their every day work and talk, but we think this is unrealistic.

What is needed to make more impact within the hospitals?

The engagement of clinicians managers and the use of casemix information by even the most skeptical of doctors are indicators of some considerable success. Any change will require space and time for review and adoption, and resistance to management efforts to provide transparency to encourage more efficient use of resources is to be expected. It will take time to acknowledge the inevitability of increased accountability. Clinicians will need to realise that a new equilibrium between autonomy and accountability will need to be achieved in the face of rising health financial pressures. Macro-level health reforms are moving in the direction of accountability. Individual hospitals are following suit with the implementation of CDs.

The extent of the use of casemix information systems in a given organisation will, we believe, be necessarily influenced by the prevailing culture of that organisation. As Braithwaite and his colleagues²³ pointed out, attempting to influence the culture of an organization is very “challenging and multifaceted”. Ham²⁹ expressed a similar sentiment and provided a useful clue as to the nature and speed of reform.

Building the capacity of people and organisations to bring about improvements might

be slow and unglamorous work, but in the long term it is likely to have a bigger effect than further bold policy strokes. Policymakers and managers also have a role in the provision of systems and institutional leadership and framing of the agenda for reform. (p. 1980)

As for the means of achieving effective change, he recommended the engagement of clinicians through well-developed systems of clinical leadership with any changes to current managerial practice to be negotiated, rather than imposed.

Casemix systems should not be expected to single handedly deliver a change of culture to an organisation. They are however, a tool for negotiating changes to relevant managerial and clinical practices based on evidence. Large investments have been made in information technology and data warehousing capabilities at state and hospital levels to provide hospitals with casemix information. Given that these databases exist, it is hard to establish, in the absence of more in-depth research, why there seems to be a lack of will at the organisational level to capitalise on the technical investment in casemix information systems. A related research question would explore ways to make this information useful to support policy and financial decision making. Certainly there is anecdotal evidence that casemix coordinators and managers feel that their roles are not well supported. Typically, their time was spent fulfilling the labour-intensive demands of information systems implementation and casemix costing. These demands were at the expense of engaging with clinician managers in the more useful discourse of how the information can be used to achieve efficiency gains and improvements in the quality of care. Given that this is the case, we conclude that casemix use within hospital organisations is, in the main, fairly immature. There has to date not been any reported evidence that casemix has exerted perceptible changes in an organisation.

If we accept that casemix is one of the tools of choice for negotiating changes to relevant managerial and clinical practices based on evidence, the reasons for this lack of impact need to be understood. Answers to some of the questions set

out below will contribute to our understanding of how we can use casemix information more effectively at the internal organisational level.

- What is it that is stopping the casemix information from being used within hospitals as an effective discourse on efficiency and quality?
- Are more resources needed to extract high quality data from the source systems?
- What motivates clinicians and how can they be engaged in questions of efficiency, accountability and transparency in the production system?
- Once we have good evidence of the need for change do we have the policy/structural environment needed to take action?

Conclusion

We conclude that, yes, regarding the technical matters of grouper and clinical coding development, there is a mature use of casemix for the inpatient sector. Indeed, we assert that for this sector Australia has a well deserved reputation as a world leader. However, there is still much to explore and consolidate regarding its use for the accident and emergency, ambulatory, rehabilitation and mental health sectors. In the use of casemix systems to chart and understand the journey of the patient through the health system, Australia compares less favourably with some other countries that have the benefit of universal identification systems.

The picture for casemix-based funding varies across the country. In some states the systems have reached maturity, but others such as Queensland are only beginning to use casemix funding in any meaningful way, and there is little evidence that others, such as Western Australia, have used the system at all. More publicly available information on the suitability and effectiveness of the different funding models used for casemix-based funding systems would be helpful for those states with less well developed systems and other countries yet to implement these systems. Also needed is comparative research to establish whether and to what extent these casemix-based funding systems do encourage more efficient use of resources and whether the

states that have lagged behind in implementing casemix show evidence of greater inefficiencies.

Regarding the use of casemix data for a variety of clinical uses the picture is also quite mixed. Certainly there are instances of using casemix information effectively, and casemix standardisation of data is more commonplace. However, more could be done, especially by using casemix information in quality of care activities.

Since the inpatient sector is the most mature in the technical and funding system aspects of casemix it is fair to ask what impact the use of casemix information and clinical directorates has had on hospitals. We believe that research is needed similar to that done in New Zealand. This research should adopt a social science approach for describing the effect of casemix information on clinicians and managers in an environment of casemix funding. We conclude that it is doubtful if hospitals have explored yet the full range of opportunities afforded by these changes. Further research is needed, but at this stage there is a long way to go in using casemix in the management of hospitals.

Competing interests

The authors declare that they have no competing interests.

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