IS THERE A Y2K PROBLEM FOR CASEMIX?

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ABSTRACT

Current casemix development builds on early casemix work, including a focus on inpatients, use of routine data, and mutually exclusive classification design. These early choices in part reflected the contemporary health system (and information technology). The current uses of casemix (in funding, management and clinical practice) will lead to new requirements for casemix development including ways of setting volume caps for hospitals, identifying appropriate admissions, and assisting in quality management. These extensions of casemix tools will create new challenges for managers and policy makers.

KEYWORDS: Casemix Design And Development, Future, Funding, Management, Clinical Practice

Australia is gripped by millenial fever. It is an updated and more technologically oriented fever than the one that gripped Europe a millenium ago. Then there was widespread belief that the new millenium would see the second coming. Now, the new millenium has a more "doomsday" element to it, involving collapse of the electricity system, meltdown of nuclear reactors, planes falling from the sky and dire consequences for any part of society which is based on computers. I don’t think these dire consequences will happen but the newspapers are still full of warnings for companies, universities, etc. to prepare for the millenium bug.

The new millennial fever has a similar flavour to the apocalyptic predictions of one thousand years ago, but this time the doomsday event has human origins. The Y2K bug is a result of short sighted computer programmers in the 1960s saving money by economising on bits and hence almost ensuring obsolescence in their programs when four digit date calculations became necessary. The question I think we need to address is whether casemix development
has this same in-built obsolescence. Is there some event which will assign the pre-existing development paths of casemix to the garbage can of history? This is not some idle pre-occupation, as health care (and to a lesser extent, health systems) change rapidly and the contemporary preoccupations could be seen as quaint in fifty years time.

The development of casemix classifications of course, could only have occurred because of the advances in information technology. The large scale data collections that have made casemix classification possible could only occur in the context of ability to store these data systematically and to provide a capacity to analyse them. The question immediately arises of whether casemix itself is going to be exposed to some form of millenium bug and if exposed, what will the consequences be?

We all know the history of casemix development although sometimes this history is rewritten. Bob Fetter tells the story well: that it started with an interest in quality assurance at Yale New Haven Hospital where clinicians wanted him to identify the aberrant cases. He argued that in order to identify the aberrant, you had to identify first the normal and hence the Diagnosis Related Group classification system (DRGs). DRGs were designed to standardise for resource use within the constraint of clinical meaningfulness.

Classifications for inpatient services have remained the foundation of casemix classification. DRGs have evolved through numerous versions in the U.S. with numerical suffixes and alphabetic prefixes. A veritable alphabet soup of European inpatient terminology has been developed including HRGs, GHMs, etc. Australia has contributed with AN and AR DRGs.

Inpatient services are still the most expensive component of a health system and so classification systems which attempt to describe these services (and thus provide the basis for analysis) will continue to be extremely important. However, casemix classification has evolved into other areas of the health system, including ambulatory, emergency and rehabilitation services. Australia has had the most interesting evolution of ambulatory classifications with the VACS, SACS, QHACS and DACS developments based on the ambulatory classification systems for Victoria, South Australia and Queensland and the national system called the Developmental Ambulatory Classification System.

Specialty specific and even age specific classifications have been developed in areas such as mental health and paediatrics. A number of these classification systems are overlapping in that a single inpatient stay could be classified by two or more of the systems e.g. a psychiatric episode could be classified according to a generic system such as DRGs and a specialty classification such as a mental health system (which may also provide a classification for community-based services).
This multiple classification approach is quite worrying as it almost inevitably creates conflict between funders and providers as providers seek to undermine the funder’s classification of choice by selective comparisons with alternative classification systems.

The highly targetted classification systems will almost inevitably have somewhat better performance characteristics than the more generic ones. Obviously the larger the number of categories for a given area, the greater the reduction in variance (although this is not always the case, the marginal return for additional categories in generic classifications seems to be plateauing). The specific classification systems may also be seen as being more clinically meaningful (because of the larger number of classes). More importantly, the specific classification systems often require collection of additional specific data which assists in better explanatory power. It may be easily possible to ensure that zealots collect the additional data but routine implementation of additional data collection is expensive and often difficult to achieve on a consistent basis across sites.

I am arguing here against the proliferation of specialty based classification systems, not against the need to develop classification systems relevant to other services not encompassed within the inpatient-oriented DRG system. Development of these systems will obviously continue to be a high priority for the future. Echoing Miriam Wiley’s earlier comments at this conference, there seems to be an opportunity for some joint developmental work in these areas and in the development of a procedure classification which can be used to facilitate the transition to ICD-10. Joint development and cross-national learning has been an important part of casemix development in the last couple of decades, and it will hopefully continue to be in the next millenium.

CHOISES IN CLASSIFICATION DEVELOPMENT

The contemporary casemix classification approach has been characterised by a number of choices which have dominated casemix development. First, the classification systems were based on existing data and were designed to be clinically meaningful. This characteristic is not likely to change, although the range of data being routinely collected is likely to increase with improved ‘feeder’ systems in hospitals and other settings.

A key early choice in casemix development was that the systems were primarily institution or service based rather than episode or population based. The first developments were inpatient oriented and came to be associated with inpatient funding systems. In recent years however, an alternative paradigm of population based classification systems has been developed, an example being the ACG family of classification systems generated out of Johns Hopkins University (Weiner et al, 1991). The interest in these classifications systems stems principally from the need to provide better risk adjustment for population funding in a managed care environment where managed care organisations will be contractors to funders. The predictive
power of the population based classification systems is still quite low (around 20%), reminiscent of the early days of the DRG classification systems which achieved similar reductions in variance. However, some have argued (eg, Newhouse 1994) that this level of reduction in variance is actually the maximum that can be achieved given the inherent variability in likely future health care needs for an individual. Further development of population-based classification systems is obviously going to be a key future issue for the development of casemix classification systems generally.

There is also increasing amount of work on ‘episode-of-care’ classifications, involving bundling of pre-admission, inpatient and post-discharge elements of the treatment continuum. Episode of care classifications are clearly important for monitoring cost shifting between payers and/or different sites of care. Their use in funding, however, will be limited to those situations where the same management entity has clinical responsibility for all phases of the treatment process. This is the case in many types of managed care organisations in the U.S. and in some integrated systems in Europe. However, it is not universally the case especially where hospitals and primary care providers are funded through different structures, or where medical providers function with a high degree of autonomy.

The third fundamental choice made in the initial classification systems was that they would be based on a mutually exclusive classification systems, ie, each case (in the inpatient situation – each discharge or separation) can be assigned to one and only one DRG. An alternative approach is consistent with the situation where patients can have multiple diagnoses. The DRG system handles this situation by allocating some of these cases to a group designated as being with comorbidities or complications. Patient Management Categories (PMCs), on the other hand, is an example of a classification which allows a single separation to be assigned to multiple categories. The PMC system has decision rules to assign a unique relative weight to the separation which takes account of the existence of the multiple categories. The ambulatory system APGs also allows multiple assignment, and use in funding is accompanied by bundling and discounting rules to deal with second and subsequent allocated groups.

The underlying statistical technology used in classification development has evolved since Fetter’s original work and there are now several packages available for PCs which support casemix classification development, most of which assume the mutually exclusive categorisation system. However, there is no inherent reason why this paradigm need to be maintained nor why a system developed this century based on analysis of variance needs to be maintained in the next millennium as the statistical technique of choice for classification system design. Other statistical approaches are emerging (eg, based on fuzzy sets or the grade of membership classification) which may begin to provide some alternative structurings for classification system design.

A number of these initial choices such as using routine data, and that the classification should be clinically meaningful, are obviously key foundations which have appropriately stood the test of time. However, as interesting as these developments in statistical technology are, the most exciting development in the last 20 years has been the evolution in uses of casemix classifications. Obviously, the birthday we need to celebrate is the introduction of casemix as
the method of funding for U.S. Medicare but a number of countries now use DRGs as part of their funding system for inpatient and/or outpatient services.

USE IN FUNDING

The use of casemix classification in funding has obviously led to improved efficiency as demonstrated in a number of countries. However, in most budget driven countries, the use of casemix in funding has led to a number of other policy issues appearing on the policy agenda, including allowing or requiring a greater focus on measurement of quality of care.

The introduction of casemix funding also usually requires a focus on setting volume targets for the number of patients who will be funded in the system. The initial implementation of casemix funding in the United States was accompanied by fears that it would lead to a dramatic escalation in utilisation rates, fears which proved unfounded. However, implementation of casemix funding in other countries is normally undertaken in an environment where there is a cap on overall public sector spending. If price is fixed then the mechanism for capping is via a volume target. Setting an appropriate volume target often relies on criteria which are quite distinct from the casemix classification as we have traditionally perceived it: volume targets usually involve predicting "need" for hospitalisation, population projections, etc. However, there have been interesting developments of classification systems which can be used in this volume setting process. These classification systems are not 'iso-resource' (cases are not resource homogeneous) but rather are 'iso-need', in that they are based on categorising in terms of whether an admission is necessary.

There are two broad strands of this development, the first of which attempts to categorise hospital inpatients in terms of the extent to which they represent admissions which could have been prevented (or incidence reduced) as a result of improved outpatient, primary care or other ambulatory services. There are a number of example of classifications which do this eg Ambulatory Sensitive Conditions (Stamp et al, 1997, Bindman et al 1998, Hadley and Steinberg 1996). A second ‘iso-need’ approach involves assessing the extent to which the admission represents services which are highly sensitive to referral patterns (Referral Sensitive Conditions). Just as a DRG can be characterised by the mean resource use for patients assigned to that DRG, so too can the DRG be characterised by the extent of variation in the admission rate for that DRG across municipalities, regions or other geographic areas. The higher the dispersion in admission rates, prima facie the greater the level of uncertainty or lack of agreement amongst clinicians about the need for admission in that DRG (assuming standardisation for age, sex and other epidemiological factors). Both approaches can provide information which could be used in setting volume targets. Further development of routine databases to assist in more sophisticated strategies for influencing volume targets is an important future area for casemix development.
It is also important to ensure that, as more sophisticated budget setting approaches develop, apparent efficiency gains are not made at the expense of quality. The more casemix measures are used in funding, the more important it is to improve quality measurement, thus closing the loop back to the original interest of Fetter in developing casemix classification systems. However, despite that initial orientation, the casemix fraternity is still in the early stages of engaging in the task of measuring and evaluating quality of care.

As has been shown in a number of European countries, the use of casemix measures in population based funding approaches is not incompatible with the use of casemix for institutional level funding. It will always be possible to fund a region on the basis of its population and for the region to fund services on the basis of their activity. This is the predominant method of funding in Australia, where Commonwealth funding to states is essentially based on population with state funding to institutions being predominantly casemix based. However, the smaller the region to be funded on a population basis, the greater the incompatibility between casemix and population funding. This is principally because a system based on smaller regions is likely to have greater variations in utilisation rates. As regional expenditure is the product of price per case and the number of cases, the regions will have to manage both efficiency variations in price per case and variations in the number of cases caused by utilisation rate variations. Influencing utilisation rate variations is still a developing art and pure population based funding may result in regions having impossible tasks set in terms of meeting expenditure targets as increase in price per case would not be able to be offset by reductions in the utilisation rate (Evans 1990).

**USE IN MANAGEMENT**

Increased use of casemix classification systems in funding almost inevitably leads to increased use of casemix classifications in management as providers attempt to ensure that their expenditure is within the revenue bounds set by the funder/purchaser. Although the situation may vary in different countries, individual manager’s use of casemix classifications in Australia is highly variable. Managers are often not chosen on the basis of their facility in understanding statistical patterns and their reliance on information-based or evidence-based approaches to management. The management task is often still seen as solely a political one rather than involving both political and technical skills.

Accordingly, there is a reskilling task for health care managers and for this to cascade through the rest of an institution. Improving the skills of managers in using information ideally would precede the use of casemix classifications in funding, but certainly casemix funding stimulates interest in this area.

The amount of reskilling is significant, as historically comparisons between hospitals and within hospitals have been based on simple measures such as length of stay. However, length
of stay is not a good proxy for cost as for example, care intensity can vary significantly within a given DRG even for similar lengths of stay (Duckett and Jackson 1999). Thus managers need to re-focus away from the simple historical measures such as length of stay to more appropriate and relevant indicators. This in turn means that managers need to be supported by information systems which allow comparisons between groups within the hospital in terms of cost and quality. These systems are often expensive to obtain but more importantly, are expensive to maintain and can easily, if not maintained properly, produce inaccurate information, further handicapping management’s ability to make rational decisions. Unfortunately, personnel to develop and maintain hospital level management information systems are in short supply, at least in Australia, as are people skilled in assisting in the use of such systems. Conferences such as this one will continue to have an important rôle in providing a forum for those engaged in this task to exchange information and garner new ideas. PCS-E is an especially valuable forum because of the attendee mix including researchers, hospital level implementers and policy makers.

USE IN CLINICAL PRACTICE

An important, and hopefully developing area of the use and evolution of casemix classification, is the use of casemix in routine clinical practice. One of the contemporary debates in medicine is about the relevance of evidence based practice and how this can be used in local clinical practice. An important and positive initiative in this area is the development of clinical pathways which set out best practice for a number of conditions. However, these clinical pathways are designed and established for the normal case and there are obviously going to be situations where there is variation from this norm. Casemix standardisation is as important in analysing these variations as it is, for example, in analysing cost variations.

What is particularly important in assessing quality of care is to assess the experience and practice of the care in the particular patterns of cases that arrive at that institution versus what might be universal best practice. The Gold Standard randomised controlled trial may tell us the results to expect from a particular treatment in otherwise healthy 50 year old males, but how can an institution or provider know what results are reasonable for the procedure when performed in a 30 year old female with diabetes?

The development of a database which allows assessment of the procedure in previously untreated patient groups is a longer-term and more ambitious project, but one which is necessary to allow the use of the so-called ‘evidence base’ of modern medicine in routine clinical practice. Moreover, individual hospitals require tools to summarise these data and particularise them: what results can be expected for the 30 year old female in this institution? From the perspective of clinicians, this will most likely require a different classification system from that used from the perspective of the funder or purchaser. It may require many more categories with a different underlying logic: not resource homogeneity, but homogeneity
of comorbid conditions, for example. This is an area where the casemix classification systems possibly need to evolve to meet the requirements of these new uses.

CONCLUSION

Overall, there are a number of challenges that may lead to different evolutionary paths for casemix classification. This evolutionary path may lead to a reexamination of underlying design principles including the mutual exclusiveness principle. Fuzzy set logic may be particularly relevant in the clinical decision making process.

Whether these different design principles do become common will in part depend on whether they are available as programming packages designed to assist in developing classifications on these new logics. In our enthusiasm for these new applications, however, let us not lose sight of the key challenge for casemix research—which I believe is to facilitate the use of existing casemix classification systems rather than designing elegant new classifications. There are still a number of challenges involved in implementation of the knowledge we have rather than developing new classification systems which might add a few per cent in terms of reduction in variance. The big gains in efficiency, equity, quality and acceptability are to be obtained from better implementation of existing knowledge rather than chasing increased refinement or utopian applications for new classifications.

The Y2K problem then, is for casemix researchers to continue with the hard slog of working to implement the knowledge we have. This involves partnerships between academics and bureaucrats, between policy people and clinicians, and especially learning about what happens in other countries to assist in innovative solutions in the countries we come from. PCS-E has an important role to play in this regard.

BIBLIOGRAPHY