Commentary

Casemix in Singapore – 5 Years On

EK Lim,[1] *MBChB, MSc, HSM*, CE Lee,[1] *MBBS, M Med (PH), FAMS*

The development of casemix classification systems started in the late 1960s when clinicians at the Yale-New Haven Medical Centre asked Professor Robert Fetter of Yale University for help with the identification of aberrant cases in utilisation review. Professor Fetter argued that in order to identify the aberrant, you had first to identify the normal, hence the advent of casemix classification systems.[1]

Casemix classification systems were designed to group diseases into clinically meaningful diagnostic clusters called Diagnosis Related Groups (DRGs), where resource use was similar. Each DRG describes a cluster of patients with related diagnoses incurring similar treatment costs.

The use of casemix classification systems for funding was pioneered in the United States and adopted for the publicly-financed Medicare programme in the 1980s. Since then, there has been a growing trend internationally towards the use of casemix-adjusted payment for healthcare, especially in the past decade.[2]

Casemix for Funding

Since 1 October 1999, casemix has been used as a tool to fund day surgery and inpatient services in public hospitals and national centres (with the exception of Woodbridge Hospital, National Dental Centre, National Skin Centre) in Singapore.

Prior to the introduction of casemix, outputs were described in terms of length of stay and table of surgical procedures. Defining output based on length of stay was highly unsatisfactory as the resource requirements for one day of hospitalisation can range from purely board and lodging (for those that are under observation or recuperating) to intensive care services.

The use of DRGs (which seeks to relate medical conditions to resource use) has facilitated fairer allocation of resources. As typical cases in a single DRG can be expected to have similar costs for treatment, the use of DRGs allow subvention to be better correlated with resource requirements. The adjustment of DRG based subvention rates annually (based on actual cost data submitted by the hospitals) has also allowed the Ministry of Health to take into account the differing rates of medical advancement across different DRGs. Instead of a flat rate that is applied across-the-board, casemix allows us to better target the increase to specific DRGs where additional resources are required.

Casemix-based funding has resulted in incentives for healthcare providers to economise, and seek out more cost-effective treatments. Under casemix-based funding, a fixed rate is provided for each DRG. This provides incentives for hospitals to learn where they are less efficient and to quickly take steps to improve efficiency.

Casemix has led to greater cost consciousness in our public sector hospitals. Prior to its introduction, cost data was only available at the service (e.g. X-ray, ward, etc) level. As casemix required patient-level cost data in order to compute the subvention for each DRG, it has provided the impetus for hospitals to develop robust patient-level costing systems that enable them to determine the cost for the whole episode of care.

Casemix-based funding encourages hospital departments to adopt a collaborative approach to manage costs of entire episodes of care (e.g. total knee replacement) rather than just components of care (e.g. surgery, rehabilitation, radiological and lab tests). This promotes the development of clinical pathways that seek to provide patients with seamless care across various specialities based on evidence-based practice. Casemix promotes care that is patient-centred rather than department- or specialty-centred.

The way in which hospitals are organised may, however, need to be reviewed in order to provide this patient-centred approach to care while optimising efficiency. As a single subvention rate is provided for each DRG, hospitals can decide how to structure their services accordingly. For example, the hospital may decide that it may be better in terms of optimising the use of expensive equipment, to centralise the treatment of complex diseases in one department while the other departments take on the "bread and butter" cases. The same principle could be applied for organising services at the inter-hospital level. The way the financial performance for each department or speciality is reported should similarly be reviewed to encourage inter-departmental collaboration.

[1] Healthcare Finance Division, Ministry of Health
Ministry of Health Singapore
Address for Reprints: Dr Lim Eng Kok, Health Services Finance Branch, Healthcare Finance Division, Ministry of Health, Singapore, 16 College Road, College of Medicine Building, Singapore 169854.

Casemix for Quality

The key strength of casemix is its ability to standardise the definition of outputs of healthcare institutions. A common output measure is an essential building block for cost efficiency (i.e. input/output) as well as cost effectiveness (i.e. input/outcome) studies. A common output measure also facilitates meaningful comparisons of cost, quality and access.

Casemix highlights differences (i.e. outliers). Analysis of such differences can lead to more streamlined and cost-effective clinical practice. One of the key lessons from the publication of hospital bill sizes on the Ministry of Health's website was that hospitals with the lowest cost per unit of service (e.g. laboratory test, ward charge, etc.) need not necessarily have the lowest cost for a particular admission if these services are used inappropriately. For example, a hospital with the cheapest non-standard drug would still be more expensive than another hospital that uses generic drugs.

A common output measure enables identification of practice variations. Review of cost data across public hospitals through utilisation management activities have shown several areas where practices could be further standardised. These included the use of investigations (for example, using "specific" individual tests instead of the more expensive "all-inclusive" panel tests),[3] and the use of expensive drugs (through prescribing guidelines and a system of internal checks to ensure compliance with guidelines).[4]

It should, however, be emphasised that casemix does not tell us what the proper practice is. In fact, the outlier may be the hospital or department that is practicing optimally in terms of quality, cost and access.

Limitation of Casemix

A key feature for casemix classification systems is optimal number of groups (DRGs), i.e. not too many (which will cause some groups to have too few observations to allow conclusions to be drawn), nor too few (as overly large number of cases placed in the same class may conceal real differences between the cases). However, this feature is also the key limitation of casemix, i.e. its effectiveness at lower levels of dis-aggregation.

DRGs work on the principle of "Law of Large Numbers", i.e. with sufficient number of cases, the distribution of cases would assume a normal distribution. Thus while DRGs work well at higher levels of aggregation (e.g. at hospital or cluster level), they are less effective at lower levels of dis-aggregation (e.g. departmental or even individual doctor level) as the smaller number of cases at this level means that one or more outliers can potentially skew the averages significantly.

However, if hospitals wish to examine resource utilisation at lower levels of aggregation, supplementary mechanisms can be developed. For these specific studies, additional variables (e.g. patient functional status) may have to be considered. The value of casemix in this context is to identify areas that need further study so that hospitals can undertake more targeted and detailed studies such as that described by Sahadevan et al[5] earlier in this issue.

Conclusion

Although DRGs are often associated with funding, they were originally developed as a tool for utilisation review and quality assurance. As casemix evolves in Singapore, it is interesting to see that we are going "back to basics" with an increasingly important role in analysing healthcare quality.

While casemix has many strengths, it is not a perfect tool. Existing casemix systems need to be enhanced to better adjust for severity. There is also a need to extend casemix classification systems to outpatient care as well, in line with the move of an increasing number of inpatient treatments to the outpatient setting. These enhancements would need to be undertaken with care, leveraging on existing systems to avoid increasing administrative costs. Casemix systems would also need to be supplemented with other methodologies for more detailed studies.

In conclusion, the investment in casemix systems by public sector hospitals has started to bear fruit in terms of financial savings and reducing unnecessary variations in care. This is, however, a work in progress with numerous areas for improvement. The active involvement of clinicians is both heartening and crucial for the benefits of casemix systems to be fully realised.

REFERENCES

1. Mills R, Fetter RB, Riedel DC, Averill R. AUTOGRP: an interactive computer system for the analysis of health care data. Med Care 1976;14:603-15.
2. Reforming NHS Financial Flows: Introducing payment by results. UK: Department of Health, 2002.
3. Lim YJ, Tai HY. Utilisation Management – A Cluster's Perspective. Paper presented at Casemix Conference Singapore; 2004 Mar 12-13. Singapore: Ministry of Health, 2004.
4. Toh MPHS, Tan HN. Using casemix and DRG data to design the National Healthcare Group Chronic Heart Failure Disease Management Programme. Paper presented at Casemix Conference Singapore; 2004 Mar 12-13. Singapore: Ministry of Health, 2004.
5. Sahadevan S, Earnest A, Koh YL, Lee KM, Soh CH, Ding YY. Improving the diagnosis related grouping model's ability to explain length of stay of elderly medical inpatients by incorporating function-linked variables. Ann Acad Med Singapore 2004;33:614-22.