Choice of a Case Mix System for Use in Acute Care Activity-Based Funding—Options and Considerations

Introduction

Recent interest by jurisdictions across Canada in activity-based funding has stimulated deliberation and reflection on the design of case mix systems for application in funding allocation and the appropriate manner of obtaining a case mix system for implementation in acute care activity-based funding allocations.

To help jurisdictions have an informed debate, this paper provides discussion and considerations about these topics.

The Role of Case Mix Systems in Activity-Based Funding

Activity-based funding can be defined by two features: first, a case mix system is used to describe hospital activity and to define its products or outputs; second, a payment price is set for each case mix group in advance of the funding period, and payments to the hospital are made on a per case basis.¹

Case mix systems categorize patient episodes into usable groups such that the episodes within any given case mix group are clinically similar and consume similar health care resources. In Canada, Case Mix Group Plus (CMG+) is the case mix system developed and maintained by CIHI for the acute care inpatient population.
Case mix systems also assign a measure of cost to each episode. This cost measure may be the average cost of an episode within its respective case mix group, represented in dollars. However, it is more common for case mix systems to represent cost using a relative cost weight; here, the average cost of all episodes across all case mix groups is set as the anchor point with a cost weight of 1, and the cost weight for each episode is set relative to that anchor point.

Case mix systems provide valuable insights on the health care system by linking the clinical characteristics of patients to the financial expenses associated with their course of treatment. The dual service of describing cases in clinical terms and cost terms results in the utilization of case mix systems in many applications, including funding allocations among hospitals. As a specific example, cost weights provide a basis for setting payment rates for allocations determined using activity-based funding.

Cost weights produced by a case mix system often require refinement by the jurisdiction to ensure alignment with its reimbursement system or its health policy goals. Such refinements are made by producing an additional set of weights—payment weights—which may differ from cost weights, so as to provide incentives for changes in hospital activity and efficiency, to address structural cost differences across hospitals or to include only certain components of the overall costs.

Options for Choosing a Case Mix System

A jurisdiction that is embarking on the design and implementation of activity-based funding in an acute care setting has options for the case mix system to be used as the basis for the payment system:\(^2\)

- Adopt CMG+ and its cost weights;
- Modify CMG+ to suit the jurisdiction’s specific needs and to align with the jurisdiction’s funding goals;
- Adapt a different system that was designed outside of Canada by making modifications to its underlying case mix groups or cost weights to suit the jurisdiction’s specific needs and to align with the jurisdiction’s funding goals; or
- Build its own case mix system.

There are various advantages and disadvantages to these options for a case mix system for activity-based funding. Table 1 lists key items for consideration for each approach.
Table 1: Options for Choosing a Case Mix System

<table>
<thead>
<tr>
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<th>Possible Advantages</th>
<th>Possible Disadvantages</th>
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<tr>
<td><strong>Adopt</strong></td>
<td>• Is inexpensive and immediately available</td>
<td>• Likely does not perfectly align with the jurisdiction’s payment policy</td>
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<tr>
<td><strong>CMG+</strong></td>
<td>• Allows comparisons with other jurisdictions using that case mix system</td>
<td>• Does not guarantee that modifications to the system will be implemented in a timely</td>
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<td></td>
<td>• Provides opportunity for the jurisdiction to influence future changes to the system so that it meets the</td>
<td>manner</td>
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<td>needs of the jurisdiction</td>
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<td></td>
<td>• Avoids the need to obtain development expertise</td>
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<td></td>
<td>• Is well-known and accepted by stakeholders</td>
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<tr>
<td><strong>Modify</strong></td>
<td>• System foundation is available and familiar</td>
<td>• Requires nominal resources, including time to modify and maintain</td>
</tr>
<tr>
<td><strong>CMG+</strong></td>
<td>• Provides ability to modify system or design new components to better support payment policy</td>
<td>• Lacks ability to make comparisons with other jurisdictions</td>
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<td></td>
<td></td>
<td>• Requires user education regarding the modifications to the system</td>
</tr>
<tr>
<td><strong>Adapt</strong></td>
<td>• System foundation is available</td>
<td>• Requires at least moderate resources, including time to adapt and maintain,</td>
</tr>
<tr>
<td><strong>a</strong></td>
<td>• Provides ability to adapt system or design new components to better support payment policy</td>
<td>particularly in regard to ensuring compatibility with ICD-10-CA and CCI (see next</td>
</tr>
<tr>
<td><strong>Different</strong></td>
<td></td>
<td>section for details)</td>
</tr>
<tr>
<td><strong>System</strong></td>
<td></td>
<td>• Lacks ability to make comparisons with other jurisdictions</td>
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<tr>
<td></td>
<td></td>
<td>• Requires user education regarding the adaptations to the system</td>
</tr>
<tr>
<td><strong>Build</strong></td>
<td>• Is developed specifically to align with the jurisdiction’s payment policy</td>
<td>• Requires substantial resources, including time to develop and maintain</td>
</tr>
<tr>
<td><strong>Own</strong></td>
<td>• Provides complete control over design and modifications</td>
<td>• Lacks ability to make comparisons with other jurisdictions</td>
</tr>
<tr>
<td><strong>System</strong></td>
<td></td>
<td>• Requires user education regarding the new system</td>
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Case Mix Systems—Considerations for Use in Activity-Based Funding

Figure 1 and the discussion that follows list five considerations for a case mix system for implementation in activity-based funding.

Figure 1: Case Mix System Considerations for Activity-Based Funding

1. Availability of Reliable Clinical Data to Support Implementation of the Case Mix System

Patient-level clinical data is critical for input into a case mix system and as the basis for activity-based funding. The capture of this clinical information must be done accurately, completely and consistently. The collection of reliable clinical data requires detailed coding and abstracting standards, further supported by professional coder training and support. In Canada, these standards and support structures for reliable clinical data collection are maintained and provided by CIHI.

Acute care case mix systems rely heavily on primary classification systems to codify the diagnosis and intervention information of patient episodes. In Canada, the standard classification systems for diagnosis and intervention coding are the International Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA) and the Canadian Classification of Health Interventions (CCI), respectively.

Adopting a case mix system that is not based on ICD-10-CA and CCI is possible but would require substantial effort to implement, including mapping ICD-10-CA and CCI codes to the primary classification systems upon which the case mix system is based. This mapping may affect the clinical and cost homogeneity of the case mix groups. This loss of homogeneity could be mitigated to some extent, but not without considerable effort and likely not without some loss of the design strength of the case mix system.

2. Clinical Validity and Transparency of the Case Mix Groups

3. Accuracy of the Resource Estimates Provided by the Case Mix System

4. Opportunity for the Jurisdiction to Influence and Participate in the Design of the Case Mix System

5. Ability to Monitor Changes in Hospital Behaviour as a Result of Activity-Based Funding

It is imperative that changes in coding practice be monitored when activity-based funding is implemented, particularly with a focus to guard against attempts by hospitals to increase their payment revenue through coding practices that aggrandize their patient episodes.
2. Clinical Validity and Transparency of the Case Mix Groups

Case mix groups can be thought of as the product lines of the hospital—they must be clinically meaningful to hospital administrators and clinicians in the management of patients. Furthermore, they must enable a hospital to identify, review and discuss pathways of care that are cost-inefficient. That is, administrators need to be able to act on any funding deficiencies within a hospital by reviewing, for example, clinical practices, staffing or the use of technology. The assignment of a case mix group and cost weight to a patient episode should be transparent and no more sophisticated than needed by hospital administrators, clinicians and the jurisdiction.

3. Accuracy of the Resource Estimates Provided by the Case Mix System

The cost weights assigned by the case mix system must be accurate for them to be useful for setting prices by the jurisdiction and for reviewing costs by the hospitals. Monitoring the performance and stability of cost weights across hospitals and over time is critical to ensure that the jurisdiction and the hospitals have confidence in their use. Cost weights that are highly unstable over time are not suitable for funding and need to be investigated to determine if revisions are needed to their calculation or if the instability is a result of data quality issues with the clinical and/or case-cost data that is reported by the hospitals.

The underlying case-cost data used in the calculation of cost weights needs to be reported with sufficient detail on the different components of cost for each patient episode. This provides two advantages to the jurisdiction. First, it allows the cost information to be reviewed for quality. Second, it enables jurisdictions to identify and exclude any expenses that are not to be reimbursed through the activity-based payments and to fine-tune cost weights so they align with the jurisdiction’s payment policy.

4. Opportunity for the Jurisdiction to Influence and Participate in the Design of the Case Mix System

Activity-based funding models require flexibility in the case mix system to accommodate the needs of the jurisdiction.2, 3 The design of a case mix system and its cost weights needs to align with the jurisdiction’s health care payment policy and its goals. If the jurisdiction provides its own case mix system, either through building a new system or through purchasing and adapting an existing system, the jurisdiction is the sole influencer in its design and will be able to align the case mix system as needed. If adopting an existing system, such as CMG+, it is paramount that the jurisdiction be able to participate in and influence the design of the system to ensure alignment with the jurisdiction’s health payment policy. The jurisdiction must be viewed as a partner in the design of the case mix system, and the body responsible for maintaining the case mix system must be responsive to the needs of the jurisdiction.
As examples, the following design features may be incorporated into a case mix system as a result of its application in funding allocations:

- Excluding certain comorbid conditions, such as those that are hospital-acquired, from case mix group and cost weight assignment;
- Modifying the long-stay trim points that are used to identify episodes with extraordinarily long lengths of stay, and also modifying the per diem adjustments applied to their cost weights. Long-stay trim points and their subsequent per diem adjustments need to take into account the jurisdiction’s health payment policy;
- Combining case mix groups to provide more stable and robust cost weights where the cost differences are immaterial to the jurisdiction and where that combining does not constitute any egregious breach of clinical homogeneity;
- Combining case mix groups that differ on aspects of clinical care whose applications are considered to vary widely due to hospital or clinician preferences; and
- Combining case mix groups that, if left separated, might unduly encourage additional care for the patient in the interest of increasing hospital revenue.

For jurisdictions undertaking implementation of activity-based funding, there may be benefits to collaborate with one another and with CIHI in attaining a national case mix system that is appropriate for use in activity-based hospital payments.

5. Ability to Monitor Changes in Hospital Behaviour as a Result of Activity-Based Funding

Activity-based funding can cause both favourable and unfavourable changes in hospital activity and behaviour (Figure 2). While the risk of unfavourable changes exists regardless of the case mix system chosen, sophisticated systems, including CMG+, by design are more resistant to incenting unfavourable behaviours.

Metrics need to be established to understand the changes in hospital behaviour that result from activity-based funding. The ability of the jurisdiction and hospitals to use the case mix system as the basis of monitoring these metrics is critical within activity-based funding mechanisms. In addition to developing metrics to observe changes within a hospital, it is critical to assess changes across hospitals and among the different health sectors to determine if the observed changes are desirable in terms of quality of care or allocation of health care resources. Circumstances will arise that will require mitigation through modification of the case mix system (for example, undue patient care in the interest of increasing hospital revenue) or other aspects of the reimbursement system (for example, penalties for poor-quality care or bonuses for superior-quality care).
Concluding Remarks

While there are many components of an activity-based funding mechanism, the case mix system is the foundation of that mechanism since it provides the basis for determining costs and setting payment prices. This paper has provided discussion and considerations about the design of case mix systems and the alternatives available to a jurisdiction in obtaining a case mix system for application in funding.

CIHI has established an Activity-Based Funding Unit to serve jurisdictions as a centre of technical expertise on the design, implementation, monitoring and evaluation of activity-based funding systems and the application of CIHI products in these systems. For more information on these or other related topics, contact us at casemix@cihi.ca.
References


