The Why, the What and the How of Activity-Based Funding in Canada: A Resource for Health System Funders and Hospital Managers

Health System Performance

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Introduction

Over the last few years, those involved in the administration and delivery of the Canadian health care system have expressed interest in learning more about activity-based funding (ABF). They have been looking to further their understanding of ABF, how it can be of use to them, its basic principles and components, and considerations in its design and implementation.

The Why, What and How of ABF

Canadian jurisdictions are now focusing more on efficiency, value for money and accountability within the health care system. Additionally, jurisdictions continue to seek solutions to address the topics of wait times and access to health care services. Many are assessing whether these concerns can be at least partly addressed by changing how funding is allocated. ABF is being looked at as a solution to some of these challenges.

ABF is a method of funding health care providers (such as acute care hospitals, long-term care facilities and rehabilitation facilities) for the care and services that they provide.

Health system funders that implement ABF make use of information from routinely captured clinical and financial data. Clinical data is used to categorize episodes of care into clinically similar and cost-homogenous groups. Each episode category has a predetermined ABF payment price. Funders then have a means to reimburse health care providers for the services that they provide based on the volume and types of patients treated.

Objectives of This ABF Manual

The Canadian Institute for Health Information (CIHI) produced this manual to be a resource for those interested in learning more about ABF. It covers the basic principles and components of ABF and offers considerations for the design and implementation of an ABF system. It does not offer policy advice or policy recommendations; rather, it presents potential health policy goals and challenges that health system funders and hospital managers might consider when designing their ABF system.

ABF is not a one-size-fits-all solution. Stakeholders must consider and understand various aspects to be positioned to implement ABF. The different chapters of this manual are meant to provide readers with ideas that may be relevant to their own ABF implementation.

Scope of This Manual

This manual focuses on ABF for hospital inpatient care; as a result, there is considerable discussion about case-mix systems and other topics that are specific to implementing ABF for hospital activity. However, in Canada, there are well-developed reporting systems and case-mix methodologies across the care spectrum. Canadian jurisdictions therefore have the option of implementing ABF in various health sectors or combinations of health sectors, whereas other countries often started by implementing ABF in the hospital sector only due to limitations around data availability.

Audience for This Manual

This manual is a practical how-to guide that was written for health system stakeholders such as hospital managers and provincial ministry staff. Its audience is persons across Canada responsible for or involved in the funding of health care who may be considering the adoption of ABF and who would be responsible for or involved in the design and implementation of ABF. The audience also includes staff responsible for managing the budget of a health care organization or facility.

Readers will learn about the role of ABF and how it compares with and complements other funding mechanisms. Readers will also learn about the technical aspects of an ABF system: developing case-mix systems and setting prices, monitoring health system performance and measuring the success of ABF, and coding and capturing clinical and financial data. Additionally, readers who are involved in delivering health care services can learn about the benefits and impact that ABF can have on their institutions and the ways in which they are managed.

Contents of This Manual

This introduction is followed by 15 chapters.

Chapters 1 and 2 set the context of ABF and introduce some of its basic concepts. Policy objectives for ABF and its key functions are also discussed.

Chapters 3 to 10 review in more detail the main activities involved in establishing an ABF system: describing the products of hospital care as “groups,” having a payment scheme for hospitals’ activities and designing business rules and processes to complement the ABF model.

Chapters 11 to 13 explore topics related to implementing a new funding system and aspects of the health care system that will need to be managed in new ways.

Chapters 14 and 15 are directed toward managers and leaders within hospitals as the discussion moves to ways to manage a hospital that is funded under ABF. Just as there are system-wide implementation issues that need to be addressed with ABF, there are also hospital-level implementation issues.

The manual closes with a summary including a 10-point checklist that health system funders may use before implementing ABF.

Part 1: The Why and What of Activity-Based Funding

This part of the manual sets the context for ABF and introduces some of its basic concepts.

Chapter 1: The Why—Policy Objectives for Activity-Based Funding

Over the last few decades, health system funders around the world have been rethinking how they pay for health care. Most funders are trying to reduce the rate of growth of health care expenditures. Some are seeking to reduce the taxes or premiums that support health care delivery, while others are aiming to get more value for money. Hospitals and other providers try to increase these funds, both to treat more patients and to introduce new drug treatments and other technologies to improve patient outcomes.

Health system funding arrangements either implicitly or explicitly define the roles of the funder and the health care provider: Who has responsibility for managing resources at different levels of the system, and who bears responsibility for over-budget expenditures? This chapter explores why some funders have looked to ABF over other funding arrangements and describes ABF's strengths in terms of supporting different health policy goals.

1.1 Options for Paying for Hospital Care

A number of attributes describe hospital funding design: the extent to which it is a top-down versus a more market-led system, the extent to which adjustments are made during the year and the extent to which there is accountability, to name a few.

Publicly funded systems have traditionally been more top-down, and the funds allocated to hospitals have typically been described as global budgets. In market-based systems, setting budgets is an internal matter determined by the revenue generated from treating patients.

Global budgets are still a common approach to paying for hospital care, with consultations, history (plus or minus an annual incremental change), specific inputs and, in some cases, activity influencing decisions about the budget. Following these consultations, the budget is fixed for a period as short as one year, potentially longer.

In the past, budgets were also allocated on the basis of inputs (for example, salaries and costs of supplies), which is known as line-by-line budgeting. This approach is relatively weak in terms of achieving common policy objectives such as access to care, quality and efficiency/ sustainability. Another approach is to tender for services. In this model, there is a market testing of the costs of providing services, and the resulting contracts can include accountability arrangements in terms of access or volume of services, as well as quality measures.

Many health funding authorities are moving to more formula-based allocation systems, with regional health authorities being funded on the basis of their population served (capitation) or their activity.

Health system reform in the 1990s in most provinces involved creating regional health authorities. These authorities were responsible for health care services for persons residing within a geographic region and for many, but not all, aspects of publicly funded health care in the region (for example, regional health authorities are not responsible for physician services or drug plans). The idea was that the regional health authorities would have the ability and incentive to ensure that the right investments were made in disease prevention and in primary care to reduce demand on high-cost hospital care. Regional health authorities would also have the incentive to invest in long-term care and home care, providing them with lower-cost alternatives for caring for patients who would otherwise be hospitalized. Regional health authorities' budgets were set on the basis of the population served (weighted using measures of health needs, including age and sex), with some adjustments for patient flows into and out of the region.

The last decade has seen an increased interest in an alternative approach to funding: basing funding for the major institutional providers (such as hospitals and nursing homes), entire regional health authorities or certain health services (such as home care) on their activity, with the capacity for their funding to vary up or down with changes in activity. This approach goes by a variety of names. "Activity-based funding" (ABF) is used here, but "case-mix funding" (because funding is based on the mix of cases treated) and "service-based funding" (because funding is based on services, not inputs or populations) are also common. ABF is also sometimes described as "the money follows the patient" and can thus be used to encourage facilities to be more responsive to patient needs. The way ABF is implemented, and the policy objectives it aims to achieve, depends in large part on the choices made in its design.

The reality is that the dichotomy presented here between population- and activity-based funding is not quite that stark: a regional health authority has to determine how much funding will flow into its hospitals and thus is forced to make choices about the basis and level for payment as outlined above, and in any health system hospitals may be assigned activity targets that take account of the population served. The two payment options can therefore exist side by side, with population-based funding flowing to a region and ABF being used within the region to fund hospitals, or population-based funding being used for some functions (such as public health) and ABF for hospitals and other direct services.

A second attribute of funding design is the extent to which adjustments are made to allocations. Is the budget fixed at the start of the year, or can it vary during the year with changes in activity? In fully market-based systems, hospitals are fully exposed (in terms of their revenue) to variations in patient demand. In public systems, practice varies: at one end of the continuum, budgets may be set at the start of the year based on expected patient load with no variation during the year, at the mid-point hospitals may be exposed to fluctuations within a band, and at the other end of the continuum they may have full exposure, as in a market system.

A third important attribute is the extent of autonomy a hospital is accorded. In the past, hospital autonomy was constrained, and managers were held to account for spending against, say, each type of input if budgets were set on that basis. At the other end of the autonomy continuum is a global budget, where a hospital has complete autonomy to set priorities in terms of services and spending patterns. Between the two are funding policies that constrain autonomy to within-program choices. Under these arrangements, a hospital might have a specific allocation for inpatient care, outpatient care or community outreach services and would be constrained from reallocating funding among these programs. The more categories used to contain spending in certain hospital programs, the less autonomy.

Not all options from these choices are logically possible: fully market systems, for example, can coexist only with high levels of autonomy. But the design of ABF arrangements will necessarily involve choices about the other two attributes: the extent of adjustments to allocations within years and the extent of hospital autonomy.

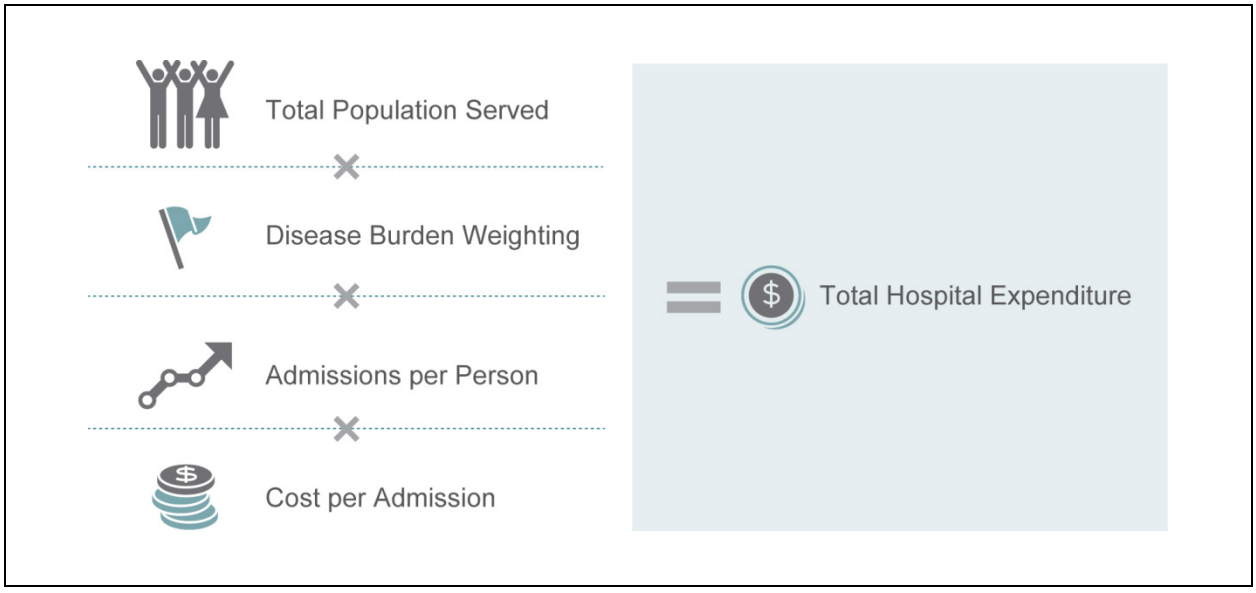
1.2 Health Expenditure

To understand the context of using ABF to fund hospital care, it helps to look at the factors that contribute to hospital expenditures in the broader health system. Total health expenditure is determined by the interaction of four key factors:

- The population served;
- The distribution of the disease burden in the population;
- The utilization rate of health services (publicly and privately funded); and
- The cost of each service (including infrastructure and stand-by costs).

A main difference between population-based funding and ABF lies in who is responsible for managing variations in these four key factors. This is illustrated in Figure 1 and described below.

Figure 1: Factors Contributing to Health Expenditures, Using Hospital Expenditures as an Example



Under a population-based approach, the funder (say the provincial ministry of health) assigns a population to a regional health authority and funds that authority based on a measure of the disease burden of the population. The funder thus takes responsibility for the first two of the four factors; the regional authority manages the risk of variation in utilization rates and in cost per service.

Under ABF, the funder takes responsibility for the first three of the above factors, and the hospital is responsible for managing the costs of the services it provides. Just as population-based funding requires a formula to recognize that there are legitimate differences in cost for sicker versus healthier people (so the disease burden of the population served is taken into account), ABF needs to have a way of describing the activities of the hospital. This issue is covered in Chapter 2.

1.3 Why ABF?

The great hope of population-based funding was that it would give regional health authorities an incentive to manage utilization rates (through prevention, primary care or other strategies), thus promoting allocative (or social) efficiency in the health system. The reality has been that influencing utilization rates is difficult, despite the documented large variations.

The 2002 Senate report on the future of Canada's health care system[1] had this to say:

> Overall, the majority of witnesses agreed that after years of global budgets in a number of provinces, no one knows how much anything costs anymore and that, as a result, it is difficult to know even approximately what the public is getting for its spending on hospitals. The Committee believes that the lack of costing data with respect to hospital services is inconsistent with our vision of what a twenty-first century service sector ought to be: that is, a sector . . . held accountable as a result of governments (and the public) knowing which services in which hospitals are provided efficiently, and which are not.

The report went on to note that

> The current literature on case-mix-based approaches seems to suggest that such methods fund hospitals more equitably than other methods. A particularly attractive characteristic of case-mix-based approaches is that they encourage efficiency and performance.

The report concluded that

> The Committee concurs with witnesses that, as much as possible, hospitals should be funded for the specific services they provide, that is, according to service-based funding. Service-based funding is the most appropriate method for financing the operational costs of hospitals.

These quotes highlight the most common reasons why ABF is being pursued:

- Transparency: so the basis for distributing funds among hospitals is clear;
- Equity among hospitals: so hospitals that provide similar services can be funded similarly; and
- Efficiency: so there is value for money in health care spending.

The third reason for introducing ABF, efficiency, is more complex than the other two.

The essence of ABF is that the funding available to a hospital will be based on its activity. With a global budget approach, funding is not based on relative efficiency, so some hospitals may receive more funding for providing the same level and mix of services than others. ABF (based on case-mix adjustment of patients treated) will automatically identify hospitals that are more efficient compared with others and will lead to a consequent redistribution of funding that is more equitable. Whether the system itself shows an overall improvement in efficiency depends in part on the level of the payment to hospitals. So in that sense, ABF is neutral with respect to efficiency gains.

Under ABF, policy-makers have options about where to set the price paid for each unit of activity: the higher the price, the less will be the efficiency gains. Setting a price above the average cost will lead to an overall reduction in efficiency. Even if the price is set at the average cost of current practice to encourage the less efficient hospitals (those currently operating at above-average costs) to improve, overall efficiency will improve only if the more efficient hospitals remain more efficient and their cost structures do not become more expensive. Efficiency gains in the less efficient hospitals could be offset by efficiency losses in the more efficient hospitals. Thus improved efficiency will occur only if there is purposive action to achieve it.

One of the strengths of ABF is that it allows incremental changes to funding distributions to reflect incremental changes in the distribution of need; aligning payments to legitimate costs also promotes system efficiency. Other funding systems (such as historic funding or global budgets) may initially be based on an alignment of funding and need, but over time need and funding can diverge. Institutions that benefit from this divergence (that is, their funding surpasses their needs) could be mobilized against radical redistributions of funding. By using a rules-based funding model such as ABF, funders are more able to match distribution of funding to the distribution of need. In addition to considering the relative emphasis to be placed on efficiency improvement, ABF system design needs to consider the interaction between funding policy and other aspects of the system. Available funding needs to be adequate to provide good quality care, and ABF design needs to dovetail with other aspects of policy (such as the extent to which growth in activity is a policy objective).

Chapter 2: The What—Key Functions in an ABF System

ABF relies on three key assumptions:

- The activities of hospitals can be described fairly;
- There is a means to set payment prices for the activities; and
- There is a set of business rules and transparent funding processes.

Although these have been cast here as assumptions, they are in fact the key building blocks necessary for ABF implementation. They will be described briefly in this chapter, with more substantive discussion in Part 2 (Describing Activity), Part 3 (Funding Activity) and Part 4 (Regulating the Funding System).

Figure 2: Building Blocks of ABF

2.1 Describing Hospital Activity

The fundamental assumption of ABF is that it is possible to describe hospital activity in a fair and meaningful way. The technology to do this was originally developed in the 1970s, when descriptions of hospital activity moved from counting the number of days of care provided or the number of patients seen to methods that took into account the complexity of patients treated. The breakthroughs in this area were led by Bob Fetter, a professor at Yale University (see Box 1). He and his team developed a classification system to enable comparative reporting for hospital inpatients. The system is known as diagnosis-related groups (DRGs), named so because the constituent groups were related to the diagnoses. This was the first so-called “case-mix classification.” Fetter’s approach created a classification with fewer than 500 groups. All inpatients could be assigned to one (and only one) of these groups.

A number of case-mix classifications have been developed since Fetter's original work. Some countries have developed classifications for inpatients using their country's diagnosis and procedure coding systems. While Fetter and his team worked on their DRGs, parallel work was going on in Canada in CIHI's predecessor organization. The first version of CIHI's case-mix classification for the acute care inpatient sector, Case Mix Groups (CMGs), was adapted from the Yale DRGs shortly after the Yale DRGs were first published. Canada's current methodology for the acute care inpatient sector is known as Case Mix Group+ (CMG+) and is described in more detail in the next chapter.

Fetter adopted four key principles to shape classification system design:

- The definition of groups within the classification system was to be based on information routinely collected in computerized hospital abstracts;
- There was to be a manageable number of groups;
- Each group was to contain cases that had similar patterns of resource use (this characteristic is generally described as groups being "resource homogeneous"); and
- Each group was to contain cases that were similar from a clinical perspective, that is, the groups were to be "clinically meaningful" or "clinically homogeneous."[3, 4]

These principles are still relevant, albeit with some modifications. (For example, what is a "manageable" number of groups?)[5]

Box 1: Bob Fetter and the Advent of Case Mix

Robert B. Fetter was an industrial engineer and professor in the Yale School of Organization and Management, married to Audrey, a hospital manager. He was approached in the 1960s by clinicians at the Yale–New Haven Hospital to identify "abnormal" cases that should be subject to utilization review.

As he described the process, "through identification of cases of inappropriate utilization, the hospital staff should be able to learn about its own practices and increase the effectiveness with which the facilities are utilized."[2] Fetter quickly realized that to identify the abnormal, you first had to identify the normal: What was expected utilization in a particular instance? He was joined in this quest by John Thompson, a nurse by background who was also a professor at Yale.

The team led by Fetter and Thompson went on to develop DRGs, the first comprehensive system to describe inpatient care. The principles developed by Fetter and Thompson have shaped approaches to measuring hospital activity since then.

The contemporary criteria for evaluating the performance of classification systems include their resource homogeneity: To what extent do the groups in the classification system contain cases that are similar in terms of resource use (Fetter's third principle, and the fundamental basis of "fairness" in case mix–based funding)?

Not all cases will fit well within the classification system: there will clearly be situations where a patient's condition is such that the resources used in his or her treatment will be quite outside the norm. These cases are referred to as outliers. Identifying the proportion of cases that are categorized as outliers is another criterion in evaluating the performance of classification systems. For example, if a high proportion of patients are deemed outliers, then the case-mix system may not be performing well in terms of segmenting patients into cost-homogenous groups.

Once hospital activity has been described with a manageable number of groups, it is expected that cases that fall within these groups will consume a similar amount of resources. The leap to a policy that payments should be made to hospitals on the basis of the expected resource consumption of cases is a small one. The caveats here are important: the leap from case-mix description to case-mix payment can be made only where there are good descriptions of activity and where the costs of hospital resources are well defined and understood. Payments for hospital services (such as teaching, training and research) that do not meet those criteria are often handled outside ABF systems (see Section 11.2).

2.2 Defining Prices

The essence of ABF is in its name: funding for a hospital should be based on its activity. But there are multiple ways in which "based on" can play out; this manual outlines some of the choices that can be made at various steps in ABF system design. In any jurisdiction, these choices will be influenced by the policy objectives being pursued (transparency, funding equity, efficiency) and by the context within which ABF is being introduced.

Moving from the description of hospital activity to payment involves assigning a price to each of the groups within the case-mix classification. This involves estimating the average cost of the patients within each group. The average cost of a group can be assigned as the payment price for each case within the group.

More commonly, an additional step converts the average cost to a cost relativity, also known as a cost weight. To calculate the cost weight for a group, its average cost is divided by the average cost of all patients (that is, the average across all CMGs). These cost weights can then be assigned to each group as payment weights. In setting prices, the payment weight is later multiplied by a single overall dollar value for each weighted unit of activity (that is, a base value) to give a dollar payment price for that group.

Table 1 illustrates the two approaches. Chapter 6 discusses both approaches and base prices in more detail. Chapters 3 and 4 discuss cost weights in more detail and describe CIHI's CMG+ methodology. CMG+ cost weights are further differentiated within each CMG, providing greater explanation of cost variability.

Table 1: Alternative Presentation of Base Prices and Payment Weights for Episodes Classified to the CMG *Arrhythmia Without Coronary Angiogram* in CMG+ 2013

Patient Age at Admission	Price Schedule Approach	Resource Intensity Weights*
29–364 Days	$2,221.95	0.54194
1–7 Years	$1,812.53	0.44208
8–17 Years	$2,085.67	0.50870
18–59 Years	$1,806.01	0.44049
60–79 Years	$2,280.17	0.55614
80+ Years	$2,516.95	0.61389

Note

* Resource Intensity Weights are cost relativities under CMG+.

Despite the variability in ABF system design, four broad principles (based on Averill and Kalison[6]) characterize ABF arrangements:

1. The amount of revenue a hospital receives varies in some way with its activity;
2. The payment prices for each unit of activity are fixed in advance for the period (usually a financial year) to which they apply;
3. In its stable state (after any phase-in period), the payment prices are not based on the hospital's past or current actual costs; and
4. The hospital is responsible for managing within the revenue it receives (retaining surpluses and being accountable for losses).

Funding systems based on these principles are likely to achieve the objectives described in Chapter 1. In terms of the efficiency objective, for example, the application of the third principle usually means that payment prices are based on the overall cost experience of all hospitals in a system (province, country) and can be an average or at a benchmark based on costs for the group of hospitals. An individual hospital's costs no longer determine the funding it receives. Where the hospital's costs are higher than the payment rate, applying the fourth principle means that the hospital will need to shift money from profitable areas to fund losses in unprofitable areas or reduce its costs so that they are in line with payment.

The way in which ABF plays out is subject to the environment in which it is introduced. The first major implementation of ABF occurred in the United States in 1983,[7] with subsequent major implementations occurring in Australia[8] and in many European countries.[9] See Box 2 for details about the U.S. implementation of ABF and Box 3 for an example of a Canadian implementation of ABF.

Box 2: Prospective Payment for U.S. Medicare

ABF in the U.S. is often referred to as prospective payment because hospital payment rates are determined prospectively at the start of a financial year (see principle 2 above), rather than retrospectively based on submitted cost-based bills. The major implementation of ABF in the U.S. is the Prospective Payment System for Medicare, the U.S. funding scheme for the elderly and certain other groups of people.

Prospective payment replaced a previous system whereby hospitals were funded based on their costs. Under the prior arrangement, Medicare expenditures were increasing at almost 20% a year in the years prior to implementation. Prospective payment was introduced to contain costs and to provide rewards for efficiency.

Medicare adopted Fetter's DRG classification to describe inpatient care, with payment rates adjusted for a range of factors, including whether the hospital looked after a high proportion of poorer people and the extent to which teaching was undertaken in the hospital.

Although the system has evolved significantly from its initial implementation, and prospective payment principles have been applied beyond inpatients and acute care hospitals, the current arrangements still bear witness to these early antecedents.

The annual process of updating prices is a very public one and involves considering the impact of new technologies and price movements for inputs. The Medical Payment Advisory Commission provides an example of this process.[10]

Box 3: Patient-Focused Funding in British Columbia[11]

B.C.'s Health Services Purchasing Organization (HSPO) introduced patient-focused funding to 23 of the largest hospitals in the province in April 2010. Patient-focused funding provides financial incentives for the hospitals to deliver high-quality patient care and improve patient access to hospital services. To achieve this goal, in 2010–2011, HSPO administered the following programs:

- Activity-Based Funding
- Procedural Care Program
- Emergency Department Pay for Performance
- American College of Surgeons National Surgical Quality Improvement Program

HSPO adopted CIHI's CMG+ case-mix system and Resource Intensity Weights (RIWs) in its implementation of ABF. It paid $1,520 per inpatient RIW and $3,040 per same-day-care RIW. These payments per RIW were not intended to cover the full cost to open new capacity in hospitals, but rather to aid management, staff and physicians to make improvements within existing capacity.

ABF causes fundamental changes in the relationship between funders and hospitals. Under global budgeting, the province or the regional health authority allocates a budget to a hospital. Under ABF, it is the activities that are funded. Thus what is now actually being allocated by the province or health authority is the ability for the hospital to earn revenue from patient treatment. In ABF, the revenue that can be earned may not be unlimited. There may be a cap on revenue determined by activity volumes: that is, the amount of revenue a hospital gets depends on the extent to which it reaches the activity ceiling.

Under ABF, the budgeting process for a hospital thus becomes primarily an internal one. The hospital assesses how much activity it will generate, subject to any accountability agreements that determine expected or maximum volumes, and thus how much revenue it will earn for that projected activity. The hospital develops its budget based on those parameters.

ABF is essentially based on the cost structures of the average hospital, with the average cost used as the basis for setting the price. While the price-setting may take into account hospital characteristics (for example, there may be distinct prices for small, medium and large hospitals), it may not be fair for all hospitals. For example, very small community hospitals may fare less well under ABF for two reasons: there may be higher costs per case than average because of lack of economies of scale, and there may be an insufficient volume of cases to even out the swings and roundabouts in terms of different types of patients (that is, what you gain on the easy cases, you lose on the more expensive ones). Special provision may thus be necessary for these small hospitals, which often provide essential access in rural and remote areas.

The issue of swings and roundabouts is an important one affecting all hospitals, not only small ones. As Averill and Kalison phrased it,

> A common misconception about [case-mix] payments is that no patient should have a cost higher than the payment amount or stay longer than the average length of stay for the DRG. The definition of the patients in each DRG is not so precise that every patient is identical. There are variations across patients within a DRG, due to severity of illness and other factors that cause the resource needs of patients within a DRG to vary. It is expected that there will be patients whose costs exceed or fall below the payment amount. So long as the variations in resource needs are random and not associated with particular types of hospitals, there will be no inequities in the system.[6]

2.3 Regulating the ABF System

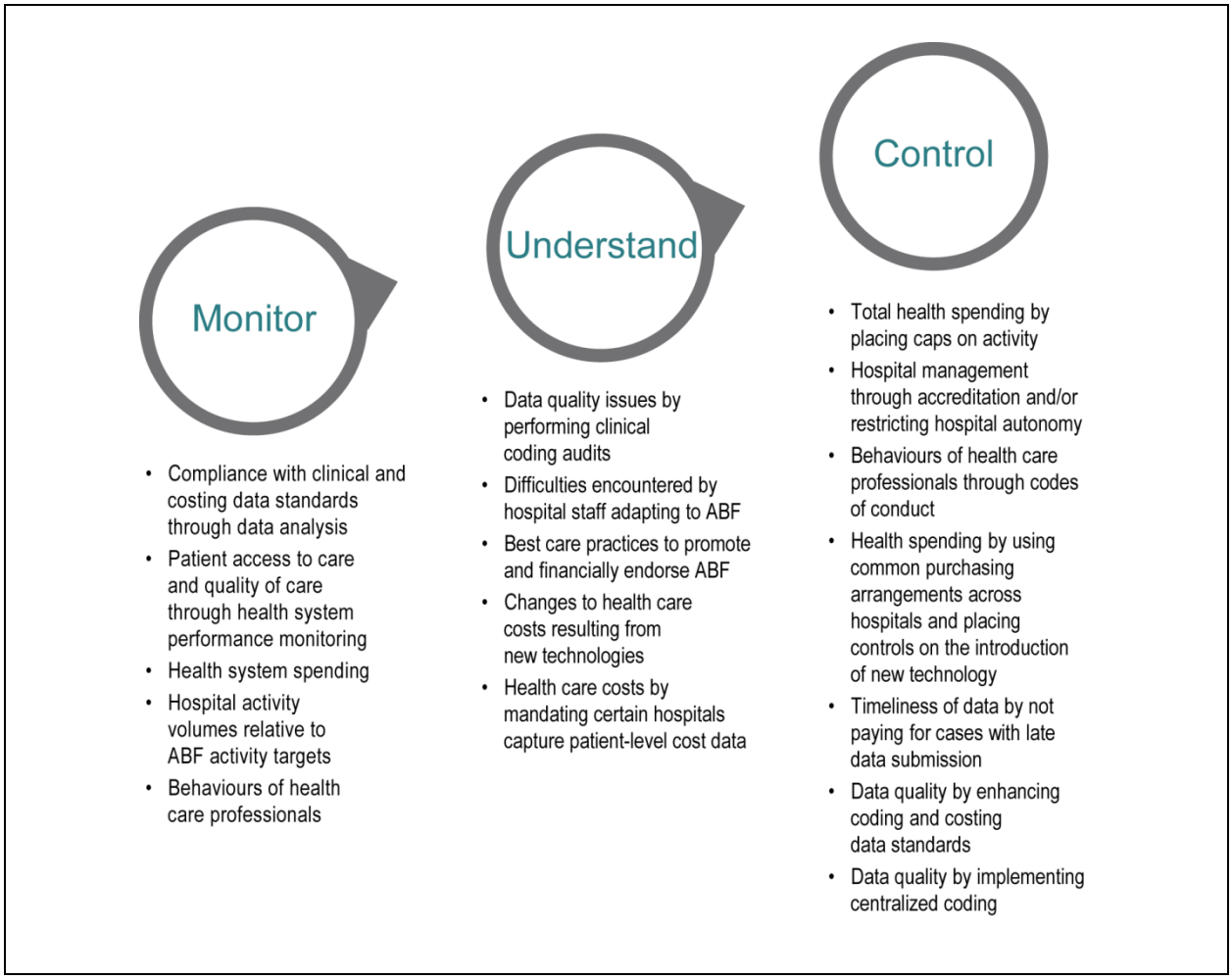
The purpose of regulating the ABF system is to control health system behaviours to bring them to the level desired by policy. In this context, regulation focuses on the efforts of the funding authority to monitor, understand and control hospital activities and costs so that they align with the ABF policy goals.

Funders rely heavily on data when using ABF, so they need to trust the quality of the data. Regulation systems need to emphasize compliance with data standards (for both cost data and clinical data). Certain hospitals might be required to collect patient-level cost data.

Funders should consider monitoring the possible unintended health system changes that could result from ABF. They may want to tighten and regulate hospital behaviours where unintended changes are observed. As an example, the funder might want to ensure that certain services are maintained by all hospitals to prevent hospitals from becoming more specialized. Conversely, the funder might want some hospitals to specialize. Funders must also define the behaviours that are expected of hospital staff and health care professionals.

Figure 3 presents some ways in which the funder could regulate the ABF system. The topics listed in this figure are explored in further detail later in this manual.

Figure 3: Regulating the ABF System—Some Examples



Part 2: Describing Activity

This part of the manual introduces ways of describing hospital patient activity.

Chapter 3: Case-Mix Systems and ABF

It has been 50 years since Fetter pioneered the design of the first case-mix system. Since then, other systems have been developed, each having taken a different path in its evolution. Today, different case-mix grouping methodologies are used by different countries. Within Canada, CIHI has several case-mix methodologies that are applicable to various health care sectors. Canada's first case-mix system, the CMG system, was developed 30 years ago and adapted the American ICD-9-CM–based DRG system to accommodate Canada's ICD-9/CCP classification systems.[12]

3.1 Not All Case-Mix Systems Are Designed With ABF in Mind

Each case-mix system has its own history in terms of development and design rationale. The rationale of Fetter's DRG system was to facilitate hospital comparisons; it was not designed for funding purposes. Many countries have moved to using grouping methodologies with specific emphasis on use in ABF or other payment systems. Others, such as Canada, have continued to make heavy use of their case-mix systems for health facility and health system management purposes. CIHI made its case-mix design choices (including high cost-explanatory power) with consideration about various applications, including benchmarking, utilization management and funding. Until recently, case-mix funding applications in Canada have not been ABF per se but rather have been used to allocate a fixed budget based on measures of activity (that is, activity-based budget allocation). Canadian health system funders have expressed more interest in ABF, with implementation in some provinces.

3.2 Options for Choosing a Case-Mix System

Every case-mix system has strengths and weaknesses in terms of its usability for ABF. No single case-mix system will necessarily be suited to every implementation of ABF. Health system funders need to look at available options and determine which case-mix system best aligns with their ABF objectives. Their decision regarding a case-mix system will be influenced by various characteristics, such as its foundation data, the clinical buy-in to its grouping logic, the alignment of the grouping logic and cost weights with the clinical practice patterns and costs in their jurisdiction, and the incentives it presents.

One option for health system funders is to adopt an existing case-mix system, built using similar foundation data, as the basis for their payment system. Table 2 lists some of the advantages and disadvantages of adopting an existing case-mix system for use in ABF.[13]

Table 2: Considerations When Adopting an Existing Case-Mix System for Use in ABF

Possible Advantages	Possible Disadvantages
• May avoid the confusion of using two separate case-mix methodologies in a jurisdiction (one for system management and one for funding). • May be relatively inexpensive and immediately available. • Allows comparisons with other jurisdictions using that same case-mix system. • Provides an opportunity for the jurisdiction to influence future changes to the system, particularly if the requested changes are beneficial to many users of the case-mix system. • Avoids the need to obtain development expertise. • May be well-known and accepted by stakeholders.	• Likely does not perfectly align with the jurisdiction's payment policy. • Does not guarantee that modifications to the system that are requested by the funder will be implemented in a timely manner.

A health system funder may decide that adopting an existing case-mix system in its entirety is not suitable and consequently might consider other options, such as modifying the system's existing CMGs or cost weights. Alternatively, the funder may consider adopting a case-mix system that was built using different foundation data (for example, a Canadian province may adopt an American-developed case-mix system) or building a new case-mix system altogether. Many countries that have implemented ABF have developed their own case-mix systems. While these other approaches may offer better alignment with a jurisdiction's payment policies, each comes with higher costs in terms of development and maintenance.

Whichever approach is used, it is important to consider the appropriateness of the case-mix system for use in ABF (see Chapter 4).

3.3 Canada's Inpatient Case-Mix System

This section introduces concepts in case-mix system design by describing CMG+, developed by CIHI for the Canadian acute care inpatient population.[14] Chapter 4 presents some considerations for funders who decide to adopt or adapt CMG+ for use in ABF.

3.3.1 Foundation Data for CMG+

The CMG+ methodology was developed, and is updated regularly, using multiple years of inpatient data and, for a large proportion of that data, the associated case-cost information.

Clinical and demographic data related to each inpatient episode is stored in CIHI's Discharge Abstract Database. Each database record represents an episode of care for a patient who was admitted to a hospital. This includes patients who received care and were later discharged, patients who died during their hospital stay and those who signed out or were transferred to another hospital.

Canada's patient-level cost data is stored in CIHI's Canadian Patient Cost Database, to which a subset of hospitals submits detailed cost information for each patient episode. The cost data is linkable at the patient level to the clinical activity data.

Box 4: CMG+ 2013 Cost Weights

CIHI created the CMG+ 2013 cost weights based upon activity and cost data sets:

- The activity data set contains clinical and demographic information from all provinces and territories except Quebec. It includes over 7 million records (2,331,167 for 2008–2009; 2,343,854 for 2009–2010; and 2,354,553 for 2010–2011).
- The cost data set contains patient-level cost data from selected facilities in three provinces (B.C., Alberta and Ontario) for the two most recently available years. This data set includes more than 1 million records (533,196 for 2008–2009 and 742,500 for 2009–2010).

CMG+ is updated and published on an annual basis using the most recent years of clinical and cost data available (see Box 4).

CIHI has coding standards for the capture of all clinical and demographic information stored in its Discharge Abstract Database. These standards ensure that the foundation data required by the CMG+ methodology can be trusted to be of high quality. CIHI has established and maintains the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA) and the Canadian Classification of Health Interventions (CCI), which are the national classification systems for capturing diagnoses and interventions, respectively.[15] The *Standards for Management Information Systems in Canadian Health Service Organizations* (commonly known as the MIS Standards)[16] and the patient-costing methodology[17] provide the accounting and methodological frameworks for reporting costs at the patient level.

3.3.2 Assigning CMGs

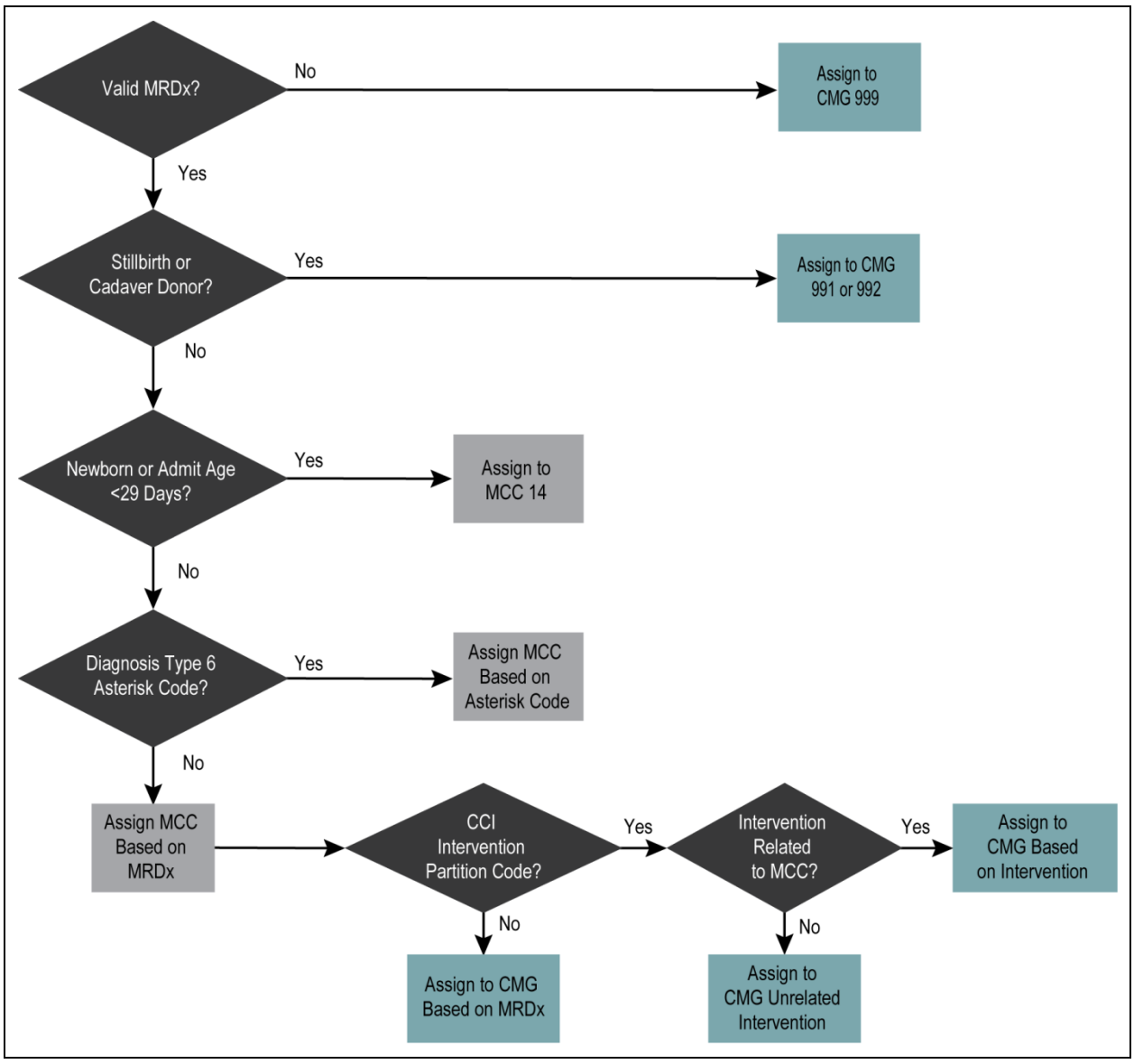
In common with most other case-mix classifications, CMG+ uses information from hospital abstracts to assign each patient episode to a unique CMG that is both clinically relevant and cost homogeneous. The following describes the hierarchical approach used to assign a CMG to an abstract:

- There are 21 major clinical categories (MCCs). An MCC is a large grouping of diagnoses generally related to a body system, specific condition or trauma. In general, an MCC is assigned to the patient episode based on his or her most responsible diagnosis (MRDx), that is, the diagnosis determined to have been the most responsible for the patient's stay in the hospital (which is not necessarily the same as the admitting diagnosis). An exception to this approach is the newborn and neonatal MCC, which is defined based on an admission age of 28 days or less.
- The MCCs are then further divided into the diagnosis or intervention partition according to whether or not a surgical intervention was performed.
- Within the intervention partition, the grouping methodology considers all interventions coded on the abstract to find one that is related to the same MCC as the MRDx. If more than one intervention is found, the case is assigned to an intervention CMG based upon an intervention hierarchy. The intervention hierarchy orders CMGs from the most to least resource intensive, as defined by clinical judgment and expected resource consumption. Additional information, such as diagnoses, interventions not on the intervention-partition code list, gestational age and unplanned admission status, may also be used in CMG assignment.

- Within the diagnosis partition, cases are assigned to a CMG primarily based on their MRDx. Additional information, such as other diagnoses, interventions not on the intervention-partition code list, planned or unplanned admission, and gestational age and weight on admission for neonates, may also be used in CMG assignment.

The high-level business rules for CMG assignment in CMG+ are summarized below in Figure 4.

Figure 4: CMG+ High-Level Business Rules for CMG Assignment



For the 2013 version of CMG+, there are 562 CMGs. Box 5 provides a high-level summary of other case-mix systems.

Box 5: Summary of Other Case-Mix Systems

U.S. (MS-DRG version 29): The U.S. Medicare Severity—Diagnosis Related Groups (MS-DRG) divides cases into 25 major diagnostic categories (MDCs), surgical and medical partitions and 751 groups. An additional pre-MDC is also defined for 15 high-cost groups (for example, lung transplants).

Australia (AR-DRG version 7.0): The Australian Refined—Diagnosis Related Groups (AR-DRG) divides cases into 23 MDCs and 771 groups in 406 adjacent groups. In addition to the surgical and medical partitions common to many systems, an "other" partition is used for interventions that occurred outside of an operating room. An additional pre-MDC is also defined for 18 high-cost groups.

Germany (G-DRG version 2013): The German system was developed using the AR-DRG as a basis. It divides cases into 23 MDCs (plus 1 pre-MDC) and 1,187 groups.

Nordic Countries (NordDRG version 2012 NC): The Nordic DRG system defines 796 groups within 28 MDCs (plus 1 pre-MDC).

France (GHM version 11): The *groupes homogènes des maladies* (GHM) divides hospital cases into 26 MDCs (plus 1 pre-MDC) and 2,297 groups. There are 606 base GHMs, most of which are split into four severity levels.

Portugal (AP-DRG version 21.0): A non-modified version of All Patient (AP)-DRGs defines 669 groups within 25 MDCs (plus 1 pre-MDC).

England (HRG version 4, 2009–2010): The Healthcare Resource Group (HRG) system covers the majority of hospital acute care cases and was designed specifically to support government health policy. HRG4 unbundles costs so that high-cost interventions, drugs and devices can be recognized for ABF purposes. It has 22 chapters and 1,468 groups.

3.3.3 CMG+ Factors

Unlike most other case-mix systems, CMG+ overlays a series of factors on the CMGs, making CMG+ a multi-dimensional classification. These factors were incorporated into the CMG+ system design to provide enhanced clinical differentiation and increased power to explain variation in resource use. They are not used to assign an episode to a CMG. Along with the CMG, they are used to assign indicators of resource use, specifically the Resource Intensity Weight (RIW, a relative cost weight) and expected length of stay (ELOS). In case-mix classifications of other countries, information contained in these factors is more typically incorporated into the DRG definition.

Factors are based on the patient's age on admission, the presence of comorbid conditions and three factors involving interventions (flagged interventions, intervention events and out-of-hospital interventions). A brief description of each factor is presented below and in Table 3.

The age factor is made up of nine age groups, based on the patient's age at admission.

The effect of comorbid conditions is incorporated into the CMG+ system using the comorbidity factor. A list of selected comorbidities is used to assign each episode to one of five comorbidity levels. The comorbidity level is based on the cumulative impact of all comorbid conditions present on the abstract. Episodes where there are no significant resources consumed due to comorbidities are assigned to comorbidity level 0. Episodes where the presence of comorbidities led to an estimated 25% to 50% increase in resource consumption are assigned to level 1, episodes where resource consumption increases 50% to 100% are assigned to level 2, increases of 100% to 200% are assigned to level 3 and increases of 200% or more are assigned to level 4.

There are 16 flagged intervention categories, each of which has been determined to be associated with a significant increase in resources used and occur too rarely within many CMGs to allow a split based on that intervention. These are handled as separate factors and provide substantial power to CMG+ in explaining resource costs. An example of a flagged intervention category is invasive ventilation.

A patient who is grouped to the intervention partition of his or her MCC is said to have incurred an intervention event when one of the surgical interventions on the intervention list has been performed (usually involving a trip to an operating room, endoscopy suite or cardiac catheterization lab). The intervention event component of CMG+ adjusts the RIW and ELOS when there are additional intervention events within the same patient stay (adjustments are made for two and for three or more intervention events).

The third type of intervention that generates a separate factor is out-of-hospital events; this applies to a few CMGs where an inpatient episode may involve transporting the patient to another facility where a procedure is performed on an ambulatory basis, following which the patient returns to the initial facility. As the costs of the procedure are not incurred by the inpatient facility, this factor reduces the RIW of the inpatient episode.

Table 3: CMG+ Factors

Factor Name: Description	Factor Values
Age Category: The patient's age at admission.	**Newborns and neonates:** Newborn, 0 to 7 days, 8 to 28 days **Pediatric:** 29 to 364 days, 1 to 7 years, 8 to 17 years **Adults:** 18 to 59 years, 60 to 79 years, 80+ years
Comorbidity Level: A measure of the impact on resources consumed, based on the presence of specific comorbid conditions.	**0:** No significant comorbidity **1:** 1.25 to 1.5 times more resource intensive **2:** 1.5 up to 2 times more resource intensive **3:** 2 up to 3 times more resource intensive **4:** 3 or more times more resource intensive **8:** Comorbidity not applied (for example, normal newborns)
Flagged Interventions: The presence of specific interventions that are indicative of patients with higher-than-expected resource use.	16 indicators (**present** or **absent)** for each of Cardioversion, cell saver use, chemotherapy, dialysis, feeding tubes, heart resuscitation, invasive ventilation greater than or equal to 96 hours, invasive ventilation less than 96 hours, paracentesis, parenteral nutrition, pleurocentesis, radiotherapy, tracheostomy, vascular access device, non-invasive biopsy and per-orifice endoscopy
Intervention Event: The number of visits to the operating or surgical room, regardless of the number of interventions performed during the visit, as long as at least one of the interventions was significant.	**1:** One intervention event **2:** Two intervention events **3:** Three or more intervention events **8:** No intervention events (hence a diagnosis-partition CMG)
Out-of-Hospital Intervention: Interventions performed on an ambulatory basis in a hospital other than the admitting facility, with the patient then returning to the initial facility. This factor is applied to only a few cardiac CMGs.	**In-hospital** or **out-of-hospital** for each of Pacemaker implant, coronary angiography and percutaneous coronary intervention

Box 6: CMG+'s Unique Factor Overlay Approach

The U.S. MS-DRG system has 751 groups, the Australian AR-DRG has 698 and the Canadian CMG+ system has 562 groups. The number of groups for each of these systems would, at first glance, appear to be similar.

For the U.S. and Australian systems, factors similar to age or comorbidity are used when defining DRGs. Canada uses the factor overlay approach to explain variation within the base CMGs. With the inclusion of the five factors, the number of potential groups is considerably higher than in other systems internationally. The number of combinations that exists for the 562 CMGs when considering age category and comorbidity level only is more than 16,000. While the more refined CMG+ classification system brings greater specificity in describing cost variation, it can introduce different challenges when being used for ABF. Chapter 4 discusses some of the strengths and weaknesses of CMG+ for use in ABF.

3.3.4 Atypical and Long-Stay Statuses

CMG+ denotes patient episodes as atypical when they involve patient transfers into and/or out of an acute care facility, patient deaths in hospital or patients who signed out prior to medical discharge. Furthermore, episodes with unusually long lengths of stay are classified as long stay.

CMG+ determines which episodes are long stays by setting length-of-stay thresholds (trim points) for every patient episode based on the CMG and factor values assigned to it. That is, episodes with lengths of stay that exceed the trim point are identified, after taking into account their case-mix (that is, clinical and age) characteristics.

Other case-mix classification systems use different approaches for defining atypical cases and determining long-stay outliers. (For example, for long-stay cases, the Australian system uses three times the mean length of stay of the group as the high boundary point.)

Box 7: Long-Stay Trim Points in CMG+

Long-stay cases are defined as those that stay longer than the trim point, which is determined separately for each CMG using the following formula:

Trim Point = Q3 + Multiplier × (Q3 − Q1), where

- Q3 is the third quartile length of stay for the CMG (that is, where 75% of patients have a shorter stay);
- Q1 is the first quartile length of stay for the CMG; and
- The multiplier is a number that is set each year so that a specific proportion (4.5%) of cases overall (not by CMG) are defined as long stay.

The atypical and long-stay statuses serve to divide the patient population. For the activity data used for CMG+ 2013, 12% of patient episodes were atypical, 3% were long stay, 1% were long-stay atypical and the remaining 83% were typical cases.

3.3.5 Resource Intensity Weight and Expected Length of Stay

There is often significant variation in resource consumption and length of stay among patients within a CMG. The CMG+ methodology accounts for this variation by using additional information—the CMG+ factors, atypical status and long-stay status—to adjust the resource indicators—RIW and ELOS—calculated for individual patient episodes.

The CMG+ methodology is produced using a statistically sound series of regression models from the cost and activity data sets. This includes estimates of the influence of each factor on each CMG, as well as the interaction effects when multiple factors are present for an episode. Table 4 describes the approach for RIW assignment for each type of episode differentiated by the CMG+ methodology.

Table 4: Approach for RIW Assignment by Type of Episode

Type of Episode	Approach for RIW Assignment
Typical	RIW is based on its CMG and CMG+ factor assignment.
Atypical	RIW is based on a per diem and the individual patient's length of stay. The atypical per diem is an average based on aggregations of episodes with similar CMG and factor adjustments, lengths of stay and whether the case is acute transfer in, acute transfer out, death and/or sign out.
Long Stay	RIW is derived by adding per diems to the typical RIW for all days beyond the ELOS. The per diem is based on episodes with similar CMG and factor assignments.
Long-Stay Atypical	RIW is derived by adding per diems to the typical RIW for all days beyond the ELOS. The per diem is based on episodes with similar CMG and factor assignments, lengths of stay and whether the case is acute transfer in, acute transfer out, death and/or sign out.

Box 8: CMG+'s Resource Intensity Weight

CMG+ produces a cost weight called Resource Intensity Weight.

Cost weights are set such that the average cost of all episodes across all CMGs is measured relative to a reference point. The reference point represents the average cost of all typical episodes across all CMGs. The reference point is typically represented by a cost weight of 1.

The cost weight for each CMG, and each patient episode assigned to that CMG, is then set relative to that reference point. As an example, a cost weight of 0.5 is assigned to an episode that consumes half the resources of the average typical episode, whereas a cost weight of 2 is assigned to an episode that consumes twice the resources.

CMG+ uses as a reference point the average typical inpatient case. That is, it excludes atypical cases and long-stay cases when setting the reference point for RIWs. The sum of the typical cases is equal to the sum of the RIWs assigned for typical cases.

3.3.6 Summary of CMG+

Table 5 shows the distribution of cases by presence or absence of CMG+ factors and by type of episode. For the activity data set used for CMG+ 2013, 74% of the patient episodes had no factors (other than the age factor) and 83% of patient episodes were typical. For the 26% of cases that did have factors, CMG+ provides a better differentiation of costs than a case-mix system that does not use a factor approach.

Table 5: Percentage Distribution of Cases by Factor and Type of Episode

	Type of Episode (N = 7,029,574)				
Factor Type	Typical	Atypical	Long Stay	Long-Stay Atypical	**Total**
No Factor (Other Than Age Category)	65.2%	6.0%	2.1%	0.7%	**74.0%**
Comorbidity Level Only	10.3%	2.9%	0.8%	0.4%	**14.4%**
Intervention Event Only	0.3%	0.1%	0.0%	0.0%	**0.4%**
Flagged Intervention Only	3.7%	0.9%	0.2%	0.1%	**4.8%**
Out-of-Hospital Only	0.5%	0.1%	0.0%	0.0%	**0.6%**
Comorbidity Level and Flagged Intervention Only	2.8%	1.8%	0.1%	0.1%	**4.8%**
Multiple Factors	0.7%	0.3%	0.0%	0.0%	**1.0%**
Total	**83.4%**	**12.1%**	**3.3%**	**1.2%**	**100%**

Note

Episodes were grouped using the CMG+ 2013 methodology. This is the activity data used for CMG+ 2013 calculations.

Source

Discharge Abstract Database, 2008–2009 to 2010–2011, Canadian Institute for Health Information.

Chapter 4: Case-Mix System Use in ABF

No single case-mix system will suit every funder who wants to implement ABF. Funders need to look at the different case-mix systems and options that are available before determining which aligns best with their ABF objectives. This chapter discusses ways to assess the strengths and weaknesses of a case-mix system in terms of its usability for ABF.

In addition to Fetter's four key principles in case-mix design (see Chapter 2), the following criteria could be used to evaluate the appropriateness of a case-mix system for use in ABF:

- Representativeness of cost weights;
- Understandability and transparency;
- Vulnerability to inappropriate responses;
- Stability of cost weights; and
- Potential for inappropriate rewards.

These criteria are discussed below. Where appropriate, the CMG+ methodology is referenced to provide specific examples of case-mix design features that are relevant to ABF design and implementation.

4.1 Representativeness of Cost Weights

A key evaluation criterion for any case-mix system is its ability to predict resource use; this criterion is also important to consider for a case-mix system used for ABF. At the national level CMG+ performs very well on this criterion. The coefficient of determination (R^2) runs at greater than 70% in CMG+, indicating that CMG+ is very powerful in explaining variations in costs among patients; this is a reflection of its use of factors and atypical categories. By using CMG+ cost weights in ABF, payment weights are closely aligned with actual costs.

Most case-mix systems derive cost weights by using patient-level cost data from only a sample of hospitals. CMG+ is no different. The acute care cost data available to and used by CIHI in CMG+ 2013 comes from 54 hospitals in three provinces (B.C., Alberta and Ontario). For an ABF implementation, it is important to assess whether or not the costs in the sample of hospitals are representative of the costs for the hospitals being funded. (For example, are they biased toward the costing patterns in large hospitals?)

The national weights published by CIHI have the major benefit of availability: they are easily and immediately available and based on service patterns across three provinces. However, a health system funder in a case-costing province (B.C., Alberta or Ontario) might consider the benefits of deriving cost weights based on its own cost data. Provinces that do not collect case-cost data and that are considering ABF should consider the appropriateness of adopting cost weights derived from hospitals outside their jurisdiction.

Another aspect of assessing cost weights is to compare cost weights for similar types of care between different health sectors (different case-mix systems are generally used to describe activity in different sectors). For example, consider an intervention like cataract replacement that could occur in either an inpatient or day surgery setting. Health system funders might compare the cost weights produced by an acute inpatient case-mix system for such cases with those produced by a day surgery case-mix system.

4.2 Understandability and Transparency

ABF design needs to ensure that those affected by the incentives in the funding model can take action on them. It is important to recognize that hospital managers may be able to control only some costs. As well, some hospital services (such as payroll, catering, cleaning and health information) may be managed centrally at the regional or provincial level. The way in which the case-mix system derives its cost weights takes on a new importance under ABF.

The ability of managers to respond to the incentive effects of ABF relies on those incentives being understood by and transparent to them. One way to facilitate comprehension is to use a case-mix system that is already familiar to managers. This would require a less-steep learning curve as they adapt to an ABF environment.

CMG+ is already used by many hospitals in Canada for resource management purposes. The challenge CMG+ presents in terms of its understandability for use in ABF may be its multi-dimensional approach to the calculation of RIW and ELOS indicators, resulting in a large number of distinct RIW and ELOS values. On the other hand, using two separate case-mix methodologies in a jurisdiction, one for system management and one for funding, may lead to confusion by the users.

Box 9: ABF Payment by DRG Versus ABF Payment by Cost Weight

Case-mix systems developed in other countries generally have between 600 and 900 separate groups (including, where appropriate, subdivisions to account for age and comorbidity effects). These case-mix systems are designed such that all episodes in a DRG are assigned the same cost weight. When these case-mix systems are used for ABF, ABF payments are differentiated by DRG. Hospital managers understand ABF in terms of a dollar amount paid for each DRG.

Some of the more sophisticated case-mix systems are designed such that cost weights within a DRG are differentiated based on a number of factors. For example, CMG+ has more than 16,000 separate CMG–age–comorbidity level combinations of RIWs and ELOS (the flagged interventions and intervention event factors result in the creation of even more combinations). When such a case-mix system is used for ABF, ABF payments are better understood in terms of payment per cost weight rather than payment per CMG.

4.3 Vulnerability to Inappropriate Responses

ABF and other financial reward systems carry an inherent risk of evoking inappropriate responses through adverse selection or moral hazard.[18] An example of adverse selection is a hospital favouring the provision of care to patients who are more likely to be profitable to the detriment of those patients who are more likely to be unprofitable. An example of moral hazard is putting less effort toward reducing costly and potentially avoidable events (such as in-hospital injuries) as a result of knowing that financial compensation will be provided for them. The design of the funding system needs to consider the ways hospitals might respond to ABF and to account for where ABF is vulnerable to these inappropriate responses.

Another area that could be vulnerable in ABF is hospitals responding to financial incentives by changing coding practices rather than by addressing efficiency directly. This is referred to as "gaming" the coding. So funders also need to consider whether the case-mix design is robust to issues regarding coding quality.

The detail embedded in the case-mix system's design has the potential to offset the risk of gaming in ABF. In fact, CMG+ was designed specifically to address the gaming issues that were found in its predecessor, the CMG/PIx grouping methodology, by placing more emphasis on interventions over comorbidities through the introduction of the flagged intervention factors. For CMG+, identifying the incremental revenue to be obtained from a change in coding practice would require a sophisticated understanding of the interactive effects of the various factors, which may make it less susceptible to gaming if used in ABF. However, including particular factors may remove any incentive for hospitals to explore whether care can be provided more effectively and efficiently. As well, if the system is not transparent, it may inhibit hospitals' ability to understand and respond to the incentives. The response of hospitals may be to engage in gaming instead of making efforts to provide optimal and efficient patient care.

Vulnerability to gaming increases as a hospital's financial risk increases. With ABF, the hospital's financial risk is partly determined by the ability of the case-mix system to differentiate cases with different cost patterns.

For example, the definitions used to classify atypical and long-stay outliers are important to consider with respect to gaming since these cases have very different (and usually higher) cost patterns than typical cases. Atypical and long-stay outliers often have different methodologies used to assign cost weights, which may also translate to different ABF payment rates. A hospital is exposed to fewer financial risks with classifications that assign more cases as atypical and long stay (if the funder recognizes that these cases have different cost patterns), whereas the hospital is exposed to greater financial risks with classifications that result in fewer cases being classified as atypical or long stay.

Another area of potential risk is cost-shifting. For example, CMG+ does not make use of short-stay outliers, which means the cost weight for a patient with a very short hospital stay is the same as the cost weight for a patient with a more typical length of stay. Under ABF, that translates to no deduction in ABF payments for short-stay patients. Hospitals might target efforts at moving patients out of the hospital as quickly as possible rather than making patients well as quickly as possible. The consequence of this is either the patient or a different health sector (such as nursing homes) bearing significant additional costs. The shift in these costs benefits only the hospital, as it minimizes its costs while not affecting the revenue it receives though ABF.

Issues related to vulnerability to inappropriate responses are further explored in Section 8.2.

4.4 Stability of Cost Weights

Cost weights must be updated on a regular basis (CMG+ cost weights are updated annually), and some change is expected. Substantial fluctuation from one version to the next raises concerns about the legitimacy of the costs weights and makes it difficult for a hospital manager to understand and manage the payment prices and incentives in the ABF system. A change in cost weight for any given CMG may be the result of

- Real changes in costs (such as advances in technology or practice patterns);
- Changes in the way that cost weights are calculated (such as a change in the costing methodology or the case-mix classification);
- Changes in the cost sample (such as more hospitals performing patient-level costing); and
- Changes attributable to “noise” (such as estimates produced based on small samples).

Prior to implementing ABF, cost weights over a multi-year period could be reviewed to identify the CMGs with unstable weights, the causes of the instability and the impact of the instability on health system funding allocations. Determining whether the degree of instability in cost weights is acceptable is subjective: it involves assessing the impact of any observed instability (for example, on understandability or on overall funding) as well as understanding the factors that are contributing to the instability.

4.5 Potential for Inappropriate Rewards

Another consideration in ABF design is to understand where potential inappropriate rewards or perverse incentives are being created by the case-mix system. This is particularly relevant for CMG+, since it was designed to be policy neutral and to reflect *actual* costs. An example specific to CMG+ could be the following: Is a payment adjustment for an intervention event appropriate for all CMGs or for specific ones only? Or should penalties and incentives be added after the cost weight has been calculated and applied? On a similar note, cost weights produced by most case-mix systems (including CMG+) recognize comorbidities and complications equally; that is, diagnoses present on admission (comorbidities) have the same impact in the CMG+ system as diagnoses that arise during the course of treatment (complications). Funders will need to consider whether cost weights derived that way are appropriate for ABF.

Cost is not synonymous with price. When a funder decides on payment weights, these do not have to be linked directly to the costs incurred but can be adjusted based on system goals, system pressures and the vision for the ABF process.

Chapter 6 explores the topic of costs and payment in more detail.

4.6 Thoughts on CMG+

This chapter described topics about case-mix systems that are relevant to health system funders who are implementing ABF. Specifically, funders must consider how well any given case-mix system aligns with its ABF policy goals. CMG+ was discussed in the context of its potential application for ABF. To assess its appropriateness for use in ABF in any particular jurisdiction, one must consider both the policy objectives of ABF and the way in which CMG+ is used in the ABF model. For example, B.C. has assessed CMG+'s appropriateness for use for its specific ABF policy goals and found it to be acceptable without any modification. In B.C.'s implementation, the sophistication of CMG+ and the factor overlay methodology was overcome by associating ABF payments with RIWs rather than with CMGs.

CMG+ was designed to excel in two areas: describing hospital activity and predicting the cost of delivering care. It was not designed specifically for application in ABF. The RIWs, for example, do well in explaining cost variation among patients due to clinical factors. However, RIWs may not align entirely with all ABF policy objectives. Consider the RIW adjustments made as a result of the occurrence of certain hospital-acquired conditions (that is, the comorbidity factor adjustment). Policy-makers might decide that this is an area where it is more appropriate to not differentiate ABF payment rates, since hospitals with high rates of hospital-acquired conditions should be able to reduce these rates. Removing the differentiation for hospital-acquired conditions and setting payments based on estimated average costs across all hospitals means that payment will reflect the average rate of hospital-acquired conditions. Alternatively, the funder could use RIWs without modification, since these predict actual costs, and in a separate process apply financial penalties to retract payment for incurred costs that do not align with ABF policy objectives.

CMG+ uses factors to provide further refinement to the base CMGs. It also treats deaths, sign outs and transfers as atypical and applies a per diem cost weight methodology to them, rather than including them with the typical cases. These approaches provide greater clinical specificity and explanation of cost variation. For ABF, however, this may be a weakness, since it increases the number of distinct groups subject to management review and service change.

4.7 Summary of Evaluation Criteria for Case-Mix Systems for Use in ABF

This chapter introduced criteria that can be used to assess case-mix system design in terms of ensuring transmission of desirable incentives and minimizing undesirable ones in ABF. The first two criteria reflect the importance of ensuring that the incentives inherent in the ABF system are known and understood by hospital management, and that management can respond to those incentives. The last three criteria recognize the potential for perverse incentives to be introduced and the possibility of inappropriate responses to the financial incentives.

Table 6 summarizes some of the key points raised.

Table 6: Considerations When Evaluating a Case-Mix System for Use in ABF

Evaluation Criteria	Specific Attributes to Consider
Representativeness of Cost Weights	• How well do cost weights recognize variations in resource use at a provincial or more detailed level? • Is the patient-level cost data that is used to derive cost weights representative of all hospitals? • Is there a substantial time lag for patient-level costing data that is used to derive cost weights? • Are cost weights comparable across case-mix systems when considering similar types of care between different health sectors?
Understandability and Transparency	• Is the case-mix system already familiar to hospital managers? • Is the methodology for assigning CMGs and cost weights easy to understand?
Vulnerability to Inappropriate Responses	• Is the case-mix design robust to issues regarding coding quality? • How well does the case-mix system differentiate cases with different cost patterns (for example, atypical cases, long-stay cases, short-stay cases)? • Is certain data (such as on interventions) used by the case-mix system vulnerable to perverse responses?
Stability of Cost Weights	• Is there substantial fluctuation in cost weights assigned to CMGs from one version of a case-mix system to the next? • For CMGs with unstable weights, what are the causes of the instability and the impact of the instability on health system funding allocations?
Potential of Inappropriate Rewards	• Does the case-mix system recognize comorbidities and complications equally? • Will penalties and incentives be added after the cost weight has been calculated, or will these be embedded within the calculation of the cost weights?

Part 3: Funding Activity

The previous part of the manual introduced case-mix systems as a way of describing hospital patient activity. This part covers the issues and requirements around designing a funding approach.

Chapter 5: Measuring Hospital Costs

One important piece of information required for ABF is information about current costs of care. Funders need this information to estimate cost relativities for different types of care and to inform price-setting. For hospital managers, understanding these costs in relation to the ABF payment price is a necessary step to ensure the financial health of their institutions.

Cost data is most valuable when it is captured at a granular level of detail (for example, for each hospital department and for the specific activities of those departments). Additionally for ABF, funders need a way to map these costs to individual patient episodes to use this data to set prices. However, mapping the costs of activities at the patient level can quickly become complicated. For example, patient-level costs are relatively easy to measure for drugs, implants, X-rays and lab tests. However, patient-level costs for staff time (such as of nurses) and operating room costs require greater effort.

Most hospitals in Canada already collect complete financial and statistical data on activities and services for each of their departments. Some hospitals are then able to distribute the department-level costs to the patient level (known as patient costing or case costing). This chapter explores the uses for these different types of data and presents a cost-modelling option for provinces that are implementing ABF without their own patient-level cost data.

It is important to recognize that most input costs of health care are estimated. The essence of cost allocation is identifying the best way to allocate costs to a particular patient. Few inputs are solely dedicated to a single patient. Cost allocation is thus about taking costs incurred by a group of patients and proportioning them to individual patients. The challenge in estimating patient-level costs is that not every patient consumes the same proportion of these shared resources. It is therefore important to utilize any statistical and clinical information that is available that describes the patient stay. This additional information makes it possible to improve the precision of allocating hospital costs to individual patients.

As more and more hospitals take on an integrated approach to data collection and management in their internal processes (such as lab and drug orders and nursing workload measurement systems), managers are able to harness data to provide patient-specific records of the products and services used during a stay. These records can be linked together to provide a full profile of the resources utilized to treat the patient. Commercial software has been designed to use data from the hospital’s general ledger, along with the above patient-specific data on the use of products and services, to derive a cost for each patient treated. These can then be averaged to estimate a CMG-level cost.

5.1 Dimensions of Financial Data

Standardized reporting of financial data is an important accountability mechanism for all economic enterprises, public as well as private. Annual financial statements have a long history of assuring the public that economic decisions taken by the enterprise are transparent and within the law. But this data is not primarily intended for day-to-day management purposes. A separate approach to accounting, known as management accounting, has been developed to support internal decision-making.

Health care facilities within most provinces and territories capture and record their activities and costs at the functional centre level (that is, the cost centre), according to CIHI's MIS Standards. Functional centres are subdivisions of an organization used in functional management accounting systems to record the budgeted and actual direct expenses, statistics and revenues (if any) that pertain to the service or activity being carried out. For example, the functional centre endocrinology specialty clinic (primary account code 71 3 50 43) can have costs reported for its various activities, such as for earned hours for unit-producing personnel (for example, a registered nurse providing care).

The collection of patient-level cost data enables functional centre costs to be understood at a finer level of detail. Hospital activities and costs are recorded by functional centre and by patient episode. This enables total costs for each patient episode to be calculated. Only some hospitals in Canada allocate costs to this level of detail (see Section 4.1).

The interest in understanding patient-level costs is based on one of Fetter's perspectives about the production of inpatient care. Fetter saw that patients required different quantities of what he termed "intermediate products" such as X-rays or days of stay.[3] These had previously been considered outputs of a hospital, but he reconceptualized the final product or output of a hospital as the treated patient, with intermediate products of care as inputs to the final product. He described the treated patient in terms of DRGs (see Figure 5). The aggregation of the costs of intermediate products for any patient will be the total resources consumed in treatment (that is, the total cost).

Figure 5: Insights From Fetter on the Production of Inpatient Care

Source
Adapted from Fetter RB. The DRG patient classification system: background. In Fetter RB, Brand DA, Gamache D, eds. *DRGs: Their Design and Development.* Ann Arbor, U.S.; Health Administration Press: 1991:3-27.

5.2 Value of Financial Data

Health system funders and hospital managers use functional centre–level and patient-level cost data to understand the cost differences between hospitals and among cases to set ABF payment prices fairly. They use this data to learn about the hospital activities that make up those costs.

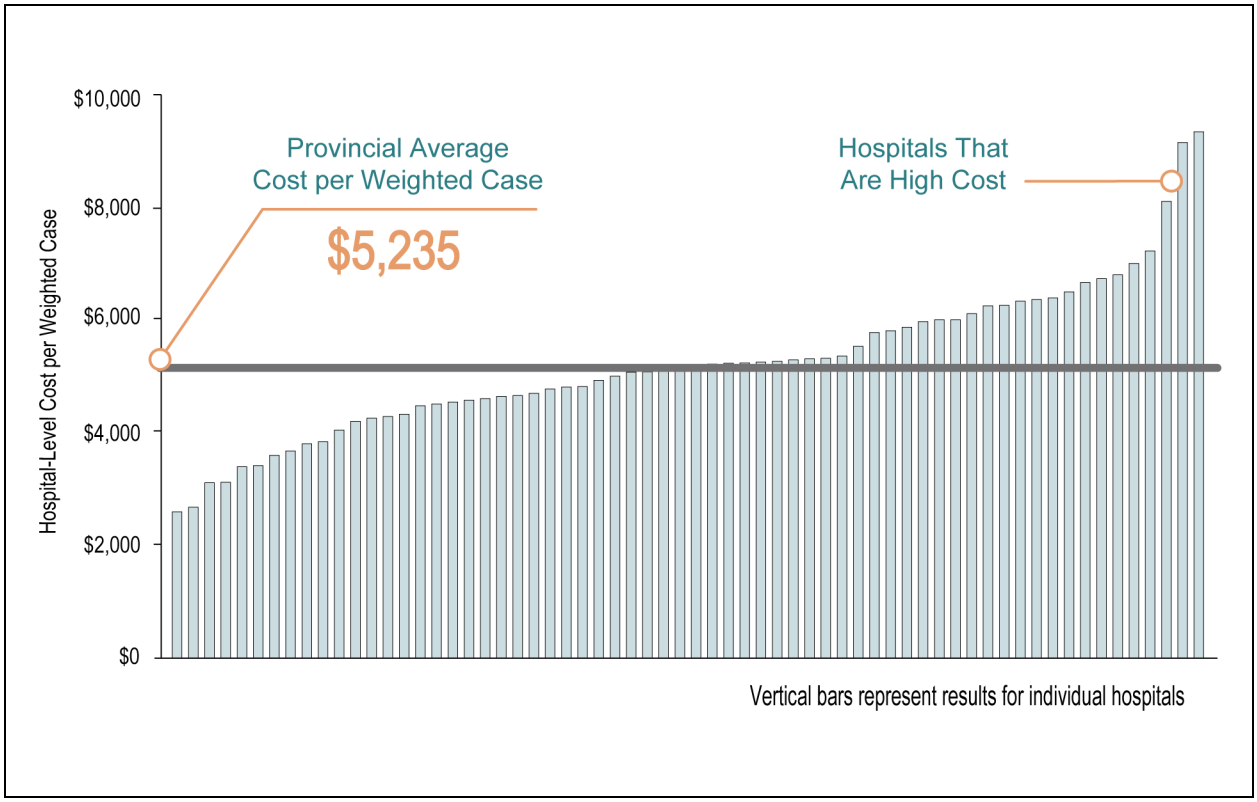
5.2.1 Value of Functional Centre Financial Data

Functional centre reporting makes it possible for funders to estimate the unit costs for hospital services. They can estimate the average cost per diagnostic test, average workload unit cost for nursing services and so on. Functional centre reporting also enables funders to precisely identify and quantify the costs that they want to exclude from ABF and instead fund them through a separate mechanism. Additionally, it allows them to set base values (such as by using the provincial average) and to assess variations in cost-efficiency across hospitals.

Figure 6 presents an example of a profile of hospital-level costs that can be useful for both health system funders and hospital managers. It presents for each hospital the average total cost incurred for each unit of RIW (data grouped using CIHI's CMG+). Another way to interpret this graph is that each vertical bar represents a hospital-specific average cost to treat an average typical acute inpatient who has an RIW of 1. The value represented by each vertical bar is determined by dividing the annual expenditures for the inpatient portion of a hospital's activity over a fiscal year by its total annual inpatient activity, weighted by RIWs to account for case-mix differences. This ratio is called cost per weighted case. This figure shows that some hospitals (10 to be exact) incur less than $4,000 in expenses for every unit of RIW. Most hospitals incur more than $4,000 in expenses per RIW, with two hospitals utilizing $9,000 of resources for every unit of RIW.

This information might be useful to the health system funder when considering the process by which ABF will replace historical funding programs, particularly for the hospitals that are high cost. Funders might also want to explore whether there are other hospital characteristics (or whether there are data quality issues) that might explain some of this variation. It is also useful for hospital managers to be aware of where their hospital is situated on such a scale relative to the ABF payment price that the funder ultimately decides to use.

Figure 6: Using Functional Centre–Level Reporting to Understand Hospital Cost-Efficiency



While the above figure illustrates total costs, similar figures can be produced to show the hospital-level average total costs for each functional centre. Functional centre reporting is an important activity for the hospital manager for tracking where money is being spent in department operations. Collecting financial and statistical data by functional centre provides hospital managers with the cost of personnel, supplies and equipment. Collecting data on workload measures and other statistical data provides them with information about their department's productivity and allows them to compare their unit costs with those of other comparable departments and hospitals.

5.2.2 Value of Patient-Level Cost Data

Functional centre–level data, however, has limited uses for ABF. It does not provide sufficient granularity to allow payment weights to be set by CMG, which is the second critical building block for ABF (recall Figure 2).

Patient-level cost data shows the variation in costs across patients, and it also enables costs for a patient episode to be summarized across hospital departments, services and CMGs. The functional centre attributes that describe the costs stay intact, but the cost is allocated to each patient episode more accurately with the use of additional information about the patient's episode of care. For example, the costs allocated to patients are based on information about their hospital stay, such as length of stay, diagnostic tests done, drugs administered, operating room time and nursing time.

CIHI uses this data to observe the distribution of patient-level total costs, by CMG, and from that calculates the RIWs. Funders can use the same data to determine an ABF payment weight. Funders can set payment weights on the basis of historical costs across hospitals and identify costs that may be excluded from ABF. Patient-level data (as well as functional centre–level data) is useful in determining appropriate adjustments to hospital payments to account for non-clinical factors (for example, hospital costs may be higher to treat patients who reside in remote northern areas where higher wages are needed to recruit health professionals).

Patient-level costing systems are not necessary for the implementation of ABF, but the credibility of the cost weights is enhanced if they are based on fine-grained cost data. Credibility is also enhanced by using weights that are seen as locally relevant, derived from within the province or, at least, nationally. It is for this reason that most implementations of ABF require that some hospitals collect patient-level cost data.

Managers can also use patient-level cost data to understand the resource requirements and impacts of changes in their services more thoroughly. This data yields important resource utilization information about the users of their services in terms of specific patients, physicians, CMGs, programs and so on. The ability of hospitals to respond to the efficiency incentives of ABF relies on their ability to understand the cost drivers of the care they provide and where their input costs and patterns of intermediate products per treated patient differ from practice elsewhere.

5.3 Hospital Financial Data in Canada

Canada has high-quality financial data about the health system. CIHI stores hospital financial data in two databases: the Canadian MIS Database and the Canadian Patient Cost Database. Both databases are reported according to CIHI's MIS Standards.

5.3.1 The MIS Standards

The MIS Standards, maintained by CIHI, is a set of national standards for collecting, processing and reporting information relating to all aspects of a health service organization's operations. These standards facilitate the collection and use of high-quality and detailed functional centre and patient-level cost data. The MIS Standards includes the following frameworks:

- The Functional Centre Framework provides a classification that allows financial data to be categorized for different hospital departments, and for department outputs (such as nursing workload) to be collected in a standardized way.
- There are three functional centre reporting frameworks, one each for direct costs, full costs and service-recipient (that is, patient/client/resident) costs. These frameworks provide an integrated approach for collecting, processing, reporting and using management information for decision-making purposes at the functional centre and service recipient–specific levels.

With respect to its use in ABF design, cost information collected according to one of the functional centre frameworks can be thought of as being one of three types: direct costs, indirect costs or non-operating costs.

In patient-level costing, direct costs are functional centres' costs that are directly related to the delivery of service-recipient care services. Direct costs can be matched to services provided to a patient (for example, nursing workload) or products used by the patient during his or her course of treatment (for example, a prosthesis). These direct-cost functional centres include nursing inpatient services (functional centre 71 2 **), ambulatory care services (71 3 **), diagnostic and therapeutic services (71 4 **) and community health services (71 5 **).

In patient-level costing, indirect costs are functional centres' costs that are classified as overhead. These costs are not directly related to the delivery of service-recipient care services and often cannot be easily associated with an individual patient. Indirect costs cover administrative and support services to other areas of the hospital. Indirect-cost functional centres include

- Administrative services (such as administration, finance, human resources and communications);
- Systems support services (such as data processing);
- Support services for hospital departments (such as material management, volunteer services, building operation, building security, building maintenance and biomedical engineering/medical physics);
- Support services for patients (such as housekeeping, laundry and linen, registration, case management coordination, patient transport, health records and service-recipient food services);

- Emergency preparedness; and
- Certain types of education (such as audiovisual and in-service education).

Non-operating costs (that is, residual costs) are hospital costs that are not related to the hospital's ability to provide patient care. These costs are excluded from patient-level costing. These costs are captured in functional centres for research, education (with the exception of in-service education) and undistributed functional centres (that is, revenues or expenses for which allocation to specific services, service recipients or programs is inappropriate, impractical or both, such as building depreciation).

5.3.2 Canadian MIS Database

The Canadian MIS Database stores financial and statistical data relating to the day-to-day operations of Canadian health service organizations. Financial, statistical and workload data is reported by functional centre.

For each reporting organization, the Canadian MIS Database includes a unique organization identifier and its name, address, size and ownership, along with data relating to its financial position (balance sheet) and operations (income statement). Financial and statistical data is recorded by functional centre. Revenues are recorded by source, and expenses are recorded by type. Broad groups of expenses include compensation, supplies and sundries, equipment, contracted-out services, and buildings and grounds expenses. This database also records statistical information—such as the number of hours worked by staff and the number of inpatient days reported in nursing wards—and workload information that is used to measure the volume of activity provided by employees of a specific functional centre in terms of a standardized unit of time.

The MIS Standards outlines the ways in which hospitals are to record their various activities and allocate expenses to the different functional centres, allowing for more valid comparisons among hospitals. The rules for allocating full costs, as detailed in the Functional Centre Reporting Full Costs Framework, may be of particular value for health system funders involved in ABF.

Box 10: Using Indicators From the Canadian MIS Database to Measure and Understand Costs

CIHI offers to the public an interactive report on many financial indicators through its Canadian Hospital Reporting Project, which is accessible from its website. Indicators related to hospital performance from the Canadian MIS Database could be helpful to hospitals managing under ABF. An example of such an indicator is administrative services expense as a percentage of total expense.[19] Such indicators could highlight whether a hospital's activities or expenses deviate from the norm and could also identify potential activities or departments where there are opportunities to become more cost-efficient. See Chapter 14 for more discussion on this topic.

Additionally, CIHI offers the Patient Cost Estimator, an interactive tool that estimates the average cost of various services provided in hospitals. It provides information nationally, by jurisdiction and by patient age group. The cost estimates represent the estimated average cost of services provided to the average patient. They include the costs incurred by the hospital in providing services but exclude physician fees, since physicians are normally paid directly by the jurisdiction and not by the hospital.

Reporting full costs involves allocating the costs of administrative and support functional centres to the service-delivery functional centres as indirect costs. This is done using the simultaneous equation allocation method (SEAM), which also is known as the reciprocal method. SEAM provides a valid allocation of indirect and full-cost results, and it recognizes the reciprocal relationship between support areas (for example, housekeeping provides services to human resources and vice versa). SEAM is endorsed as the standard for indirect cost allocation in the MIS Standards. Non-operating costs are not allocated to service-delivery functional centres.

5.3.3 Canadian Patient Cost Database

Some hospitals in Canada collect service-recipient costing (that is, patient-level costing) data, which provides a more complete picture of the extent to which nursing, diagnostic, therapeutic, and administrative and support services are utilized in the treatment of patients. Patient-level costing captures costs by functional centre. For each patient, the Canadian Patient Cost Database provides information about the functional centres where costs are incurred and the allocated direct and indirect costs. Cost data that is collected in this way is sometimes referred to as activity-based costing.

Patient-level cost data requires the following utilization information be collected and stored for individual patient episodes: number and type of intermediate products provided and the department in which costs were incurred. It also requires information on the expected cost and/or workload associated with each intermediate product (for example, the cost of the drug ampicillin, the cost of the supplies to inject the ampicillin and the minutes of nursing to give an injection). These expected costs/workloads are commonly referred to as relative value units (RVUs) and are based on actual costs from the MIS data, a standard price, or national or provincial averages. The utilization data and the RVUs are used to allocate various costs to individual patient episodes.

The cost of some traceable supplies (typically high cost and variable by patient) is allocated based on actual costs for the patient. Other supply costs that are not linear with workload are allocated based on their RVU. The remaining direct costs, as well as the indirect costs, are allocated based on the workload RVU. The precise way in which a hospital uses any one of these three approaches to allocate costs depends on the level of cost and utilization information available from its data systems. As an example, some hospitals might use standard prices developed within the hospital, whereas others might use a price derived using national average workload values for their RVU.

Better cost estimation can be achieved at the hospital level by improving the data subsystems that identify individual patients' use of resources (for example, by more accurately identifying the specific patients receiving different types of implantable prostheses) and by capturing more detailed information on the quantities of resources consumed by individual patients (such as nurse dependency or time-and-motion tracking by clinical staff of patient care activities). Greater consistency among hospitals in rules or standards for cost allocations ensures that comparisons are not distorted by using different allocation rules and that cost estimates are reliable for ABF pricing and benchmarking.

A critical advantage of patient-level cost estimates over those done using cost-modelling (see Section 5.4 for a description of cost-modelling) is that it is possible to measure how much variation exists across hospitals in patient-level cost estimates. With modelled estimates, the only source of variation is input costs, and no confidence interval can be calculated for such estimates at the hospital or patient level. Understanding variation within a CMG is particularly useful for internal hospital decision-making, but it also allows a judgment of how robust the CMG-level cost is as a basis for setting price relativities.

5.4 Modelling Patient Costs

Collecting patient-level costs for at least a sample of a jurisdiction's hospitals is desirable when designing and implementing ABF. However, in the absence of patient-level cost data, cost-modelling can to a certain extent be used as a reasonable substitute. It may also be that for certain rare types of care (such as heart and lung transplants) there is not sufficient volume within a jurisdiction, in which case cost-modelling may help estimate costs.

The simplest form of cost-modelling is to use the relative weights associated with the case-mix classification (such as CMG+ RIWs). The cost weights for each inpatient treated within a given time frame (such as a fiscal year) are summed. The inpatient portion of total hospital cost (minus the non-operating costs) is then divided by the total weighted volume of cases (the total weighted volume is the sum of the cost weights across all patients). This yields a cost per weighted case, which is the same concept that was presented in Figure 6. With cost-modelling, the cost of an individual patient can be estimated by multiplying the patient's cost weight (such as the RIW) by the hospital-specific cost per weighted case.

Cost-modelling requires the patient episodes of interest to have been grouped by a case-mix system appropriate for that health sector (CMG+ for inpatients in acute hospitals in Canada) and a cost weight from that case-mix system to have been assigned to each episode. The hospital must also have a reasonable estimate of the total cost of those patients of interest (for example, the hospital's aggregate cost of inpatients).

A potential challenge with cost-modelling is determining the amount of indirect costs to allocate to the inpatient stay as opposed to the ambulatory stay. Some hospitals collect appropriate MIS statistics; they would be able to apportion indirect costs to the inpatient stay. However, most hospitals do not collect this data sufficiently and rely on CIHI to allocate indirect costs to the inpatient episode and from this also calculate the cost per weighted case.

A jurisdiction that relies on cost-modelling is making an assumption about the cost relativities (cost of one CMG relative to another) within its hospitals. It is assuming that those relativities are similar to that of the average across hospitals whose patient-level cost information was used to calculate those cost weights (see Section 4.1 for details of cost data used in CMG+). A jurisdiction might decide that clinical practice and costs are similar enough across Canada, and that the CMG+ RIWs can provide reasonable estimates (or at least the best estimates possible given the lack of patient-level costing in that jurisdiction).

A refinement to this approach makes use of cost weights for the functional areas of a hospital, commonly known as service weights. It is important to interpret these service weights properly: they do not distinguish variances caused by differences in the costs of intermediate products within the functional areas (such as cost per lab test) from differences in the utilization rate (such as the varying number of tests ordered per patient). Rather, these service weights, typically calculated at a provincial or national level, measure the relative cost required to deliver intermediate products by the functional areas (such as lab services) by CMG.

The use of service weights allows hospital managers to make more fine-grained estimates of their local costs by calculating a functional area's cost per weighted case. Functional area cost per weighted case is calculated at the hospital level by dividing the total cost for a functional area by total weighted cases for that same functional area. Then, if hospital managers want to estimate costs for a particular functional centre for each patient, they can do so by multiplying the patient's cost weight for that functional area by the cost per weighted case of the functional area.

Box 11: International Perspectives on the Accuracy of Patient Cost Estimates

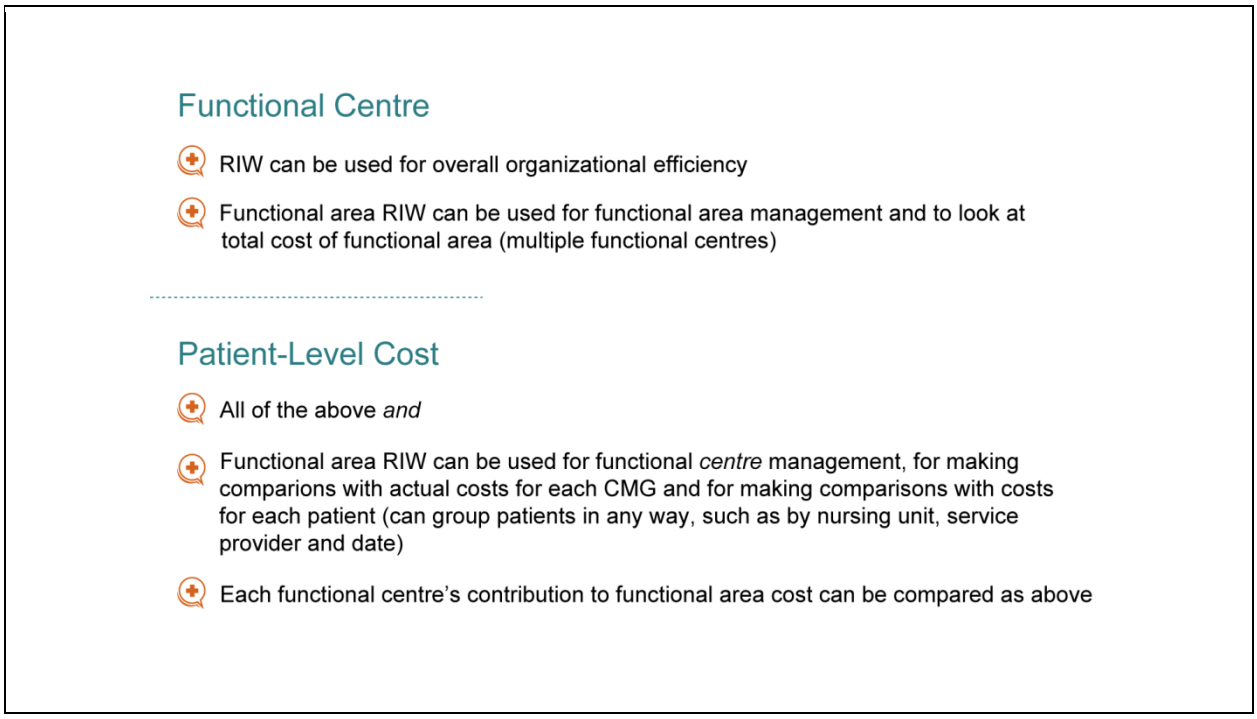
Different hospitals have differing combinations of modelled and patient-specific costs available.[20] The options available for allocating patient-level cost estimates are determined by the accuracy of the cost estimates and the specificity in identifying patients for each costed functional centre.

The following illustrates different ways in which patient-level cost estimates might be derived for the coronary care unit (CCU) of a hospital:

- If the hospital has no way to identify patients admitted to the CCU using its data, it can identify patients who were likely treated there in relevant cardiac CMGs. RIWs or patient lengths of stay might be used to allocate either a greater or lesser share of CCU costs to those patients.
- Should the hospital have a system that flags all patients admitted to the CCU, CCU costs can be allocated specifically to them. CCU costs could be allocated proportional to total CCU days for individual episodes. The hospital may estimate different nursing workload units for acute myocardial infarction patients with very high care needs versus unstable angina patients and then use the workload units to allocate costs proportionally to individual episodes.
- If the hospital has shift-specific patient-dependency rostering information, then it is possible to more accurately allocate nursing expenditures. This is a refinement of using workload units described above that uses daily patient-specific prospective measures of the intensity of the care each patient requires for each shift of care. Such information makes it possible to more accurately allocate nursing costs by taking into account specific details, such as patients who received one-on-one nursing care.
- If a hospital has a nursing workload measurement system, it will be able to identify the number of worked units used by each patient in the CCU. This way, the proportion of costs can be allocated to each patient based on the actual amount and intensity of care he or she received.

The differences between CCU cost estimates that result from these various approaches may not be large. However, hospitals with more sophisticated cost allocation systems are better placed to understand the drivers of cost variation. Less-sophisticated approaches tend to result in cost variations being washed out in the estimation process and will almost inevitably over-allocate costs to some patients and under-allocate to others. This can lead to RIW compression (that is, variations in the RIWs are washed out across CMGs). Furthermore, understanding the basis on which patient-level costs are allocated allows hospitals to better understand why their costs differ from those of other hospitals. Comparisons of costing subsystems also allow funders to select sets of hospitals to contribute to cost weight determination on the basis of the accuracy of cost data.

Figure 7: Information Available in Functional Centre Versus Patient-Level Cost Data



CIHI's service weights are referred to as functional area RIWs and consist of the following categories: Inpatient Nursing Services, Outpatient Nursing Services, Operating and Recovery Room Nursing Services, Clinical Lab, Medical Imaging, Other Professional Services and Indirect Costs. For every CMG, total RIW is equal to the sum of its functional area RIWs.

Functional area RIWs allow a hospital manager to determine whether or not spending patterns within certain functional centres correspond well with those of other hospitals after adjusting for case-mix differences. An example of one way this can be done is shown in Table 7. Deviations in estimated costs (for example, Hospital Y has a higher estimated cost per weighted product or service) could be a result of service practice differences (such as clinicians ordering more lab tests than expected for the patient's case mix) or in cost-efficiency (for example, the laboratory is inefficient in conducting lab tests). The functional area RIWs allow the hospital manager to pinpoint the functional areas that are cost-inefficient and to initiate work to identify whether or not corrective actions are needed. More discussion on some of the uses of this additional cost information is presented in Chapter 12.

Table 7: Cost-Modelling Using Functional Area RIWs—An Example for a Lab Product in a CMG

Step	Method	Province A	Hospital X	Hospital Y	Hospital Z
Total Costs for a Functional Area	Identify total costs for the functional area in the Canadian MIS data	$600,000	$400,000	$50,000	$150,000
Expected Total Utilization of Products or Services From That Functional Area	Multiply the functional area RIWs for each CMG by the total number of patients in each CMG, and then sum across all CMGs	1,207.05	825.77	69.55	311.72
Estimated Cost per Weighted Product or Service	Divide the total costs for the functional area by expected total utilization	$497.08	$484.40	$718.89	$481.19

Under ABF, hospital managers are under a significant disadvantage if they cannot quantify the cost of treating their patients and consequently cannot identify variances between their costs and the price being paid for each episode. As discussed previously, patient-level costing can provide quite accurate cost estimates at the individual patient level, with high differentiation of costs among patients with varying morbidities and treatments. In the absence of patient-level costing, hospital managers still have tools at their disposal to estimate costs and conduct variance analysis.

A functional centre manager obtains enormous value from applying the techniques described above to allocate only his or her functional centre costs. Managers might calculate a cost per weighted product for their functional centre rather than for the hospital overall. For example, the manager of an operating room might want to assess the costs of patients in certain CMGs. Using the operating room functional area RIW provides a more accurate estimate of patient-level operating room costs, compared with using the total RIW.

With ABF, it is important to know where differences exist between actual hospital costs and the revenue generated from ABF. Hospitals with costs that exceed the revenue they generate from ABF payments need strategies to identify where cost-inefficiencies exist. The methods described above detail one option for those hospitals that do not collect patient-level cost data.

Chapter 6: Moving From Costing to Pricing

Cost and price are not identical concepts. Cost is a function of actual expenditure, for a given case mix and volume. Price is a policy decision that may be based on cost information but will have other considerations and influences.

Pricing under ABF shifts the role of cost data from describing activity to providing a mechanism to pay for activity. This shift involves aggregating cost data from a number of hospitals to provide a representative sample to inform price-setting.

ABF requires funders to establish prices. Prices can be established by assigning one payment weight to each CMG and multiplying it by a base value or by assigning a dollar value or tariff directly to each group in the classification, as discussed in Section 2.2.

6.1 Setting Payment Weights

In Canada, payment weights can be based on national cost weights produced by CIHI and published as RIWs as part of the CMG+ system. It is also possible for larger provinces to develop prices/payment weights using their own cost data. However, it is not practical for smaller provinces to do this, as certain CMGs would have too few observations to provide reliable and stable estimates of costs.

Chapter 4 included an assessment of CMG+ for use in ABF and noted a few areas in which funders may consider the cost weights to not align with their ABF policy goals. The RIWs do well in explaining *cost variation* among patients due to clinical factors. However, they may not align entirely with all ABF policy objectives (such as improving access to care).

6.1.1 Incorporating ABF Incentives Into Payment Weights

Funders may have reason to increase or decrease payment weights for certain CMGs so that they no longer represent relative cost. Four examples are included here to illustrate where this might be appropriate:

- Improve access to care (for example, increase payment weights to incent reductions in wait times for hip replacements);
- Improve allocative efficiency (for example, pay for inpatient cataract removals at a day surgery rate to incent use of an appropriate care setting);
- Reduce perverse incentives (for example, do not pay for returns to the operating room unless they are part of a staged surgery); and
- Promote quality of care (for example, apply best practice weights to incent adoption of clinical best care pathways).

Box 12: Best Practice Prices

Best practice prices (sometimes called value-based or normative prices) are derived using only those costs for an episode of care that align with best practice clinical care processes or pathways. This can lead to payments that may be above or below the average or another measure of central tendency. The English Payment by Results scheme recently introduced best practice prices in four areas: cholecystectomy, hip fractures, cataracts and stroke.[21] Another example of best practice prices is to structure prices/weights to encourage same-day care alternatives to overnight stays where this is clinically appropriate.

Best practice prices rely on clinical agreement on what patient care constitutes best practice and are generally not introduced as part of initial ABF implementation. In the English case, they were implemented eight years after the Payment by Results implementation commenced. One of the strengths of best practice pricing is the clear link it provides between the pricing framework and quality of care. Similar to the English case, the Ontario Ministry of Health and Long-Term Care introduced a new funding program called Quality-Based Procedures in 2012–2013. Starting with total hip replacement, total knee replacement, chronic kidney disease services and cataract surgery, the ministry has shifted from paying for selected services to paying for the patient's entire journey of care across all providers in the episode, including pre- and post-operative activities, where appropriate and feasible. This new funding program uses evidence-informed payment rates and sets out the amount of money each health care provider will receive for contributing to that patient's care journey.[22]

Best practice pricing relies on developing agreed-upon processes or pathways and so requires extensive clinical engagement. In turn, this can facilitate acceptance and support for the ABF system.

6.2 Setting Base Values

A base value is a dollar figure that indicates the amount of money associated with a case that has a payment weight of one. There are two broad options for establishing base values under ABF:

- Pricing based on the average cost; and
- Pricing based on a cost that is higher or lower than the average cost.

ABF will drive efficiency improvement only if it is purposively designed to achieve that end and if the price under ABF is positioned to do so when compared with previous payment policies and levels of efficiency. ABF does not in itself drive efficiency; rather, it is an instrument that can be used to allocate any level of funding. An ABF system does, however, ensure that all hospitals are treated equally (achieving the funding equity objective) and that inefficient hospitals are not rewarded by being funded at higher levels for treating a case that another hospital could treat with better cost-efficiency.

Furthermore, a critical component in the design of an ABF system is whether the funding incentive (and hence prices) will be based on total versus marginal costs. This topic is touched on below. See Section 7.2 for a full discussion on this related topic.

6.2.1 Pricing Based on Average Cost

Many ABF implementations set base values to equal average costs, which may, *prima facie*, be seen as fair and the least politically risky option. However, there are a number of limitations of an average cost approach:

> First, rewarding hospitals at full average cost for activity provides an incentive to increase activity as long as marginal cost is less than or equal to price/average cost; this could result in the provision of care that is financially unsustainable and/or medically inappropriate. Second, the association between prices and average cost encourages convergence to the mean, rather than incentivising improvement in performance.[23]

Setting base values to equal average costs is policy neutral in the sense that it values all activity at its relative cost. This may not be desirable if policy-makers wish to place greater incentives on certain types of activity (for example, to promote the use of day surgery over inpatient care).

By definition, average cost pricing reflects current average levels of efficiency, so efficiency improvement relies on the dynamic effect of the average cost pricing policy. Average cost–based ABF will identify some hospitals as inefficient, with consequent pressure on them to improve their efficiency or focus on areas of care where they are efficient. Assuming they are successful in that regard and hospitals identified as being efficient stay efficient, the average costs of care should decline. Under average cost pricing policies, this will lead to a subsequent reduction in prices. This dynamism, then, produces an automatic driver for efficiency improvement, phased in over time.

6.2.2 Alternative Pricing Strategies

ABF can be used as an instrument to support specific policy goals by setting ABF payment prices above or below average costs.

The decision to set ABF payment prices below average costs is usually motivated by a policy goal to improve efficiency, but it can also be associated with other policy goals.

Below-average cost pricing sets a more challenging benchmark than average cost pricing. This approach can be used to negotiate extra volumes or services between single funders and providers, taking particular economies of scale/scope into account. Below-average cost pricing takes two main forms: balanced-budget pricing and benchmark pricing.

Where total expenditure is to be capped, price might be set as the total funding available divided by the estimated weighted activity to yield an “affordable” price. See Section 10.2 for further discussion on estimating activity volumes. Balanced-budget pricing is a common approach when budget considerations require substantial savings. In these circumstances, prices are set as the dependent variable in an equation with two independent variables: available budget and expected volumes. The price is based not on observed costs but rather on what can be afforded given expected volumes. This pricing approach increases the financial risk placed on hospitals and can lead to various unintended responses in the health system if prices are viewed as unattainable by the average hospital or if total hospital activity is higher than expected.

Benchmark pricing sets base values using some characteristic of the cost distribution other than the mean. A variety of non-parametric measures can be used to establish benchmark pricing. Typically, benchmark prices are set by observing average costs at the different hospitals and then considering a base value based on

- A trim point (for example, the hospital just inside the low-outlier trim or low-extreme trim); or
- A ranking (for example, the third-lowest-cost hospital, the lowest-cost hospital or the lowest-quartile hospital).

The less representative the benchmark price, the more there is a risk that the prices set are unfair and potentially unattainable by the average hospital. Hospitals may differ in their potential to achieve improvements in efficiency for reasons such as the age of their capital stock or the substitute services available in the community (to facilitate early discharge). If the benchmark price is seen as being determined by a single atypical hospital, this may undermine the perceived equity of an ABF scheme.

Box 13: Below-Average Cost Pricing—An Australian Example

The 1993 implementation of ABF in Victoria, Australia, provides a good example of below-average cost pricing. This ABF implementation set the price around the third-best (lowest-cost) hospital performance. This was in the context of a significant budget reduction but also with the objective of showing that these challenging targets were realistic in the local context.

Below-average cost pricing may be considered in times of economic crisis or where implementation is accompanied by an emphasis on achieving major improvements in efficiency. However, when ABF is introduced to enable significant budget reductions, there can be confusion in stakeholder and public perception about the merit of ABF as a funding approach, as it may be seen as the cause of budget reductions rather than simply the mechanism of their introduction. Box 13 presents a below-average cost pricing example that was implemented in Australia.

6.2.3 Updating Base Values for Inflation

The cost data used in developing payment weights may be two to three years old. The inevitable lags involved in calculating ABF payment weights also add complexity to the process of updating the base value. The system-wide mean can be used to set the base value, meaning that the base value could be out of date.

The system-wide mean (or benchmark) in the cost data may be out of date as a result of technology change, wage or salary movements, or other economy-wide factors. Updates to the base value to reflect these changes can be done by estimating individual effects or by using broad economy-wide indicators.

The most common approach to update the base value is a simple projection: assume the trends in costs for the three to five years prior to the observed cost data continue, and adjust the observed system-wide mean to a new base value in line with the projection. However, prior years' trends (especially for a longer period) may not be good predictors, as economy-wide

changes may have an impact on health system costs. For example, high wage growth in prior years of economic growth might not be sustained during an economic downturn. Some projections blend historic health system cost movements with more up-to-date economy-wide measures (such as consumer price or labour price indices) and government-endorsed projections of price or labour costs.

6.3 Loadings on the Price

Another decision to make when setting prices is whether payment for hospital services should be the same across all hospitals or loadings should be applied to the price. Loadings are factors applied to the base value that take into account any further differences in costs that the underlying classification system is unable to detect. Loadings are applied to the base value to account for factors such as socio-economic indicators (such as the deprivation index) within the hospital catchment area, hospital teaching status, hospital isolation and so on.

6.3.1 Loadings Related to Patient Characteristics

A case-mix system takes into account clinical attributes (such as diagnoses and procedures performed) in assigning a patient to a CMG.

There may be other patient-related factors that systematically change the cost of treatment. For example, it may be that patients from remote areas generally take longer to treat than other patients. Reasons such as difficulty transferring a patient back to a local facility, concern about the ability of the patient to come back for post-discharge review or the absence of home support services may mean that additional treatment needs are provided within a hospital.

Where such factors can be identified, it may be legitimate to introduce a loading on, or adjustment to, the payment to recognize these legitimate cost differences.

6.3.2 Loadings Related to Hospital Characteristics

Although the aim of ABF is to pay for activity (based on characteristics of the patient episode), in some cases there may be a need to incorporate payment adjustments based on characteristics of the provider. Loadings for provider-related characteristics could be introduced where there are legitimate and unavoidable factors that affect the cost of providing care. For example, loadings may be applied to reflect additional supply or staffing costs incurred that relate to a hospital's remote location. Developing provider-related loadings contains issues in terms of separating factors that are outside the hospital's control from those that simply reflect past (inefficient) practices, and need to be given special consideration.

Box 14: England's Payment by Results Market Forces Factor

In England's Payment by Results scheme, the Market Forces Factor is an index of the relative differences in unavoidable costs faced by National Health Service organizations. The unavoidable costs included in their Market Forces Factor relate to differences in the costs of staff, land and buildings due to geographic factors (such as the higher costs in London). The size of any Market Forces Factor should preferably be determined using economy-wide rather than health sector–specific data to avoid the influence of historic inefficiencies on the formula.[24]

6.3.3 The Risks of Loadings

Loadings are designed to improve the equity of ABF by recognizing and compensating for unavoidable factors beyond the control of an individual hospital. However, loadings policies can undermine ABF in a number of ways:

- First, the greater the use of loadings, the more complex the system becomes and the more incentive effects are attenuated. Managers of hospitals might have their attention diverted from pursuing efficiency improvement to lobbying for loadings. Complexity of funding policies might also make it harder for hospital managers to identify where efficiencies need to be made.
- Second, increased complexity of funding design could reduce transparency, especially where there is no clear, published empirical basis for the loadings.
- Third, extensive use of loadings could undermine ABF by introducing de facto individualized payment rates for hospitals.

6.4 Payment Prices in Summary

The payment weights, base values and loadings determine the payment prices that are used in ABF. Payment weights may have values that differ from cost weights, to align payment to ABF policy incentives. Base values may be set at values that represent average cost or not, depending again on the ABF policy objectives. And loadings are applied to ensure that payments are fair and take into account other factors that explain cost differences that are beyond the hospital's control. In the case where cost weights such as RIWs are being used, penalties or incentives can be added to the weights to create these payment weights.

Pricing strategies and loadings are intended to improve the fairness of ABF payments and to align payments with ABF policy objectives. While these are the intended effects, the use of excessive loadings and pricing strategies can result in an unintended outcome of confusion and mixed signals to hospitals. It is important that each of the components involved in setting ABF payment prices is understood by and made transparent to hospitals.

Figure 8: An Example of ABF Payment Prices as a Function of Payment Weight, Base Value and Loadings

Note

The numeric values above build upon the earlier example in Table 1 for a patient in the CMG Arrhythmia Without Coronary Angiogram who is age 80+ with a 7% loading for, say, the patient residing in a remote location.

Chapter 7: Designing the Funding Approach

The context within which ABF is to be introduced shapes the design of the funding approach. Health system funders might want to set an overall fixed budget from which to allocate hospital expenditures, or they might want to allow hospital expenditures to be open-ended. Depending on the ABF policy goals, efficiency incentives may be applied over certain time periods, or there may be incentives to expand activities and services. Funders might also consider how to phase incentives (or ABF in general) into the system.

ABF requires health system funders to make these and other decisions about ABF design features. This chapter outlines the way in which they can use the clinical and cost information available to them to answer questions about the "what and how" of ABF.

7.1 Defining Payment Boundaries

The first issue to be resolved in any funding system is to identify and define the hospital activities being funded. For inpatient activity in Canada, the answer at first glance seems obvious: use CIHI's CMG+ system as described in Chapter 3. But the CMG+ system describes acute inpatient activity only, and many hospitals treat other types of patients as well (including outpatients, ambulatory patients in emergency departments and alternate level of care patients). Payment policies for these other types of patients need to be developed in parallel with payment arrangements for acute inpatients.

One particularly important issue is to ensure that the payment boundaries for different types of patient groups are clearly defined and verifiable. For example, what aspects of care for patients admitted through the emergency department will be funded through the acute inpatient system versus the emergency department system?

Over time, and as classification systems develop, it may be possible to extend ABF payment boundaries to encompass multiple health care encounters that make up an episode of care across settings or over a period of time (for example, bundling payments for pre-admission, inpatient and post-acute care). These bundled classifications are still in the research phase, primarily in the U.S.

7.2 Understanding Marginal Costs Versus Average Costs

An assumption of ABF is that pricing will identify hospitals that are cost-efficient and those that are not. ABF can give hospitals incentives to improve their cost-efficiency by reviewing and changing their processes. If the price is set at average cost, there may be an incentive to expand hospital services as a way to improve average efficiency (known as "spreading the overheads"), increase the volume of patients treated and increase hospital revenue. Many hospitals may also have spare capacity that could be brought into operation at below-average cost: there may be no need to expand some central support units.

Considering this, the funder may decide to set the price closer to the marginal cost of provision (whether based on current experience or best practice provision).

In the long run, marginal costs approximate average costs. However, in the short run, marginal costs may be significantly below average costs and thus pricing based on average costs may create too strong an incentive for activity growth.

7.3 Average Total Cost or a Fixed and Variable Payment Model?

Paying for hospital care using the average total cost often provides a strong incentive for hospitals to expand services because, generally, the additional cost of treating an additional patient (the marginal cost) is well below the average cost. Depending on the type of patients being treated, this may or may not lead to a net social benefit. For example, treating additional inpatients results in reduced wait times, but these additional admissions might otherwise have been treated in community settings.

In ordinary competitive markets, producers have an incentive to increase their production up to the point where their marginal costs and marginal revenues are the same, and in a theoretical competitive market, marginal revenue and price in the market are also the same. Of course, health care is not a competitive market. Economic theory suggests that in regulated markets the best outcomes are achieved when price is aligned with marginal costs.[18]

A way to estimate marginal cost is to use variable cost, that is, those costs that vary directly with activity; these will include costs for supplies (such as patient meals and linen), pharmaceuticals and some staffing costs. The remainder of the costs (that is, costs that do not vary with activity) are called fixed costs (including insurance and costs of senior management). Some costs might be termed semi-variable, in that they are fixed or variable over certain activity ranges (such as if an additional ward is opened).

Therefore, a critical choice in ABF design is whether to adopt a single payment approach (based on average cost) or a two-part tariff involving fixed and variable components. Different countries have made different choices. The U.S. Medicare system pays full average costs (including a contribution to capital); the original design of ABF in Victoria, Australia, involved a fixed and variable model.[8]

Box 15: Fixed and Variable Model Used in Victoria, Australia

In the original Victorian scheme, fixed grants were made for three different reasons:

- As part of the transition from the old funding scheme to the new (transition grants); these were phased out over two years;
- To provide for necessary services for which classification systems did not exist at the time (for example, for subacute services such as rehabilitation) or that were not patient related (for example, teaching, training and research); and
- As part of a fixed and variable model for funding acute inpatient activity. An estimate of the base activity was made (essentially based on prior years' experience) and a fixed grant (not affected by the volume of patients treated in the funding year) made available that covered a proportion of these costs. The variable component of the funding formula provided an additional allocation for every patient treated; the size of the variable payment was about 50% of average costs.

To some extent all ABF systems will have a fixed component: not all hospital activities can be measured in a way that can be mapped to specific patient episodes. The most common example is the cost of teaching, training and research. Such services need to be funded, and fixed grants of some kind may be required.

Paying hospitals for their activity based on covering the full average cost has the virtues of simplicity and transparency. There is a clear payment for every case.

7.3.1 Setting Fixed Payments and Variable Payments

Fixed and variable payment models are somewhat more complex, but they have the obvious advantage of moderating hospitals' incentive to increase activity. The first issue is distinguishing fixed and variable costs so that the hospital's fixed allocation can be set and system-wide variable prices established.

Although hospital costing systems are evolving rapidly, few easily distinguish fixed and variable costs; the closest they come is often "direct" and "indirect" patient-level costs, a closely related but not identical concept. Table 8 presents one way to view hospital costs with respect to these different cost types.

Table 8: Some Examples of the Interaction of Variable and Fixed Costs With Patient-Level Direct and Indirect Costs

	Direct Costs (Costs that are matched directly to the provision of patient care)	**Indirect Costs (Costs that are not matched directly to an episode of care)**
Variable Costs (Costs that vary with the level of output)	• Raw materials (such as bandages and prostheses) • Prescription drugs • Overtime costs for salaried employees	• Medical records • Admitting services • Food services
Fixed Costs (Costs that do not vary with the level of output in the short run, such as over one year)	• Salaries for nurses in certain hospital departments	• Heating and lighting • Amortization of the original purchase price of medical equipment • Maintenance of medical equipment • Insurance • Salaries of senior management

Costing standards (and associated implementations) generally require each department be identified as a direct or indirect department and, in some cases, require subaccounts within the general ledger based on the type of expense (such as labour or supplies) and whether the costs are variable or fixed. If variable costs cannot be estimated and direct costs are available, they could be used as surrogates for variable costs as an input into setting variable prices. An alternative approach is to assume that a percentage of total costs is variable, although the percentage would need to be estimated for each CMG to take account, for example, of the different incidence of prosthesis costs.

The total payment to a hospital for its patient care activities needs to cover total cost at an efficient level. In a fixed and variable model, the funding policy therefore needs to cover payments for the fixed component of the hospital's cost structure. The second issue is thus the complement of estimating variable costs: establishing and revising fixed costs and the fixed allocation. Again, there are a number of options, including establishing fixed costs based on a formula, some form of external review or historical patterns. Formula-based approaches are more transparent, but subjective approaches can more easily take account of the different starting points of different hospitals. Hospitals with older capital stock, for example, may inevitably face different cost structures than more modern facilities, where the cost differential can go either way.

There is also the question of revising the fixed allocation. The more regular (and/or the more automatic/formula-driven) the revision to a hospital's fixed allocation, the more it functions as a variable payment, albeit lagged. Fixed allocations can also be used as part of system planning; under this model, revising the fixed allocation would be linked to commissioning agreed-upon new capital construction.

7.3.2 The Scope of Variable Payments

Another policy choice that arises if a fixed and variable model is adopted is the scope of the variable payment. This issue also relates to transition or phasing arrangements.

The extent of variable payments can be arrayed on a continuum. In one design, any activity of the hospital would attract a variable payment. This approach gives the most autonomy to hospitals in deciding which areas of activity to expand. It also recognizes that, in many situations, hospitals are "activity takers" and have little influence over the types of patients who present requiring admission.

Another point on the continuum is for variable payments to be available for only a limited range of types of patients. The choices are endless and would be determined by taking into account the policy objectives and context. Options might include variable payments available for only the following:

- Specialties/procedures where there are long wait times;
- Day procedures, to encourage a shift in mode of delivery;
- Admissions from the emergency department that meet defined timeliness standards; and/or
- Particular hospitals where expansion is to be encouraged (with a high variable payment) or discouraged (with a zero or low variable payment).

7.4 Capped or Uncapped

Another fundamental choice in ABF design is whether total hospital expenditure is capped or uncapped. ABF in the U.S. Medicare scheme is uncapped, with no direct limits placed on spending through either volume or expenditure controls. Implementations in other countries have often involved some form of expenditure capping, generally through hard or soft volume caps, the distinction being whether control is exercised within the budget year (hard caps) or lagged and potentially avoided (soft caps). Capped ABF systems are sometimes referred to as activity-based budgeting or activity-based allocations, emphasizing that the process is about allocating a fixed budget or financial allocation fairly, not funding any level of activity.

Funders can either incentivize or dis-incentivize certain activities. At some point, they can even choose to fund an activity up to a certain amount only. However, when setting activity volume targets, it is important to be mindful that the population's needs for these activities are also defined by physicians and service providers. Careful consideration is needed when setting activity volumes to ensure that funders and service providers are in agreement about which activities are needed more than others. It is best to have a clear, objective mechanism to define population needs.

7.4.1 Hard Caps

Hard caps in ABF place limits on expenditure and are either couched directly as expenditure control or indirectly as volume control; the latter is more common and more consistent with ABF principles.

At their simplest, volume controls can be implemented by setting maximum activity targets for each hospital; volume above the target is not reimbursed—this gives hospitals an incentive to manage volume and the funder budget certainty. Volume targets can be adjusted over time to address regional differences in utilization rates, population growth or other factors. Adjustments are at the discretion of the funder.

For funders, it is important that pricing and volume control strategies be consistent and mutually reinforcing. If pricing is at average cost, then some hospitals may have incentives to increase volume; if pricing is closer to short-run marginal costs, then volume growth incentives will be mitigated.

A two-target or tapered approach can also be used to establish hard caps. Under this arrangement, volume up to a specified first cap/target is reimbursed at a particular price and volume above that, up to a second cap/target, at a lower price. Tapering gives some room for volume growth but with reducing prices, thus reducing incentives for higher volumes.

A more complex arrangement is to allow prices above the first cap to vary with total volume across the whole system. The 1993 implementation of ABF in Victoria, Australia, provided for an "additional throughput pool" of a fixed dollar amount (thus capping the funder's expenditure) but allowing an incentive across all hospitals to increase volume. A fixed expenditure was added

to the pool each quarter to be allocated proportionately based on the extent to which hospital-specific targets were surpassed. Although this approach gives certainty of the funder's expenditure, it exposes hospitals to uncertainty as to whether any additional volume that they produce will be reimbursed at or above their marginal costs.

In B.C.'s initial implementation of ABF, regional health authorities were supplied with a global budget that was associated with a desired baseline workload, which was expressed using both case volume and RIWs. Once the health authority reached the baseline workload, it was eligible to receive additional hospital funding through ABF. Hard caps were expressed in terms of percentage increases in RIWs past the baseline. The hard caps were differentiated between day surgery cases and inpatient cases. Activity that exceeded the hard caps was not funded. Also, if the health authority did not achieve the baseline workload, it was financially penalized.

7.4.2 Soft Caps

In contrast to hard caps, soft caps place no (or limited) expenditure or volume controls in the current year but rely on lagged effects to control expenditure over time. Under a soft cap, expenditure growth targets would be forecasted for a number of years. If volume changes as expected, price increases in line with planned expenditure growth. On the other hand, if actual volume exceeds forecasted volume, price growth is adjusted to bring total expenditure (price multiplied by volume) into line with the budget.

The lagging effect of soft caps sometimes makes it difficult to recoup excess spending from the prior year. A soft cap, termed Volume Performance Standards, was adopted in the U.S. Medicare system to control growth in physician expenditures with mixed success, partly due to the problem of recouping prior-year expenditure and partly because of political opposition from physicians to downward adjustments in fees.[25]

There are several design options for lagged volume controls, including differential price offsets to provide different incentives for different types of services.

The capping choices are essentially about the distribution of funding risk: soft caps shift the in-year risk to the funder, whereas hard caps leave the in-year risk with the provider. Marginal rates above a cap have the effect of sharing in-year risk.

7.5 Phasing and Transition

ABF introduces new dynamics into the hospital system: depending on ABF design it could encourage additional activity generally or in specific areas, and it could lead to a reallocation of funding from inefficient to efficient hospitals. Phasing arrangements for ABF introduction are therefore important to allow hospitals to adjust to the new environment. The speed of the transition will be shaped by local political and economic factors.

There are two broad options for how phasing may occur: scope of activity covered by ABF and transition arrangements for implementation of efficiency redistribution. These approaches are not mutually exclusive, and both scope and financial impact could be phased in.

In considering alternative policies and phasing periods, funders would be well-advised to run simple spreadsheet simulations of the effects on different hospital types and on individual hospitals of planned funding changes. This will ensure that unintended consequences are avoided and major changes in funding to particular hospitals are anticipated.

7.5.1 Scope Choices

There are two kinds of scope choices for ABF implementation.

First, a choice needs to be made about whether ABF will apply to all the major services of a hospital—inpatient, emergency department, ambulatory, rehabilitation and mental health care—and indeed beyond the hospital sector. ABF may be limited to some areas (such as inpatient activity) because the case-mix system needed to describe inpatient activity is much more advanced, well accepted and comprehensively implemented than methods of describing other sectors of health care. Or it may be that a case-mix system exists but there is not yet comprehensive data collection in that health sector across the jurisdiction.

The advantage of a broad-scope ABF implementation is that it mitigates the risk that hospitals will avoid addressing efficiency issues by cross-subsidizing from services not within the ABF scope. It also introduces consistent incentives across all aspects of hospital care. If, for example, only inpatient activity is covered in the ABF system and only increases in inpatient activity are rewarded, there would be a perverse incentive to discourage shifting some inpatient care to more appropriate settings.

The second type of scope choice can influence the extent of ABF implementation within a health sector. ABF could be phased in (as suggested earlier in this chapter) by first starting with a limited range of specialties or CMGs. One weakness of this approach is the impact it may have on other services. Hospitals may respond to specific incentives by reallocating resources internally to expand those services for which there is an incentive while reducing access in other areas. This could generate additional income for the hospital with no real increase in activity.

Although these scope choices have been described as “phasing,” depending on context, ABF could remain focused on a subset of activity (either in terms of inpatients versus ambulatory patients or elective versus non-elective procedures) for the medium to long terms in particular policy contexts.

7.5.2 Phasing the Financial Impact

Phasing or transition arrangements can also be considered in terms of payment levels. Again, there are two broad approaches that could be adopted.

A common phasing approach is to provide a blended payment model over a defined period of years. This model involves blending the historic hospital cost per patient and the new ABF system-wide payment price. So, for example, if the hospital cost per patient was $X in the prior year (adjusted for inflation) and the ABF system-wide payment price is $Y in the current year, then a weighted average of the two amounts could be used as the payment price to that

hospital. The more weight given to the hospital-specific costs, the easier the transition would be for inefficient hospitals (and, in a capped funding system, the less reward there would be to efficient hospitals). The weighting between hospital-specific costs and system-wide prices could be adjusted each year as part of the phase-in arrangements.

An alternative and more transparent approach is to identify the extent of any gap between current funding and anticipated ABF and use that to establish transition payments for the inefficient hospitals. The proportion of the gap to be funded by the transition payment would be determined by policies about the speed of the transition: for example, if a four-year transition was planned, the first year's payment would be three-quarters of the hospital-specific gap, the second year's would be half and the third year's one-quarter, with full implementation (no transition payment) occurring in the fourth year.

Part 4: Regulating the Funding System

ABF is more than just the mechanics of pricing and determining hospital revenues and budgets. It fundamentally changes the nature of the relationship between hospitals and their funders and requires a different form of regulatory framework. This part of the manual introduces regulatory issues that need to accompany ABF.

Chapter 8: Monitoring the System

The advantages of ABF include its transparency, funding equity and potential to improve efficiency. But management responses to ABF can be perverse: rather than addressing inefficiency, responses could involve gaming and other inappropriate system responses.[26–28] Funders need a clear understanding of how the system works to anticipate perverse responses. Convening panels of hospital managers to monitor these responses (and each other) is one way to harness system knowledge.

8.1 Potential Perverse Responses to ABF

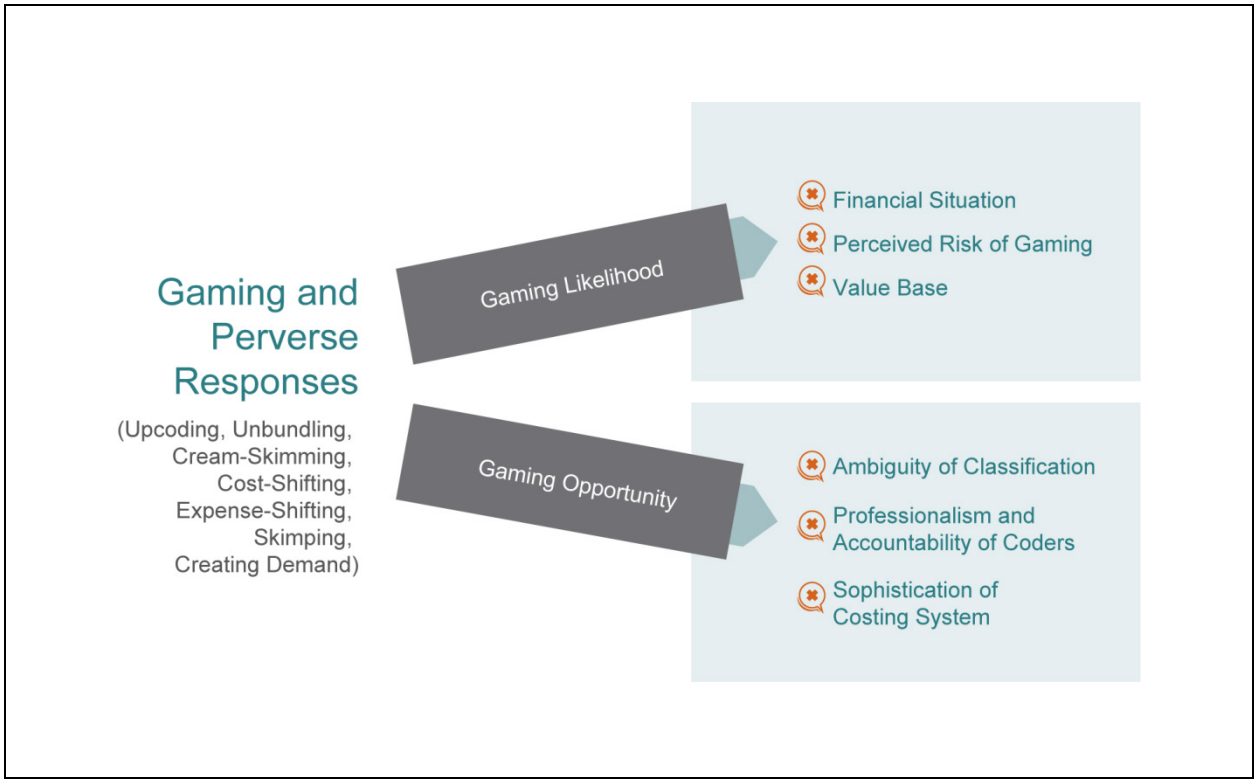
There are seven main types of perverse responses:

- **Upcoding:** One of the first perverse responses identified was described initially in the U.S. as "DRG creep." Upcoding occurs when there are subjective choices in coding, and coding practices change from choosing the codes that best describe the clinical course to codes that might positively affect the payment made for a hospital's cases. In some cases, this involves hospitals using code-enhancer software. In some cases, upcoding responses might be fraudulent (coding clinical care that was not provided).
- **Unbundling:** Unbundling is the act of dividing up patient care that was formerly a single clinical process into separate components. An inpatient stay, for example, might be unbundled into a procedural component and a rehabilitation component. The payment rate for providing a hip replacement to a patient might be based on immediate, in-ward rehabilitation, but unbundling could result in counting a component of the stay as a separate rehabilitation episode and attracting additional payments for that. The object of unbundling is thus to attract separate payments for the components, replacing a single payment for the previously integrated service.
- **Cream-skimming:** Cream-skimming is the process of selecting patients for admission (or other treatment) who are better risks, with the potential for hospitals to achieve a greater profit/surplus on their care than on the average patient's.
- **Cost-shifting:** Cost-shifting occurs when hospitals profit financially by changing clinical practice such that some costs of providing care are shifted to a different health sector or to the patient. Depending on the scope of ABF implementation, this can result in funders systematically overpaying the hospital (and underpaying other health sectors).
- **Expense-shifting:** Expense-shifting is any change to cost-accounting methodologies that weakens the accuracy of cost estimates, with the objective of increasing reported average costs for ABF-funded activities. For example, if ABF payments are based on direct costs only, then a change to reporting expenses for management activities as direct care activities would be expense-shifting.
- **Skimping:** Skimping is reducing the quality of care to a level below that which is acceptable. Skimping involves under-provision of care (for example, discharging patients too early) that results in a reduction in quality of care and health outcomes. This will be addressed in Chapter 11.

- **Creating demand:** Substantial variation in admission rates has been observed in most countries,[29] with one reason for the variation being preferences or attitudes of providers (known as supply-sensitive conditions). ABF systems (especially those involving uncapped, full average cost payments) create strong incentives for increases in activity. Although some increases in activity may be desirable, a perverse response could be an increase in unnecessary admissions.

Changing the way clinicians and institutions deliver health care is never easy. Gaming or perverse responses occur when clinicians and managers have the opportunity and are inclined to take an easier path, deviating from ABF goals. See Figure 9, based partly on Steinbusch.[27]

Figure 9: Potential Perverse Responses to ABF



Source
Adapted from Steinbusch PJ, Oostenbrink JB, Zuurbier JJ, Schaepkens FJ. The risk of upcoding in casemix systems: a comparative study. *Health Policy.* 2007;81(2-3):289-299.

Likelihood of or susceptibility to gaming is affected by both system and individual factors. At the system level, hospitals are more likely to be involved in gaming if their financial situation is poorer and if the perceived risks of gaming (such as the likelihood of detection, risk to their reputation and financial penalties) are low. Gaming likelihood is also influenced by the value base of the hospital's leadership.

However, gaming and perverse responses will occur only if opportunities are caused by ambiguities in coding or classification systems, by a breakdown in the professionalism of hospital coders or accountants (or because accountability arrangements for coders and accountants expose them to this risk, as discussed in Section 8.2.2 below) or by cream-skimming.

Although cream-skimming is widely seen as an important risk in ABF systems, it relies on advanced information systems to estimate the cost profile of patients before admission, and for staff and physicians at the front line to be able to change patient destinations using this information. At the outset of a patient's care, most Canadian hospitals do not have the ability to make reliable estimates of their costs of care, partly due to the complexity of the CMG+ system. Nor are most front-line professionals necessarily aware of these issues (or susceptible to putting aside their professionalism in the interests of the estimated financial impact on the hospital). In Canada, geography also reduces the risk of cream-skimming at remote hospitals, since there is no other reasonable place a patient can go for treatment. For these reasons, the risk of cream-skimming may be low in the Canadian context.

8.2 Strategies to Reduce Gaming Likelihood or Opportunity

Funders must clearly differentiate to hospitals those behavioural changes that are acceptable from those that are not. What rules must hospitals follow and where do they have flexibility to change? Funders must also have strategies for testing whether the rules are being followed or whether gaming is occurring.

This section focuses on gaming issues specific to coding and provides some strategies to counteract them.

8.2.1 Data Analysis

Data analysis can be an effective tool to identify potential data or practice issues, such as upcoding or unbundling, that could result from implementing an ABF system. Initial analysis will provide an understanding of the existing patterns in the data and may uncover existing data issues and outliers, and it will provide a baseline from which to monitor data on an ongoing basis. Effort to analyze data can also act as a deterrent: if organizations are aware their data is being scrutinized, they may be less likely to attempt to manipulate it.

Data analysis can look at the following:

- Overall measures of resource use: volumes/distributions of cases, assignment to CMGs and specific types of services, lengths of stay and so on. While some change to these may be expected or desired as a result of introducing an ABF system, they may also indicate potential quality issues, particularly unbundling and cream-skimming.
- Specific data elements that are used in the case-mix/funding algorithms. Many data elements are used in case-mix methodologies, so priority should be given to those that could be more susceptible to manipulation and possible upcoding. For example, the CMG+ system includes a factor related to the presence of comorbidities. Higher comorbidity levels would increase the payment under an ABF system if CMG+ RIWs were used as the basis for payment. Possible upcoding could be detected if a hospital's average number of comorbidities per patient were significantly different from that of its peers or if the number changed over time.
- Facility-level differences in results, taking into account, where necessary, any relevant differences in patient populations and changes over time.
- Data visualization and statistical outlier techniques. It is sometimes easier to identify outliers on a chart than in a table.

Data analysis can be performed frequently and on a timely basis with minimal effort. The goal of data analysis is to identify issues early before they become too pervasive. Feedback can be provided to organizations, remedial action can be taken, data can be corrected and, if necessary, the ABF system itself can be adjusted.

8.2.2 Coding Professionalism

The first line of defence against gaming and perverse responses where coding is undertaken by hospital staff is culture: to rely on the professionalism of managers and coders and their understanding that gaming is not acceptable. A culture of appropriate response can be strengthened by the professionalism of the coding workforce and reinforced by codes of conduct and the behaviour of leaders in the industry, as illustrated in England.[30]

In Canada, it is ideal that hospital coders be trained health information management professionals who must follow a code of ethics that is set at a national level. This code is established by the Canadian Health Information Management Association.[31]

In many health systems, coding is undertaken by employees who are accountable to local management and/or a local authority board. This may expose coders both to a feeling of loyalty to the local institution and to potential local management pressure to engage in upcoding.

Health information management directors may prefer that coding be done by their staff, but the advantages of having coders work independently from the hospital might outweigh their preferences. Under ABF, funders might consider data (that is, coding) as a commodity to be managed as a centralized service so that coders become accountable to the funder, making it so that there is no pressure to upcode whatsoever. Centralized coding also provides an incentive for the hospital to have complete, timely charting.

Funders now have more options for managing data collection activities. In the past, it was not easy to move records securely to allow external coding. Secure electronic transfer is now available, and coding could be managed as a separate service, performed off site or under contract. This would reduce the risk of upcoding but has the disadvantage of inhibiting easy contact between coders and clinical staff, which facilitates checking and verifying the contents within the health record.

8.2.3 Coding Audits

ABF involves a new use of routine, coded data: the data is transformed from being used for research, quality assurance and other similar purposes to also being used for payment. As with other payment processes, ABF payments need to be verified and checked through an audit process.

Coding audits or reabstraction studies involve coders reviewing a sample of records and independently recoding them. The sample can be drawn randomly or purposively to over-sample those hospitals thought to be at risk or those conditions (or CMGs) where coding practice may be ambiguous. All larger hospitals should be audited regularly to increase the risk of detecting inappropriate coding (or unbundling) and hence reduce the perceived benefit of this form of gaming. A similar exercise can be done to review a hospital's reporting of financial data, with the goal of identifying any inappropriate accounting practices.

The results of the coding and financial audits should lead to education strategies for the system as a whole (to address potential ambiguities) and to inform strategies to penalize hospitals with more errors than expected. Funders' responses to high rates of coding error might include

- Providing financial penalties beyond the sampled records, for example, by assuming that all records exhibit the same characteristics as the sampled ones; and/or
- Publishing comparative error rates.

While downstream auditing has a place in ensuring quality coding, the optimal approach is to consider ways to change the coding environment to promote high-quality coding from the start.

Chapter 9: Establishing Business Rules for the Payment System

ABF changes the nature of hospitals' accountability to funders and the role of management. As mentioned in Chapter 2, the funder no longer allocates budgets (global or other) to hospitals, but rather allocates activity targets (in a capped system) and/or shapes the system through financial incentives and other interventions. Hospitals still have to manage a budget, but hospital management creates the budget, based on expected revenue.

One of the characteristics of ABF, and often an objective of its introduction, is that it provides for a higher degree of transparency than previous practices. Budgets might have previously been set through negotiations, with the outcomes dependent on political influence and other local practices that were never made public. In contrast, the targets, relativities and prices in the ABF system need to be well defined and public for the incentive effects to work, thus making transparency almost a requirement of ABF implementation.

But ABF is more than a set of financial incentives; it also involves (and requires) a set of rules and conditions to be specified as part of its implementation.

9.1 Data Provision and Timeliness

ABF is based on a flow of information, so an important set of rules relates to providing data. In some cases, these rules may be unchanged from previous funding systems, but because data is the foundation of ABF systems, the old rules may need to be supplemented:

- New provisions may need to be made for data timeliness. These may be required to enable quarterly reconciliation of funding provided to hospitals with funding projected in activity targets. For this to occur in a timely manner across the whole system, it may be necessary to specify that, say, the only data that will be taken into account in quarterly reconciliations will be that submitted within a defined time period.
- Assuming there is to be an audit of data, there will need to be rules about access to records for auditing, and the consequences of higher-than-expected levels of coding error will need to be specified.
- If the province is proposing to establish its own payment relativities, it will need access to any financial data generated by the hospitals.

9.2 Autonomy and System-Wide Issues

An important issue for managers of health systems relates to the balance between hospital autonomy and central direction. Hospitals are not, and never will be, totally autonomous: in the Canadian system they derive the vast bulk of their revenue from provincial/territorial governments and are accountable, through their boards or regional authorities, to them. ABF does not necessarily change that, but the rules that accompany ABF introduction may need to reinforce the nature of autonomy regarding

- Jurisdictionally negotiated collective agreements and/or other wage policies (such as those for management and out-of-scope staff); and
- Any requirement to participate in central service arrangements (such as a common payroll system, common purchasing arrangements or a provincial pharmaceutical formulary).

Participation in other system-wide initiatives might also be specified (for example, evaluation processes) and adherence to any ABF-related codes of conduct might also need to be specified.

Chapter 10: Responding to the Dynamic Nature of Health Systems

The health system is not static, so ABF systems cannot be either. Depending on ABF design, clinical and/or population changes may require adjustments to ABF parameters.

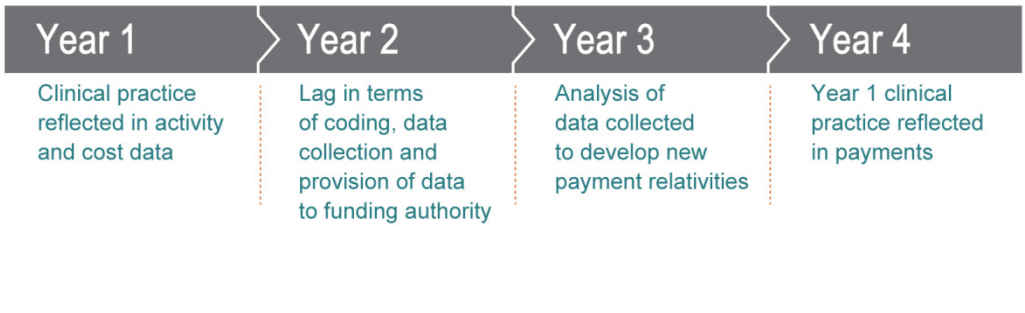
10.1 Updating the Case-Mix System and Cost Weights

Clinical practices change, so all case-mix systems need to be updated on a regular basis. In Canada, CIHI is responsible for updating the CMG+ system.

Cost weights (and hence payment weights) need to be adjusted regularly to take account of new technology and other clinical practice changes. There is a trade-off here: the more frequent the adjustment, the more instability is introduced into the system. Most ABF systems, however, update payment relativities on an annual basis.

There is an inevitable lag between clinical practice changes and their reflection in payment relativities (see Figure 10). Depending on data collection and analysis lags, the total lag could be between two and three years.

Figure 10: Updating Payment Relativities



There are a number of ways to address this lag.

The first approach is relevant where a new technology diffuses quickly. Under this approach, the funding authority could

- Use formal (clinical advisory groups) or informal processes to identify where there have been significant practice changes;
- Undertake a quick special costing study (using secondary analysis of the cost data from selected hospitals) to estimate the cost impact of the change and a quick study of the diffusion of the innovation; and
- Use that information to make an adjustment to empirically derived payment relativities.

A second approach, more relevant where the clinical change is more concentrated, is to establish a special funding program to address the additional costs of innovations. This approach is more relevant to subspecialty innovation. The special funding program could provide time-limited funding (say for two to three years) to address the lag between practice and payment, with the assumption that the new practice would eventually be incorporated in the cost data used to set relativities.

10.2 Revising Targets and Fixed Allocations

Using either a two-part (fixed and variable) tariff or volume capping raises the question of whether the fixed allocation and/or the activity targets are to be adjusted and, if so, on what basis. The decisions as to whether to adjust the fixed allocation and any volume cap are separate decisions.

The fixed allocation definitely needs to be adjusted when new capital facilities are commissioned, or when the cumulative effect of approved activity increases over time (increases in the cap) is such that any additional activity can no longer be undertaken at marginal cost because new wards need to be opened or another fixed cost needs to be incurred. Fixed allocations might be reduced if certain hospital activities become the responsibility of a separate organization, such as when hospital services (like the payroll system) become centralized through a health authority. Revising the fixed allocation thus does not need to be undertaken on an annual basis.

In contrast, revising volume caps is generally undertaken annually as part of budget processes. There are two broad choices to be pursued when updating volume caps: market-like or planning-based. Under market-like approaches, hospitals may submit bids for increases in their caps. The basis for allocation might be tendered price, but additional volume could be allocated in line with other policy goals (such as the extent to which wait times might decrease).

Additional volume could alternatively be allocated as part of system-wide supply planning.

Under a planning approach, demographic shifts in the areas served by a hospital would be analyzed and growth in activity allocated in line with shifts in anticipated demand for hospital admission. This can be done with varying levels of sophistication by estimating activity change at the specialty or even CMG level or by adopting a simpler approach, using gross age–sex-adjusted projections.[32, 33] Tools currently used by health system funders in Canada to anticipate demand for hospital admissions include commercial population risk adjustment groupers and Ontario's Health Based Allocation Model. The more acute inpatient activity targets are allocated to hospitals in line with expected, epidemiologically evidenced need, the more ABF arrangements mirror the incentives hoped for in population-based funding.

A complexity in the target-setting approach comes from the reality that population growth is a continuous process whereas system response, in the form of additional capital, is not. Where a fixed and variable model is used for payment, the fixed allocation would be adjusted in line with new capital, and any targets for variable payments would be likewise adjusted.

Part 5: Implementing a New System and Managing the System in New Ways

This part of the manual highlights implementation issues associated with ABF.

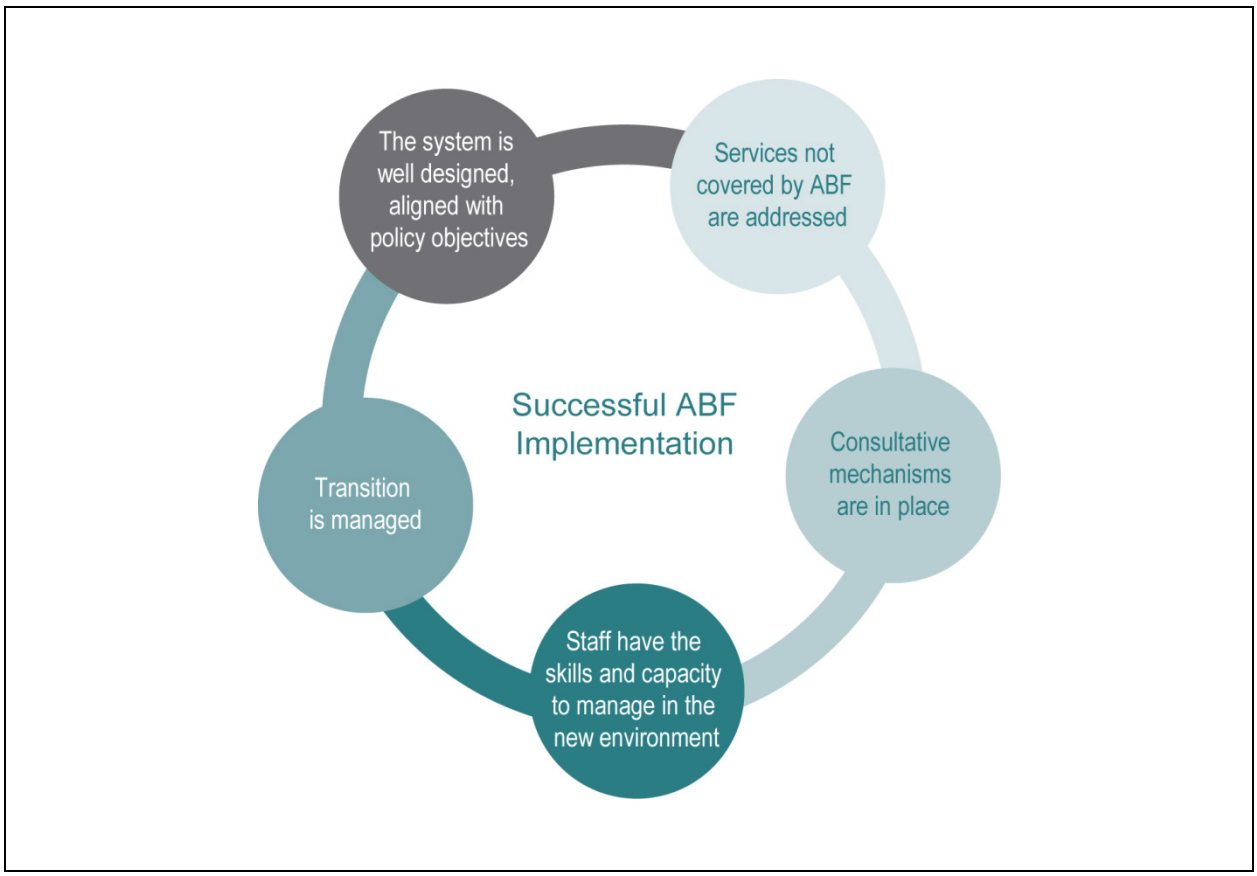
Chapter 11: Introducing a New System

As has been outlined in previous chapters in this manual, there are complex and interacting choices to be made when designing and implementing an ABF system. Successful implementation requires the following:

- The new system is designed to align with policy objectives;
- Services not covered by ABF are addressed;
- Consultative mechanisms are in place;
- Staff (both of the funder and in hospitals) have the skills and capacity to manage in the new environment; and
- The transition is actively planned, managed and monitored.

The first four factors are discussed in this chapter, and the fifth is discussed in subsequent chapters.

Figure 11: Factors Influencing the Successful Implementation of ABF



11.1 Policy Alignment

To be judged a success, any ABF implementation needs to respond well to the issues that stimulated its introduction. Typically there are multiple policy objectives that need to be addressed simultaneously:

- Funding equity and transparency;
- Improving efficiency;
- Improving access to care; and
- Improving quality of care.

Implementation may or may not be associated with a budget reduction. If available funding is unchanged, hospitals could improve their efficiency by increasing activity within the same funding envelope. In these circumstances, funding policies need to encourage hospitals to focus any service growth on the funder's priorities, such as reduced wait times for surgery.

However, if a reduction in wait times, for example, is the primary policy objective, then ABF implementation might be done differently to align better with that policy. There are a number of options for how this might be done: as discussed earlier, this might include focusing on only elective procedures in ABF implementation or including policies that state hospitals will be able to attract funding for additional activity only if wait times decline (this latter approach was part of the initial implementation design in Victoria, Australia).[8, 34]

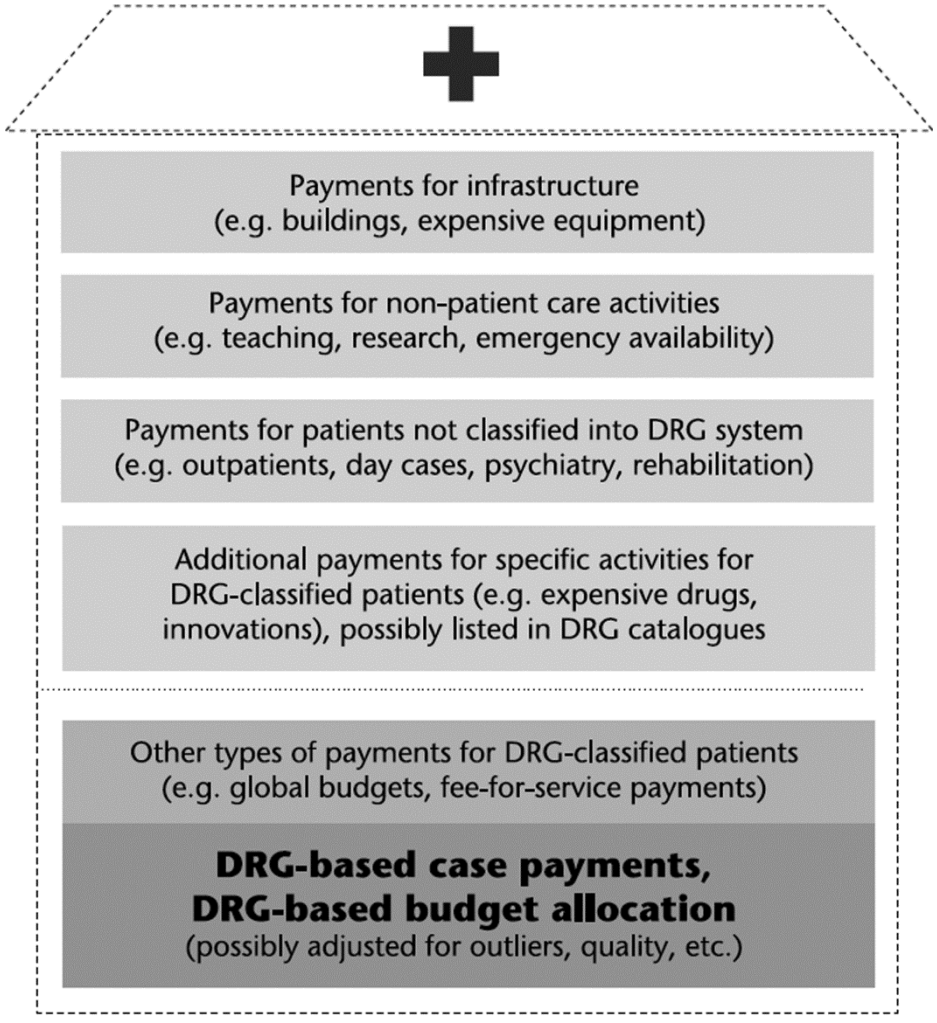
Hospitals are complex organizations that provide a range of services: medical, surgical, ambulatory, rehabilitation and mental health, to name a few. Introduction of ABF may initially focus on inpatient activity, with other activities funded in the historic way (usually by a block grant), but this brings with it a risk of cost-shifting (see Chapter 9). Alternatively, funders might want to introduce ABF in other health sectors where there are significant variations in costs across providers. For example, Alberta Health Services first introduced ABF in long-term care facilities, with plans to introduce it in other health sectors later as part of its larger ABF strategy.

Where multiple case-mix systems are used, attention needs to be given to overlapping issues in classifications: where the same patient could potentially be counted in either of two different case-mix systems, the payment relativities need to be aligned. For example, rehabilitation can be provided in a specialty rehabilitation facility or an inpatient hospital. Inpatient rehabilitation care could be classified in either the CMG+ system or a rehabilitation classification system. Similar patients should receive similar payment relativities regardless of which classification system is used.

11.2 Services Not Covered by ABF

Some activities of hospitals cannot be classified using patient-related case-mix systems. Hospitals funded by ABF may thus receive revenue calculated on a number of different bases. Figure 12 illustrates the different components that could determine total hospital payment.

Figure 12: Case Mix–Based Hospital Payment Within the Mix of Total Hospital Revenues



Source

Figure 10.2 from Busse R, Geissler A, Quentin W, Wiley M, eds. *Diagnosis-Related Groups in Europe: Moving Towards Transparency, Efficiency and Quality in Hospitals.* New York, U.S.: Open University Press; 2011.

In Figure 12, the largest payments are allocated based on activity described using case-mix classifications, but these classifications may not be able to describe some patient-related activity. This could be because the classifications are under development or not widely adopted (such as for mental health) or because the attributes of the service are such that typical case-mix variables do not describe the cost structure (such as for forensic services). As well, hospitals provide other services not included within case-mix classifications. The most notable of these are teaching and research activities.

11.2.1 Teaching, Training and Research

Most hospitals now have some involvement in teaching (such as clinical teaching of health sciences students), training (such as post-graduate training for medical graduates in a specialty) and research. While larger academic health sciences centres have a major commitment in this area, even smaller hospitals provide clinical placements to nursing and other students.

There are four types of costs associated with teaching, training and research (see Table 9). While these costs have been separated to indicate which are met by the university and which by the hospital, many of these costs are joint costs with responsibilities being shared between the hospital and the university.

Table 9: Example Costs Associated With Teaching, Training and Research

	Costs Met by the University	Costs Met by the Hospital
Direct Costs of Teaching, Training and Research	• The relevant education provider provides staff to supervise students on placement	• Hospital staff give lectures and seminars to students • Hospitals provide space for university staff • Hospitals provide diagnostic services as part of research protocols • Hospitals develop or experiment with innovative technologies
Indirect Costs of Teaching, Training and Research	• University staff provide clinical services to hospitals • University staff provide advisory services to the health system generally	• Senior hospital staff provide guidance and education during the course of ward rounds and supervise residents in operating rooms (clinical education often occurs as part of routine patient care) • Students order more diagnostic tests than senior staff

Funding the costs of teaching, training and research that are borne by the hospital is complex and relevant to the design of ABF. Hospitals can bill the direct costs associated with teaching to the university. For example, the hospital might charge a rental fee for university staff who use hospital space. Hospitals can also fund direct research costs through a fixed grant. For example, they might apply for a grant to experiment with new technologies, such as new-generation ear implants.

Addressing the indirect costs of teaching, training and research is more difficult, and it often requires a change to the way health system funders determine payments for a hospital. Several options have been adopted in different implementations of ABF:

- Do not adjust ABF payments for teaching, training or research. The decision to not adjust payment for teaching hospitals should be made when it can be supported with cost data that confirms there are no differences in cost structure between teaching and non-teaching hospitals. The logic for not adjusting ABF payments is as follows: early-year residents often slow down the work of senior staff (who mentor and guide students) but late-year residents may carry their own patient load, so the effect of a residency program may be cost-neutral to a hospital.
- Apply a loading on the base value for the estimated indirect cost of teaching, training and research. The decision to apply loadings based on hospital teaching status may be based on cost data that illustrates that teaching hospitals have a higher rate of cost outliers.[35] Loadings applied to the base values can account for the difference in cost distributions between teaching and non-teaching hospitals. In some implementations of ABF, hospital size has been assumed to be a surrogate measure of teaching activity, and different loadings were established for different groups of hospitals.
- Estimate the indirect costs related to teaching, training and research and pay for them outside of ABF under a fixed grant. Determining the amount of money to be received by each hospital could be done in many ways, ranging from negotiating with medical associations to developing activity measures for teaching, training and research. For the latter, the funder might measure the number of clinical placement weeks provided by a hospital to determine payment amounts, or it could use proxy measures (such as the number of research grants, the number of residents or the number of university staff based at the hospital). Funders might justify their choice to pay for teaching, training and research as a fixed grant (rather than through ABF) to avoid the risk of conflating teaching, training and research costs with costs of inefficiency.

In larger hospitals, teaching, training and research activity can be extensive, which makes it important to understand how their cost distributions differ (or are similar). In smaller jurisdictions, which may have only one or two such hospitals (making internal comparisons impossible), benchmarking with hospitals in other jurisdictions may be required to develop appropriate recognition of these additional costs.

Disentangling the costs of teaching, training and research is a necessary activity for funders. They must then decide how to pay for these different costs (that is, whether this payment will be part of ABF or not).

11.2.2 Small, Rural and Remote Hospitals

ABF revenue may not cover the operating costs of some small hospitals, and funders need to consider whether to make special provisions for them.

Small hospitals that fulfill a current health service need may be designated “essential access hospitals” (as in the U.S.) and funded with a block grant for their acute activity (that is, on a basis other than ABF) or provided with a premium on the standard case-mix payment. This approach recognizes that many small hospitals essentially provide a valuable availability service or stand-by capacity that needs to be funded.

Identifying the boundary line between smaller hospitals to be funded by a block grant and those to receive ABF can be approached in a number of ways. For example, small hospitals might be identified using staffing criteria: those that have only two staff at night (the minimum staffing for occupational health and safety reasons). However, a two-person staffing criterion may in some circumstances be too limiting. Hospitals marginally larger than this may also have difficulty functioning under an ABF system, either because they are exposed to volatility in admissions (seasonality factors) or because they need to carry a higher proportionate overhead than larger hospitals. An alternative approach to designating hospitals as small might take into account number of beds, seasonal variability in admissions, total number of admissions per year or total RIWs per year.

Hospitals that serve communities with declining populations might have their eligibility for a small hospital designation based on projected admissions over the medium term (say five years) to avoid switching into and out of the ABF system.

Establishing the size of an appropriate block grant for smaller hospitals is complex, as many smaller hospitals might provide a range of other services that cover overheads and, potentially, the minimum staffing required. The level of grant funding for these smaller hospitals might need to be determined on a hospital-by-hospital basis, possibly using benchmarking for facilities of like size.

Whether being funded through a continuing block grant or through ABF, small hospitals should learn about their own costs and which patient activities they perform cost-effectively and which they do not.

11.2.3 Emergency Departments

Most countries have not implemented the same level of case-mix measures to describe the work of emergency departments as of inpatients and other areas. Canada is one of the exceptions, with CIHI’s Comprehensive Ambulatory Classification System.

Where case-mix systems are available to describe emergency department activity, implementations of ABF may involve a mix of fixed grants and variable payments. Emergency department activity, especially in smaller hospitals, may not account for the full costs of service provision (the function of emergency departments is to be available to provide care regardless of whether any patients turn up). This “availability product” may need to be funded outside of ABF.

11.2.4 Other Activities Not Typically Covered by ABF

Hospitals provide other activities, in addition to teaching, training and research, that are generally not described using case-mix measures. These will vary from province to province and hospital to hospital and may include

- Telephone advisory services;
- Health promotion services;
- Retrieval services to transport very small newborns to a neonatal intensive care unit;
- Transplantation services—the actual organ transplant can be classified using CMG+, but organ retrieval and long-term patient management may not be described well by existing case-mix measures; and
- Autopsies.

There will be other, idiosyncratic services not on this list. Where these or other services are deemed necessary by the funder, the (benchmarked) cost of these services will normally need to be funded using a fixed grant, described using a term such as “site-specific services.” Hospitals have an incentive to maximize the amount of funding received under such non-activity-based grants, so periodic reviews will be necessary to ensure that all such grants remain appropriate after a few years of ABF implementation.

11.3 Consultative Mechanisms

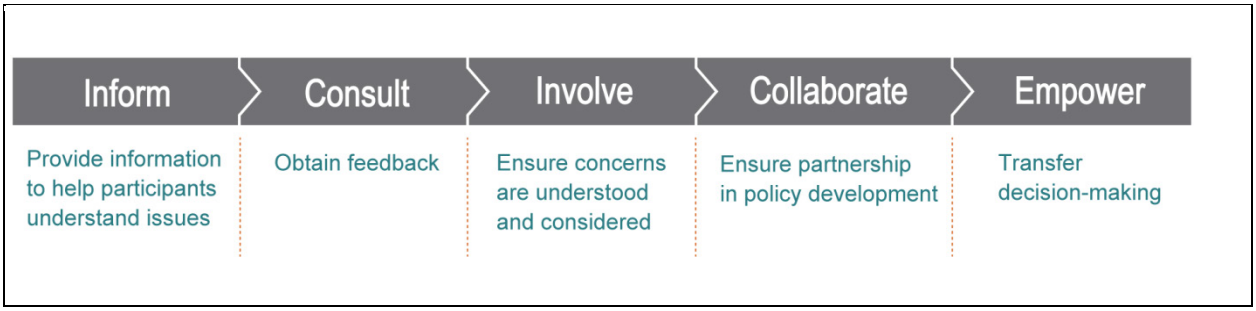
Implementation of ABF will require effective engagement of a range of key stakeholders:

- Health care professionals (including physicians);
- Managers affected by the new system;
- Universities and colleges; and
- Unions and other industrial organizations.

The appropriate mechanisms for engagement, and the point at which engagement starts, will vary from implementation to implementation. Various processes for engagement can be used, including advisory committees, stakeholder forums, one-on-one meetings and “travelling road shows” to provide site-based forums.

The International Association for Public Participation[36] has developed a spectrum of public participation that can help clarify the type of engagement that might be adopted (see Figure 13).

Figure 13: Spectrum of Public Participation



Source
Adapted from International Association for Public Participation. IAP2 spectrum of public participation [brochure]. http://www.iap2.org/associations/4748/files/IAP2%20Spectrum_vertical.pdf. Published 2007. Accessed August 30, 2013.

Engagement is more effective if its purpose and ground rules are clarified at the start, and the spectrum in Figure 13 can be useful here.

Implementing ABF affects stakeholders differently, so engagement goals and methods will be customized for different stakeholders. For some stakeholders, the objective of engagement will simply be to inform (and to counteract misinformation and misunderstanding). For other stakeholders, it will be appropriate to involve them in the process so that their concerns are understood as part of the ABF development process. For still others, engagement goals further along the spectrum may be appropriate.

11.4 Skill and Capacity Issues

ABF involves a new way of working for both the funder and hospitals, and with it comes a need for training and development.

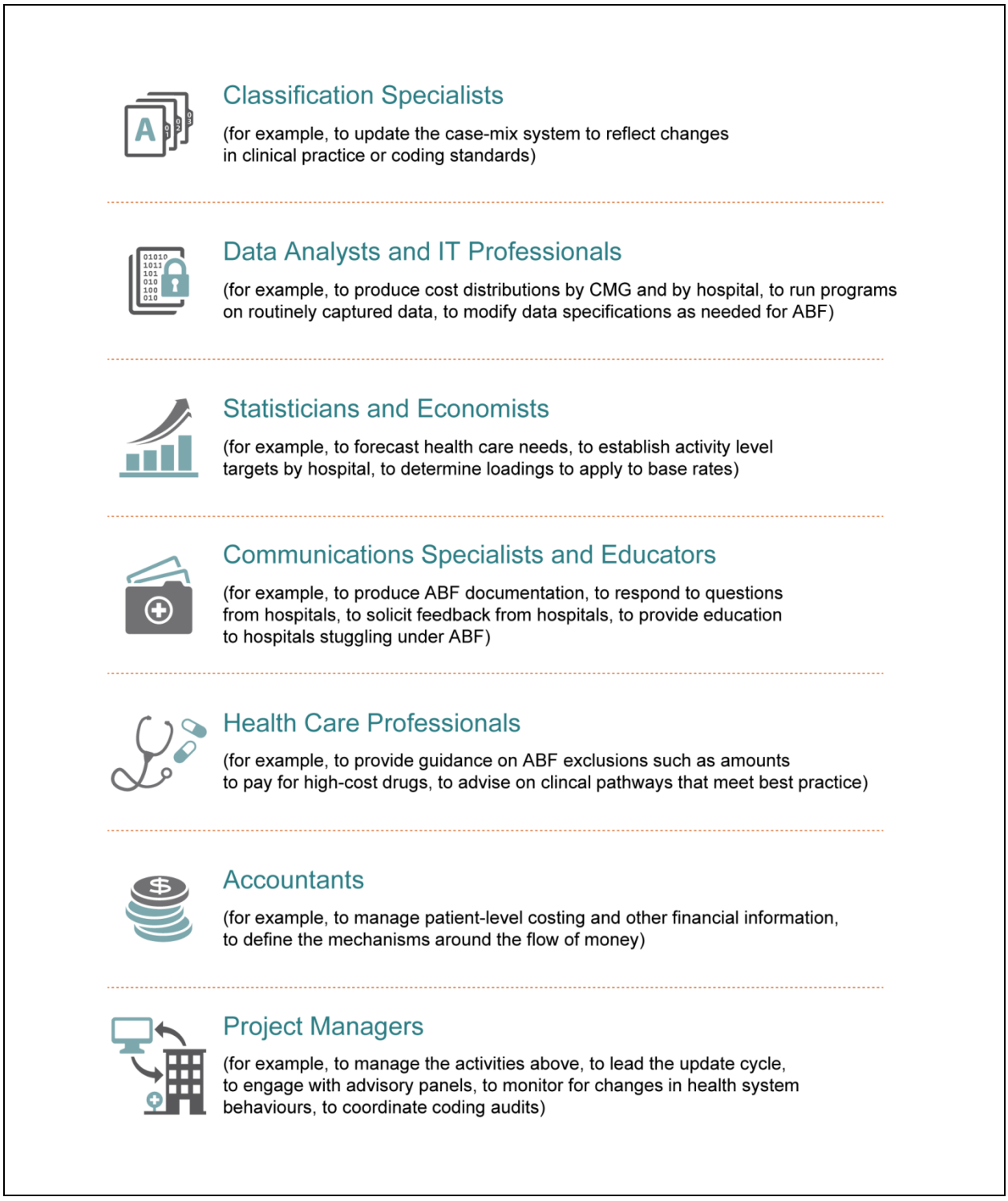
ABF to some extent is based on an arm's-length relationship between the funder and hospitals. In the past, hospitals might have lobbied the funder for special allocations to meet special needs, whereas ABF represents a more technical and bureaucratic approach to relations between the funder and hospital.

Funding authority staff (whether at a provincial ministry or a regional health authority) may need to change their style of working with hospitals and will certainly need to be very familiar with the details of the new data requirements and funding formulas. Funding staff will often be asked questions of interpretation and will need to give consistent and clear advice. It is important for staff to have access to and understand the various standards (for example, for ICD-10-CA and CCI and the MIS Standards) to gauge the impact of the standards on funding. In some cases, standards may need to be clarified or changed as their use in an ABF environment grows.

Hospital managers will also need to understand the new incentives and perhaps modify their way of operating. Strategies that might have worked in the past to allow hospitals to stay on budget may no longer be viable. For example, with global budgets, a strategy to stay on budget could be reductions in activity such as closing beds, which would not work under ABF. Given the new set of incentives for hospitals, and the potential change in the way the funding authority works, proactive staff development may facilitate implementation and encourage appropriate response to the new incentives.

Figure 14 offers some ideas for the skills and capacities needed from the perspective of the funding authority. Many of the same skills would also be needed within each hospital, albeit to perform different tasks.

Figure 14: Some Skill Sets to Consider When Implementing ABF, From the Perspective of the Funding Authority



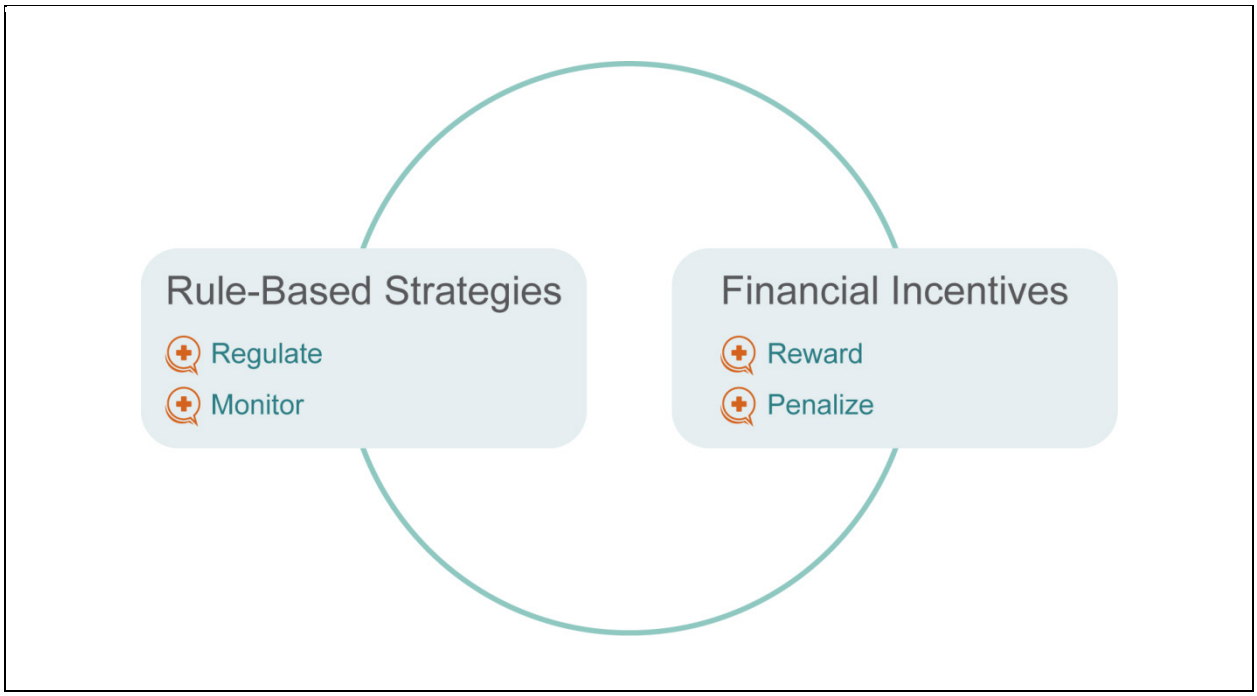
Chapter 12: Managing the System

An implicit assumption in ABF implementation is the economist's *ceteris paribus*: that all other aspects of the system remain unchanged. However, hospital managers will immediately have an incentive to use any available data to become armed with more information (such as a better understanding of cost structures). They will be ever more motivated to understand aspects of care that do not improve patient outcomes and that are inefficient, and to initiate improvements. But there is a critical risk that hospitals may respond to ABF efficiency challenges by making inappropriate changes to the coding or even the quality of care delivered. In this chapter, potential strategies to address this risk are discussed, as are ways in which ABF can be used to address broader aspects of system performance.

12.1 Incorporating Quality Considerations in ABF Design

Incorporating quality considerations into ABF design can involve a mix of financial incentives and rule-based strategies (see Figure 15).

Figure 15: Quality Considerations in ABF Design



12.1.1 Rule-Based Strategies

There are two broad kinds of rule-based strategies: regulation and monitoring. Both strategies can be used to improve quality.

An example of a regulation-based approach is for a funding body to require all its health care organizations to participate in an accreditation program. Such an approach would provide a public demonstration of the importance attached to quality issues and would allow the standards for quality to be independently defined and monitored by an external organization.

A number of indicators could be monitored as part of ABF implementation:

- A narrow range of never-event indicators (such as blood incompatibility events and wrong-site procedures);
- A broader range of adverse events or cases where additional diagnoses occurred during the course of an admission (such as infections);
- Hospital-standardized mortality ratios; and/or
- Readmissions.

Statistical monitoring of quality indicators could involve statistical process control techniques to identify hospitals that have changed incidence patterns.[37] Mitigating the risks of these undesirable outcomes of ABF can be achieved through financial penalty (for poor performance) or reward (for good performance).

12.1.2 Financial Incentives

Financial incentives can be either positive or negative: to reward good performance or to penalize relatively poorer performance. Positive incentives are sometimes called pay for performance or quality-based funding and can be based on process or outcome measures.

An advantage of using process-based quality indicators for incentives is that they are clearly under the control of a hospital and/or its physicians. Process indicators might include adherence to particular protocols and timeliness of initiating particular treatments (such as “door to needle” time). A wide range of outcome indicators is also in use for monitoring (such as of infection rates), and these might be used as part of a pay-for-performance regime.

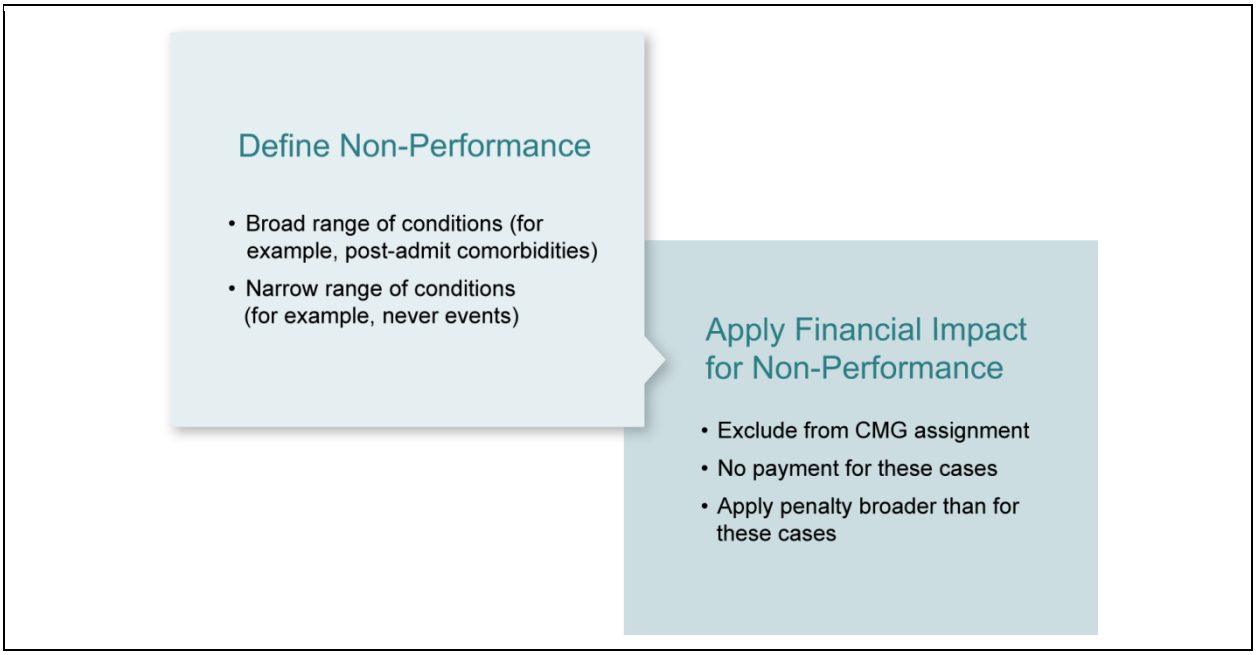
The precise range of indicators selected for reward should be developed in consultation with clinicians.

A relatively newer approach being implemented internationally is to penalize poor performance though a system of non-payment for non-performance.[38]

As an example, routine hospital data sets used for ABF distinguish pre-existing comorbidities present on admission from hospital-acquired complications. A hospital-acquired complication may lead to a higher ABF payment in the same way a pre-existing comorbidity does. The basis for non-payment for non-performance is that paying for hospital-acquired complications is in a sense perverse and rewards poorer performance.

There are several options within the general rubric of non-payment for non-performance: these can be arrayed along a spectrum of increasing scope of potential complications subject to financial incentives and a second dimension of financial impact (see Figure 16).

Figure 16: Defining Non-Performance and Options for Non-Payment



The narrowest definition for non-performance includes only those complications that are clearly preventable and should never occur. The polar opposite of a narrow scope is to identify all hospital-acquired conditions or readmissions as within scope for non-performance.[39] Table 10 lists types of events that are considered serious reportable events (never events) by the National Quality Forum.[40]

Table 10: The National Quality Forum's List of Serious Reportable Events That Might Be Considered for Non-Payment Under ABF

Serious Reportable Event Type	Number of Subcategories	Example of Subcategory
Surgical or Invasive Procedures	5	Surgery or other invasive procedure performed on the wrong site
Product or Device Events	3	Patient death or serious injury associated with the use of contaminated drugs, devices or biologics provided by the health care setting
Patient Protection Events	3	Patient suicide, attempted suicide or self-harm that results in serious injury while being cared for in a health care setting
Care Management Events	9	Patient death or serious injury associated with a medication error (for example, errors involving the wrong drug, wrong dose, wrong patient, wrong time, wrong rate, wrong preparation or wrong route of administration)
Environmental Events	4	Patient death or serious injury associated with the use of physical restraints or bedrails while being cared for in a health care setting
Radiologic Events	1	Death or serious injury of a patient or staff member associated with the introduction of a metallic object into the MRI area
Potential Criminal Events	4	Death or serious injury of a patient or staff member resulting from a physical assault (that is, battery) that occurs within or on the grounds of a health care setting

Source

Adapted from National Quality Forum. *Serious Reportable Events in Healthcare—2011 Update: A Consensus Report*. http://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=69573. Published December 2011. Accessed August 30, 2013.

The softest form of payment impact is simply to exclude hospital-acquired complications from consideration by the case-mix classification and for the cost weights to reflect the average cost of all patients in a CMG, both those with and without the hospital-acquired complication.

A stronger payment impact is to deny payment for any case where a hospital-acquired condition occurs; this approach is generally limited to lists of never events (for example, surgery done on the wrong anatomical site would attract a zero payment weight under this strategy). Payment might also be denied for readmissions. These stronger penalties run the risk of perverse responses, including reduced reporting of adverse events and incidents.

The toughest payment impact is to apply penalties for rates of poor performance. As of 2013, the U.S. Medicare program imposes penalties on hospitals (phased in, of up to 3% of payments in 2015) for excess rates of readmission for (initially) acute myocardial infarction, heart failure and pneumonia.[41]

12.2 Using ABF to Achieve Other Goals

Introducing ABF provides the opportunity to use formula-based funding arrangements and financial incentives to achieve policy objectives wider than the efficiency–transparency emphasis of ABF.[42] ABF can thus provide a framework onto which incentives/penalties relating to quite a broad range of policy objectives can be grafted. The discussion about financial incentives for quality, above, is an example.

The box below presents a specific example of a way ABF was designed to achieve other goals in B.C. Table 11, which follows, shows other possible options for financial incentives to achieve quality, access, prevention and administrative goals around timeliness.

Box 16: ABF Design for Patients Discharged Directly From Emergency

B.C.'s Emergency Department Pay-for-Performance (EDP4P) Program was designed to reduce congestion in the emergency department. Hospitals receive an extra $100 for every emergency patient treated and released within two or four hours of arriving at the emergency department, depending on triage level. For emergency patients who are admitted as inpatients, hospitals receive an extra $600 if the patients are admitted within 10 hours. Vancouver Coastal Health Authority and Fraser Health Authority implemented the program in 2007–2008 and 2008–2009, respectively, under the Lower Mainland Innovation and Integration Fund; this activity was sustained by the Health Services Purchasing Organization (HSPO) in 2010–2011. HSPO expanded EDP4P in 2010–2011 to Interior Health Authority and Vancouver Island Health Authority.

Sometimes, an emergency patient is admitted as an inpatient, but an inpatient bed is never found; the patient spends the entire inpatient admission in the emergency department and is discharged from that location. B.C. refers to these patients as DDFE (discharged directly from emergency).

The 10-hour rule in EDP4P created an opportunity for gaming, since processing a paper admission on any patient would be a way of increasing revenue, even if the patient stood no chance of actually being placed in an inpatient bed. HSPO devised an ABF payment strategy to address this: it identifies these types of patient stays within the Discharge Abstract Database. The emergency department portion of the patient stay is then excluded from the EDP4P payment to the hospital, and the inpatient portion of the patient stay is excluded from the inpatient ABF payment to the hospital.

The identification of DDFE patients currently acts as an incentive for hospitals to reduce the number of admitted patients who stay in the emergency department. Since it is not possible to tell which patient will never get a bed, the only way to reduce DDFEs is to improve the timeliness of moving these admissions out of the emergency department and into a ward. The additional revenue created helps to offset the cost of creating the needed additional capacity.

Table 11 demonstrates the wide range of incentives that can be incorporated into an ABF system. However, careful consideration should be given to the potential for incentive overload (or even potentially contradictory incentives). ABF introduces new incentives to hospitals, causing a renewed focus on efficiency and often requiring changes to priorities, information use and clinician engagement. These changes alone may place pressure on existing management systems and the skills of managers. It is also important that hospital managers and clinicians not be left in confusion about the goals of the new payment system, particularly in the early stages of implementation.

Table 11: Domains of Performance and Potential Indicators

Domain	Indicator	Possible Incentive Design
Quality	Never events (for example, wrong-site surgery)	Zero payment for such cases
	Clinical indicators, such as percentage adherence to specific treatment for specific disease	Incremental payment tied to the level of a specific indicator
	Adherence to (any) endorsed care path	Incremental payment for adherence to care path
	Provision of data to allow clinical benchmarking	Payment for provision of data
	Achievement of hospital accreditation	One-time bonus for accreditation
	Complications that arise during course of treatment (such as adverse events), contrasting with comorbidities that were present on admission	Remove complications from determination of case-mix payment
		Penalties for certain complications
	Score on consumer satisfaction questionnaire	Incremental payment for high satisfaction
	Appropriateness of care measured by agreed-upon clinical guidelines	Discounted payment for cases that do not follow guidelines
	High variability in admission rates for some elective procedures (such as carpal tunnel operations) between hospitals	Discounted payments for hospitals with higher admission rates
Access	Elective surgery wait times	Discounted payments/penalties for high percentage of patients waiting in excess of threshold time
		Premium paid for patients treated within acceptable time frame
		Additional payments (or access to other types of additional funding) if negotiated target reduction in long wait times achieved
	Hospital emergency service times to treatment (by triage category)	Penalties for failure to achieve threshold treatment time goals
	Long stays in hospital emergency service	Penalties for number of patients denied timely admission to ward
Prevention	Avoidable hospital admissions	Discounted payment for admission of patients with ambulatory care sensitive conditions
Coding Quality and Timeliness	Timeliness	Zero payment for cases submitted outside specific data time frames
	Incidence of “error” CMGs	Zero payment for error CMG codes
	Coding error as measured by audit	Penalty for systematic upcoding (for example, double deduction where upcoding found)

Chapter 13: Evaluating the Impact of ABF

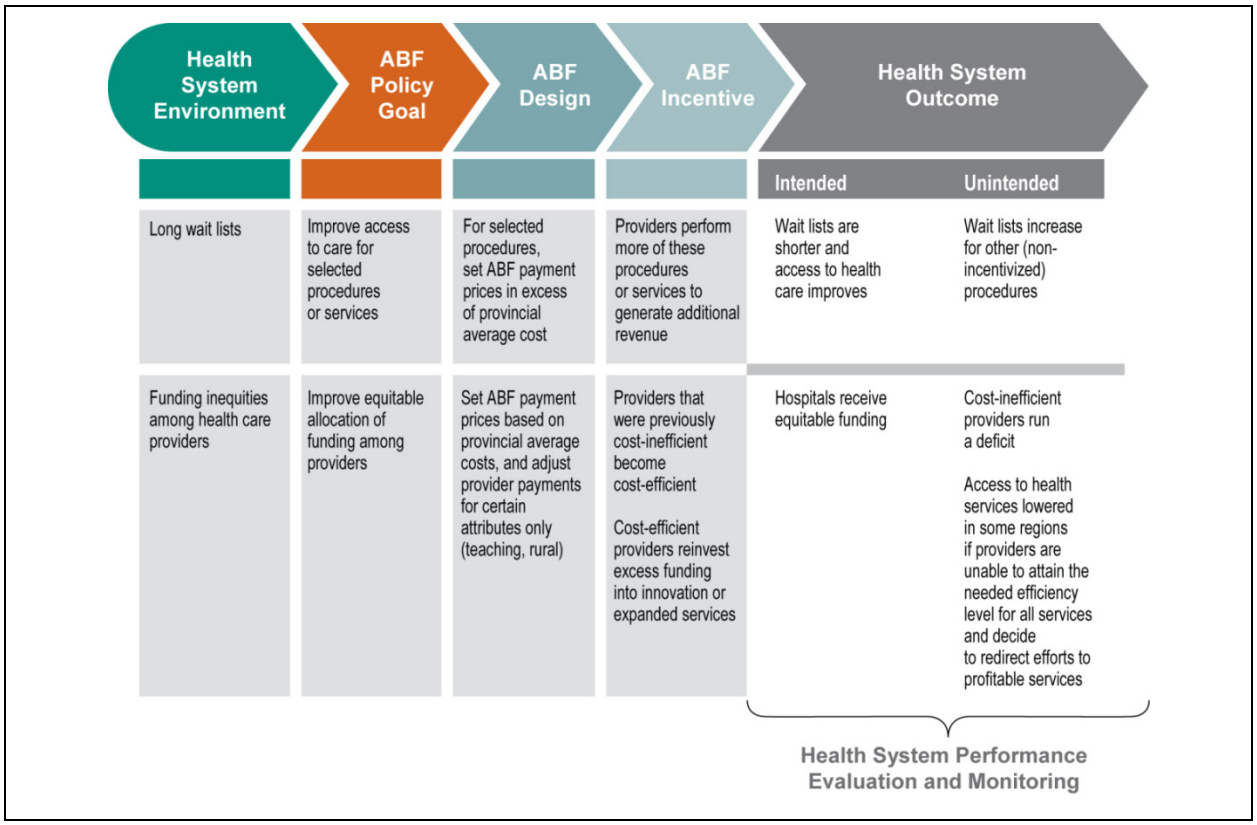
The implementation of ABF (even if implemented for only inpatient hospital services) should include an evaluation program that monitors the impacts of ABF on the broader health system. By design or by accident, ABF can have a positive or negative impact on many aspects of health system performance. For example, improvements in one hospital's cost-efficiency might be a result of ABF but at the expense of increases to total health expenditure. ABF program evaluation can be a way to inform stakeholders about any undesirable effects of ABF and to facilitate positive changes in hospitals and the health system.

13.1 ABF Policy Objectives and Evaluating the Impact on Health System Performance

As already mentioned, ABF is not a one-size-fits-all solution. A jurisdiction interested in using ABF might have policy goals and objectives that differ from those of its counterparts; consequently, ABF design and implementation will vary across jurisdictions. When thinking about the evaluation of health system performance under ABF, it is critical to have a clear understanding of the policy goals or objectives that ABF is designed to achieve.

The relationships between the health policy goals, ABF design and health system outcomes can be mapped using a logic model (see Figure 17). Logic models can be used to communicate the way that ABF design choices align with policy goals and the way that the health system responds to those design choices.

Figure 17: Logic Model for Determining Health System Performance Indicators Based on Two ABF Policy Goals



13.2 Components of Health System Behaviour to Evaluate

Health system performance encompasses a number of dimensions. At a very high level of evaluation, ABF can be specifically designed to influence three areas of health system behaviour:

- Quality of care: Has ABF positively or negatively changed clinical practice toward one that is evidence-based, focused on the patient, safe and timely?
- Efficient use of resources: Has ABF resulted in resources being used more efficiently (for example, streamlining processes and spending, and planning for the future)?
- Equitable allocation of funding: Are funds being allocated more equitably to health care providers while still meeting population needs?

At a more granular level of evaluation, health system behaviours might be characterized by considering topics (or indicators) that are shown or expected to have a direct tie to either an ABF policy goal or to an undesirable outcome from ABF.

For example, quality of care might be further defined based on the appropriateness of care, the patient's perception of his or her health system encounter (patient experience) or the extent to which unintended injuries or complications arose from health care management (patient safety). Even the ability of the patient to access health services free from financial, geographical or wait time barriers can be viewed as a quality-of-care issue.

Assessing whether hospitals being funded under ABF are using their resources more efficiently might include measuring the degree to which patient care is coordinated across the health care system's different functions, activities and operating units (patient flow) or the extent to which health service outputs are being produced without excess cost.

For the evaluation of equitable funding, the availability and funding of health services for different patient populations could be measured.

Separate from these topics, an assessment of the health system's preparedness for ABF might also warrant inclusion in an evaluation, since the introduction of ABF requires many health system changes at the clinical, hospital, regional and provincial levels. Chapter 11 looks at some of the activities needed to prepare for ABF. An assessment of the health system's preparedness should also be done prior to ABF implementation to understand the degree to which clinicians and hospital managers are prepared for and engaged in meeting the ABF policy goals, as well as the extent to which they are equipped with the information systems needed under this new funding model.

13.3 Selecting Indicators

The main purpose of evaluating the impact of ABF on health system performance is to assess and document the strengths and weaknesses in health care delivery and management. How one attaches specific numbers to concepts such as “patient safety” is not always straightforward. What is needed is a measurement tool that can be used to gauge performance on patient safety; one way to achieve this is to use health indicators.

Heath indicators can be chosen (or developed) to provide measures of performance for different health system characteristics (such as access to care and appropriate care). Some guidelines to consider when choosing (or developing) indicators are the following:

- Scope of measurement: Which health system stakeholders have a vested interest in an indicator?[43] Some indicators might target a very narrow audience or measure a small segment of the health sector and, as a result, might be a lower priority than other indicators.
- Heterogeneity of indicator results: For an indicator to be useful in distinguishing low- from high-performing health care providers, it needs to vary in value.[44] While it may be encouraging to see all providers score highly on a particular indicator, one of the key purposes of ABF performance measurement is to identify and mitigate the changes in health system behaviour that are undesirable.
- Ability to take action on an indicator: Can the results of the indicator be influenced by changes in management or clinical decisions?
- Feasibility of producing an indicator: There will need to be a compromise between the indicators that are most useful and the indicators that are possible based on data availability and data quality. For example, a health system attribute that is suitable for monitoring might not have the routine data collection systems needed to produce a performance indicator.

Appendix A provides detailed ideas and examples of indicators that could be used to assess the characteristics that make up this framework. More advanced discussion about the choice of indicators for evaluating the impact of ABF on health system performance can be found in a separate CIHI report that explores this topic.[45]

The primary role of performance evaluation is to answer one key question: Is ABF resulting in positive changes in hospitals and the overall health system? Knowing how to answer that question effectively requires an understanding of the key indicators that are relevant for board members and senior leaders. Key indicators can be identified through a decision-making process that considers ABF policy goals and the objectives of the monitoring program. Board members might contend that the role of monitoring is to mitigate any unintended consequences of ABF or that its role is to determine whether ABF is succeeding in meeting its policy goals. This can affect the mix of indicators that are used in evaluating health system performance.

Also key to answering the question of whether ABF is resulting in improvements to the health system is to document pre-implementation performance levels so there is a means to evaluate changes in indicator performance post-implementation.

Performance evaluation can serve a second role that goes beyond assessing whether ABF policy goals are met. As part of a program of health system performance measurement and reporting, it can be a tool that supports continuous improvement in health system performance.

Optimizing the value of performance evaluation requires some thought about the indicators to use in that evaluation: will the mix of indicators get the attention of senior leaders while also enabling employees in hospitals to use the evaluation to identify opportunities for performance improvement? Ideally, indicators are relevant to and actionable by the various health system stakeholders.

13.4 Evaluating Health System Performance

Descriptors derived from performance indicators can be more effective than the raw indicators to highlight strengths and identify weaknesses in health system performance. These often require a comparison with some kind of a standard, but the subjective nature of mapping indicator results to a descriptor means that no single way will be appropriate in all situations.[46]

Different methodologies can be used to describe an indicator's result, some of which are described below.

- Compare indicator results with an established pre-implementation baseline to consider the impact that ABF might have had on the results.
- Compare results across hospitals where ABF has been implemented to identify the impact on specific hospitals and to understand where objectives are being achieved.
- Compare results with targets that were established when the policy was designed. This could include establishing performance indicator targets for a specific audience that is accountable for its performance. Such indicators would also have properties such as being **s**pecific, **m**easurable, **a**ctionable, **r**elevant and **t**ime-bound (SMART).[47]

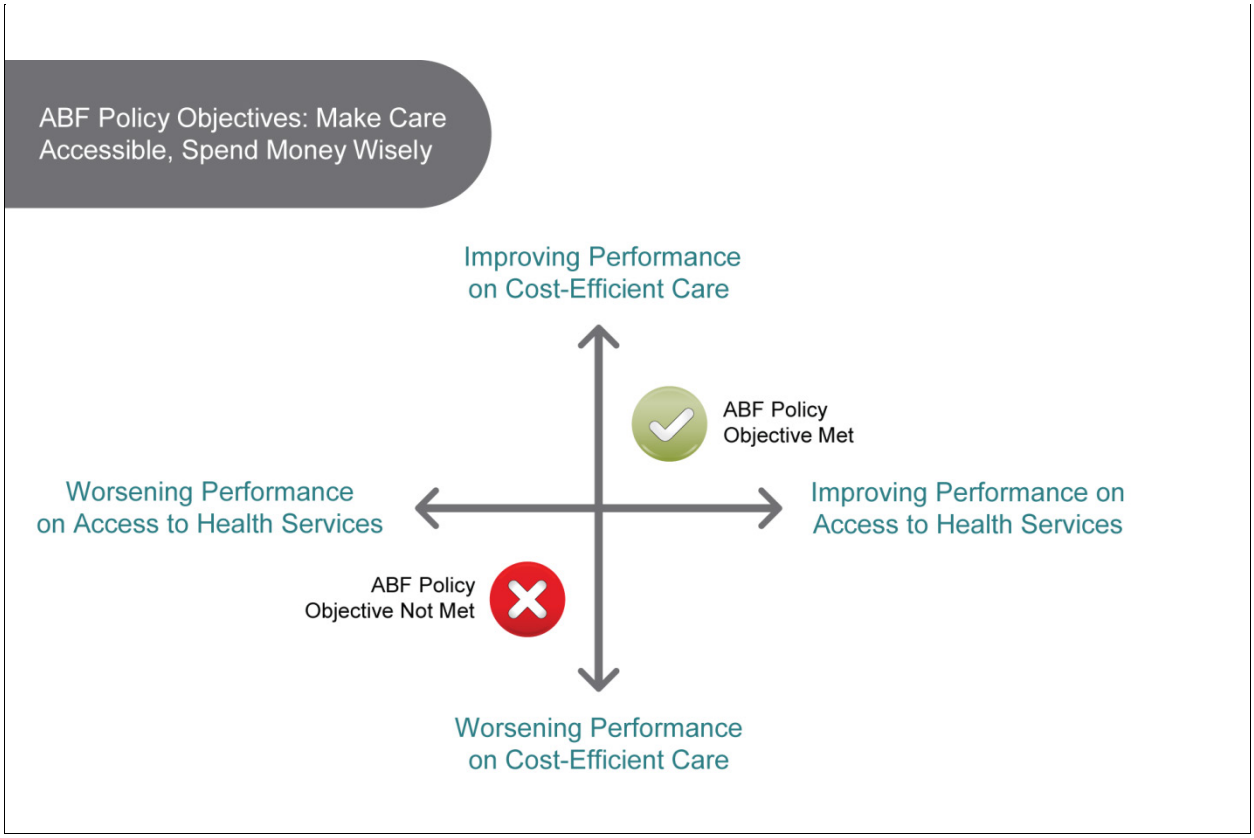
13.5 Measuring Overall Success of ABF

The overall evaluation of ABF's impact on the health system should consider ABF policy objectives and targets associated with them, determine indicators to measure both expected and planned favourable impacts as well as potential unfavourable impacts, and establish baseline levels prior to implementing ABF so that there is a good basis for evaluating changes in performance.

Depending on the ABF policy objectives (such as improved access, increased efficiency, improved transparency and/or improved accountabilities), the performance of certain indicators may be considered critical when evaluating overall health system performance.

Figure 18 illustrates a scenario for which the good performance of two characteristics is critical in terms of meeting the ABF policy objectives. In this example, two characteristics are directly related to two ABF policy objectives: to make care accessible and to spend money wisely. These policy goals would have been established prior to ABF implementation. Hence this evaluation would be performed to determine whether those goals had been achieved. This figure illustrates that the failure of *access to health services* and *cost-efficient care* translates to the failure of ABF to meet its policy objectives. The figure also shows that their combined success could translate to the overall success of ABF in making the changes to the health system that it was designed to make.

Figure 18: Illustration of a Scenario for Which the Good Performance of Two Characteristics Is Critical for Achieving a Positive Evaluation of Success of ABF



One of the important incidental benefits of ABF and health system performance monitoring is that it is often accompanied by improvements to the data process itself. It is often the case that the value of data is recognized only when one starts to attach money or performance to that data.

Part 6: Managing a Hospital Under ABF

This part of the manual provides information that will help hospital managers adapt to working in an ABF environment.

Chapter 14: The New Paradigm

This manual has discussed many of the system-wide implementation issues that need to be addressed for the transition to ABF. This chapter covers hospital-level implementation issues. To some extent, hospital-level issues parallel system-wide ones.

Hospital leaders need to think about four big questions when preparing for ABF implementation (see Figure 19).

Figure 19: Four Big Questions When Preparing for ABF Implementation

14.1 Improving the Knowledge Base

ABF changes the nature of incentives in a hospital. A key component of a hospital's implementation plan for ABF should therefore be raising awareness and providing education about the mechanics of ABF. Managers will need access to information about the new environment in which they will be working.

Clinical staff at all levels need to be aware of the new environment. If areas for improvement are identified, the staff that need to be involved will need to have some understanding of the background and issues. Clinical leaders may need to take on new functions after ABF implementation, so they should be engaged early in the ABF process to ensure they are aware of how ABF is intended to work.

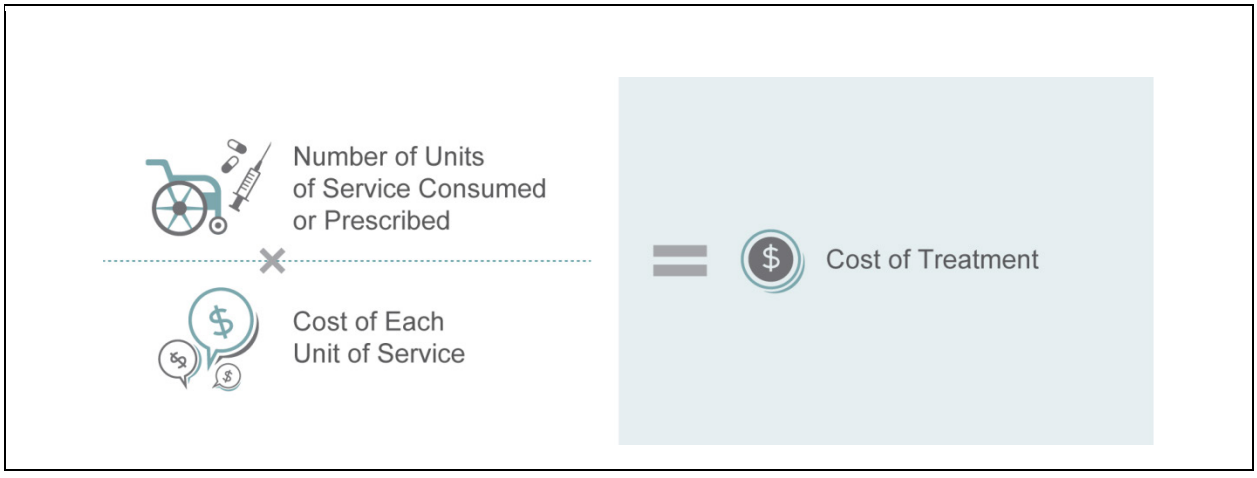
Board members will also need to understand the different environment, and the board and its committees may need to set aside time to develop new templates for reporting and new systems for accountability.

14.2 New Organizational Structures and Processes

Managing a hospital in an ABF environment is somewhat more complex than in a standard global budget environment. In addition to the issues of staff management and managing resources that have always faced managers, ABF requires a different type of relationship between physicians and management.

ABF is about managing the costs of activities. One can think of the cost of a patient's stay as being a function of two interacting factors: the number of intermediate products or services used during the patient's stay and the cost of each of those services.

Figure 20: Managing the Costs of Activities



The units of service consumed or prescribed might be days of stay, laboratory tests or medications. The responsibility for each service cost rests with a manager. For example, the cost of each laboratory test rests with the laboratory manager. Responsibility for the overall costs of the stay is shared: the cleaning component with the environmental services manager, the nursing component with the director of nursing and so on. Recall that Chapter 5 presented options for ways in which managers can estimate costs for different units of service.

Under ABF, managing the costs of these inputs is not the only task. Unit costs per service may be the lowest in the world, but the hospital could still be inefficient if more services than expected are consumed in each case. Responsibility for determining the length of stay (timing of discharge), the diagnostic tests ordered and the medications prescribed normally rests with *physicians*. Managing under an ABF system thus requires a higher level of engagement between physicians and management along with the creation of organizational structures to facilitate discussions about resource use when those discussions are required.

The role of medical staff may need to be enhanced or expanded to ensure that they share responsibility for managing resource use. Agreed-upon best practices and the creation of hospital-specific patient pathways/guidelines can assist in standardizing, as much as possible, the patient journey and the parameters of care. The roles of clinical department heads may need to be revised to clarify their responsibilities in this regard to address physicians who—without sufficient justification—are outliers in terms of resource usage.

New processes and roles may be required at the executive level as well: if it becomes clear that, say, cardiac surgery is generally more expensive at the hospital than ABF payment would cover, who on the executive would have responsibility to investigate the possible reasons for this? Who will be responsible for bringing together the various groups that need to be involved in this issue? Who should decide whether the service should continue at a financial loss to the hospital?

14.3 Coding and Coding Audit

The essence of ABF is that hospitals will be funded based on the type of patients they treat. A more accurate way of phrasing this is that hospitals will be funded based on the type of patients they treat, as recorded in the routine data set. It has always been desirable for the routine data set to accurately reflect the work performed at a hospital, relying on proper documentation of patient care provided and accurate code assignment. Good data is needed for utilization and quality review and for research and analysis. Accuracy becomes even more important in an ABF environment. Complete and accurate coding of the patients diagnosed and treated in a hospital allows the hospital and its clinicians (and funders) to examine resource usage and how this has changed over time. Good coding requires accurate and timely documentation and a process whereby coders can query physicians to clarify or complete documentation.

A critical component of preparing for ABF is to make clinicians (and especially physicians) aware of the importance of accurately and completely documenting the patient's presenting diagnoses and the care provided to the patient. Making sure that a hospital receives a fair

payment for the activities it provides starts with making sure that the data submitted is a fair reflection of the services and treatments the hospital actually provided. This is not to be confused with upcoding (discussed in the previous chapter); rather, it is simply ensuring that coding reflects the care provided.

The critical question that management needs assurance about is this:

To what extent do the codes assigned in the patient record truly represent the case?

Coding, of course, relies on good documentation. Coders can capture only what is documented and rely on clear documentation by a physician. This leads to a related question:

Is the documentation in the record adequate? (For example, do laboratory tests show an infection even though there is no diagnosis of infection recorded in the record?)

To some extent the education strategies described above may help ensure positive answers to these questions, but implementing ABF often highlights gaps in documentation in the patient record.

In some countries (such as Germany) a new job profile—medical controller—was created to verify data contained in patient health records. Medical controllers can be medical doctors or nurses who receive an additional qualification in coding. The medical controlling department is often related to the finance department and hence directly linked to hospital management.

Management (and/or the board) will want to keep a careful eye on the ABF source data, possibly conducting periodic internal audits of coding adequacy. These internal audits may also help to identify any risk of penalties from inaccurate coding.

14.4 The Right Information

Hospital managers will rely more heavily on information to manage effectively in the new environment. Depending on the organizational structure adopted, physician leaders may need to have access to reports examining utilization patterns within their departments. The information available to managers will vary:

- All hospitals should be able to develop and provide reports using routine discharge data. Although length of stay, for example, is not perfectly correlated with cost (operating room costs are one obvious distortion), in the absence of any other data, length-of-stay comparisons are a useful place to start.
- Most hospitals will also be able to provide reports on use of diagnostic services.
- Some hospitals will have patient-level cost data that brings together data on both utilization and cost per unit of service. Care must be taken when presenting this data so that information relevant to variables over which the manager or clinician has some control is highlighted.

The senior management of the hospital will need to make decisions about the frequency with which data will be reported. Too-frequent reporting might simply identify random variations in data; infrequent reporting could result in corrective interventions occurring too late. The extent of comparative reporting (for example, variation by individual physician, whether identified or de-identified) is also a contentious issue.

Managing a hospital in an ABF environment is easier if the cost structure of groups of patients is known and monitored on a regular basis, providing an incentive to introduce patient-level costing approaches. Introducing such accounting systems gives hospital managers a powerful tool for cost control. Providing the cost data to the funder ensures that the hospital's costs are reflected at least to some extent in the cost weights and loadings of the funding system. It also provides evidence should the hospital perceive any inequalities in its funding (for example, a rare but very-high-cost patient) and wish to initiate discussions with the funder.

ABF introduction also stimulates more fundamental questioning of traditional ways of providing support or other services. This leads to questions such as whether the hospital should continue to provide certain support services itself or procure them from another supplier. Choices such as these also require good information on the costs of alternative approaches and any impacts beyond the service being reviewed.

Chapter 15: Managing the Continuum of Care

ABF brings into focus the need to manage resources across the whole continuum of care.

The resource management function involves managing the costs of units of service as well as how many units of service are used. Another way to think about this issue is to consider inputs, intermediate products and final products, introduced in the discussion on costing (Chapter 5).

In terms of its efficiency objective, the traditional focus of hospital management was on the transformation of inputs into intermediate products: What was the cost of each meal? How much was the cost per patient day? ABF adds to this focus in terms of another dimension: How many days were required to care for a person with a transient ischemic attack? How about for chronic obstructive pulmonary disease?

Management's focus changes within an ABF environment, and it asks a new set of questions when inefficiency is identified. In this chapter, we illustrate some of these questions, from issues that start before a patient is admitted to those that occur after a patient has been discharged.

ABF brings with it a requirement for hospitals to think beyond their own walls: the efficiency of a hospital may critically depend on the network of services in the community it serves. Adequate community services may facilitate timely discharge of patients, whereas inadequate or poorly managed community services may hinder it. Figure 21 shows the continuum of care divided into four sections. Each section was considered when asking questions about potential areas of inefficiency.

Figure 21: Managing the Continuum of Care

15.1 Prevention and Primary Care

With respect to the goals of ABF, hospitals should pay attention to prevention and primary care issues. If hospitals have an incentive to reduce wait times, then one way of doing so (in the medium to long term) is to ensure that all admissions are necessary. Another reason for hospital interest in this area is that many staff members have a personal commitment to prevent unnecessary hospitalizations.

Critical questions that hospital leaders might encourage to be part of internal hospital review processes include

- Could this admission have been prevented? (That is, was the hospital admission for an ambulatory care sensitive condition?)
- Is “hospital in the home” an appropriate alternative?
- Could this condition be handled on a day surgery basis?

15.2 Pre-Admission Services

A focus on pre-admission services can also help to improve efficiency. Typical questions here include

- Is all the routine diagnostic work-up that is currently performed necessary?
- Were all the diagnostic tests/images that could be done prior to admission done at that time?
- What proportion of elective surgical admissions was on the day of surgery?

Part of pre-admission planning should also involve planning for discharge:

- Has discharge planning commenced early enough in the inpatient stay to avoid exit block?

15.3 Hospital Stay

By far the most important focus of utilization review, however, is the inpatient stay. There are three main types of issues that arise from reviewing inpatient resource issues:

- Adequacy of processes of care;
- Adequacy of resources, such as equipment shortages that may cause patients to wait; and
- Professional issues.

15.3.1 Processes of Care

An important place to start when examining processes of care is to consider the overall efficiency of all hospital processes:

- Is the overall flow from admission to discharge efficient?
- Are the operating room allocation and admission processes synchronized?
- Is operating room utilization optimal?
- Could this condition be handled on a day surgery basis?
- What proportion of cases is wholly treated on the appropriate specialty/nursing unit? (There is evidence that caring for patients “off unit” is both inefficient and a potential contributor to a higher risk of adverse events.)
- Are all the diagnostic tests ordered necessary?
- Are there delays getting access to necessary diagnostic tests or getting results back?
- Are there delays caused by waiting for allied health or rehabilitation services?
- Are there other resource coordination issues?
- What is the pattern of adverse events in this specialty/CMG? Are there opportunities to reduce the incidence of adverse events?
- Are there systematic inefficiencies in the care of those patients identified as long-stay outliers?
- Is there a focus on developing common care paths for common conditions?

15.3.2 Resource Issues

Although there is obviously overlap with process-of-care issues, consideration may need to be given to the hospital’s investing in new equipment or additional staffing, if this will reduce bottlenecks. Such investments might include increases in operating room capacity, automated test ordering and/or allied health or rehabilitation staffing. Ensuring financial success in a hospital requires using data to inform decisions about where more resources are needed versus where resources are sufficient but the efficient use of those resources is lacking. Chapter 5 presented options that are available to hospitals for assessing their spending patterns.

15.3.3 Professional Issues

Professional issues are the most contentious of the areas that might need to be examined as part of utilization review processes. Here the critical question is whether there are variations between practice patterns in the hospital. Do some physicians order more tests, prescribe different medications, order different supplies (such as titanium hips), use different surgical techniques, have typically longer stays and so on?

Dealing with these issues requires strong medical leadership, good medical structures and good information. An open information–sharing strategy should be pursued. Many physicians do not know how their colleagues manage similar cases, and when these differences are brought to their attention they may readily adopt a new way of working.

15.4 Post-Discharge Services

The next step in terms of looking at the continuum of care is to examine the interface between the inpatient stay and post-acute services. The issue here is that failures at this interface and problems in the community-based system can result in delays in discharging patients from the inpatient areas.

Key questions that might be examined include

- Has discharge planning started early enough?
- What proportion of patients is awaiting discharge home, transfer to another hospital or placement into residential care?
- Are all patients who have finished with their acute care designated as alternate level of care (to get a good handle on the size of this problem)?
- Is there sufficient home care (or “hospital in the home” services) to reduce length of stay or hospital costs?
- Is residential care for seniors (nursing homes or assisted living) in the hospital’s catchment area adequate?

Summary

Implementing ABF is a sizable undertaking. It requires obtaining buy-in from hospital staff, establishing appropriate information technology and administrative resources within the health care facilities and the funding organization, ensuring collaboration with other initiatives that aim to improve access to and quality of care, and having a vision that encourages system-wide improvements. This manual explored many of these topics and illustrated the complexity that is involved in establishing an effective ABF program.

This manual is organized into six parts, but there is a common thread across each one: the implementation of ABF involves choices of objectives and design elements. Most likely, jurisdiction-specific implementations of ABF will vary, addressing current health system issues, reflecting variations in specific organizational accountabilities and considering the availability of services in various health sectors (such as home care).

Figure 22: Critical Issues in ABF Design and Implementation

The manual has addressed six critical issues in ABF design and implementation, starting with probably the most critical issue: what are you trying to achieve? This is not a technical question but a policy one. It involves considering the key problems faced by the hospital system in the province/territory (or indeed within a regional health authority).

System managers rarely deal with only one problem at a time. Consequently, it is important to understand which of the various problems are the critical issues. Are the critical issues to do with access (long wait times) and/or efficiency (variation in costs between different hospitals)? Different design elements of ABF can address both of these, but the relative importance of each will lead to different design choices, and that is where technical expertise becomes relevant.

Once a broad choice to proceed with ABF has been made, multiple subsidiary choices follow, and change will be required in the roles of staff in health ministries and local hospital management. This manual is designed to provide guidance in all aspects of ABF implementation.

ABF does not present itself as a one-size-fits-all solution. Health system funders can build on the concepts presented in this manual to design their own ABF system, which could be customized to meet their specific health system structures and accountabilities, as well as their specific flavours of health policy.

10-Point Checklist Before Starting ABF

- ☑ **Define and communicate what you want to achieve with ABF.** Who is leading the ABF strategy in your jurisdiction? What is the long-term ABF strategy? What are the short-term policy objectives to be achieved with ABF? Who is the population to be funded under ABF in current and future plans (all hospitals, all patients)? Are these being communicated to all appropriate stakeholders?
- ☑ **Consider hospital functions that do not fit in your ABF model.** ABF pays for each unit of activity. How will you pay for hospital services where funding based on activity does not apply? How will hospitals be funded for high-cost outlier patients? Are variations in ABF design needed for small or rural hospitals?
- ☑ **Define exactly what ABF will pay for.** Are payment rates based on providing quality care? Will ABF payments be set to the average cost or at an efficient cost rate? What services are included in the ABF payment rate, and what services will be funded separately from ABF? Which organizations will not be included in ABF and why?
- ☑ **Fill the data gaps and address data quality issues.** Does your jurisdiction collect patient-level cost data that can inform the ABF payment rates? Is costing and clinical data of sufficient quality for use in ABF?
- ☑ **Define the process through which ABF money will flow.** How will the ABF money flow—from the funder directly to the provider or from the funder to a health authority? How much ABF money will flow? How regularly will volume payment be calculated? Will ABF be capped or uncapped?
- ☑ **Be prepared to provide support to those who will be affected by ABF.** How will hospitals, staff and the public react to a change to ABF? Do you understand the mood in hospitals? What are their reservations about ABF? Can their concerns be addressed? From what funding model are you transitioning? How much time will you give ABF hospitals to prepare for ABF? Will sufficient training and information systems be in place as ABF is implemented?
- ☑ **Be critical of the tools you use for ABF . . . and be critical of ABF.** Pick your case-mix system and understand its details. Are there parts of the case-mix system that, if changed, would serve your ABF purposes better? Are there other health policy goals, not targeted by ABF, which may see some undesirable effects by using the available ABF tools? Is ABF the right fix, or is there another way to motivate changes in the health care system?
- ☑ **Consider where things can go wrong and have an idea about what you can do about them.** Prepare to watch for changes in the health care system when ABF is implemented by monitoring the system or by conducting coding audits. Will you be able to tell whether hospitals are being managed differently as a result of ABF and, if so, if they are managed better? For the initial years of ABF implementation, will you be offering special help to hospitals that may be struggling to adjust?

- ☑ **Have a plan for how the ABF system will be introduced and how it will be maintained in the future.** Most countries that have implemented ABF have used a transition phase of several years—will you do so? Also, once the ABF system is up and running, what resources will be needed to maintain it? For example, how will ABF payment rates be updated, and how frequently will this update occur?
- ☑ **Staff your ABF team.** Does someone on your team have a solid understanding of data standards, data systems and case-mix systems? Who can you look to for insight on the potential undesirable effects that might happen in the health care system? Is there someone who is dedicated to keeping the communication channels open? Who is watching for changes in the health care system? The implementation of ABF touches on many subject matters, and the ABF team ideally contains experts in all of these.

For More Information

For more information on designing, implementing, monitoring and evaluating ABF systems, or on applying CIHI's products in an ABF system, please contact CIHI at casemix@cihi.ca.

Appendix A: Indicator Ideas for Evaluating Health System Performance

Table A1: Indicator Ideas for Evaluating Health System Performance

Characteristic	Considerations	Examples
Appropriate Care	These indicators measure the health care provider's compliance with clinical best practice guidelines. Indicators that focus on clinical best practice guidelines tend to have a very specific clinical application.	*Compliance With Best Practice Clinical Guidelines* • For colon surgery, percentage of patients with on-time antibiotic administration
Effective Care	Effective care is the extent to which a specific intervention, procedure, regimen or service does what it is supposed to do. Effective care also considers whether the patient has benefited from medical intervention. Another way to assess effective care could be to monitor readmission rates or mortality rates, as increases in these rates over time could signal the delivery of ineffective care. If a funder has targeted specific types of patient episodes for ABF, then it could design indicators specific to those patient episodes.	*Potentially Ineffective Care* • 30-day in-hospital acute myocardial infarction mortality rate • Unplanned hospital readmission rate (for cardiac surgery, stroke, etc.) *Self-Reported Health Gain After* • Hip replacements • Knee replacements
Patient Experience	These indicators solicit patients' perceptions and experiences of the care received during their treatment at a health care facility. Indicators could be derived from patient surveys. For some types of patient care, it might be relevant to determine the extent to which the patient's self-assessed health status improved after receiving a health intervention.	*Patient Perception of Care* • Score of overall impression on communication, responsiveness and dignity – For acute care stays – For rehabilitation
Patient Safety	These indicators could aim to quantify the extent to which a patient's health is compromised due to unsafe care. Indicators for this characteristic might focus on certain types of patient episodes that have been targeted by ABF. For example, if ABF is designed to increase activity for cataract removals, it may be suitable to track the rate of post-surgical site infections from those procedures. Indicators can touch on topics of infection rates, medical errors, nurse-sensitive adverse events and injuries.	*Adverse Events, Infections, Injuries* • Rate of nurse-sensitive adverse events • Rate of medical errors (that is, prescription medication errors, surgical errors) • Post-surgical site infection rates *Potentially Avoidable Injuries or Complications* • In-hospital falls • Unplanned surgical wound reopening
Access to Health Services	These indicators confirm whether activity volumes increased and wait times shortened in response to an ABF incentive. Some of the unintended consequences of ABF will be in areas that are indirectly affected by it. Efforts to monitor patient populations and health sectors targeted by ABF need to be balanced by efforts to monitor patient populations and health sectors not targeted.	*Access to Primary Care* • Percentage of patients able to obtain same- or next-day appointment with a primary care provider for an immediate health need • Use of hospital emergency departments for conditions that could have been treated by a primary care provider *Wait Times* *For procedures that are targeted by ABF* • Proportion of patients treated within benchmark wait times for hip and knee joint replacement

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Table A1: Indicator Ideas for Evaluating Health System Performance (cont'd)

Characteristic	Considerations	Examples
Patient Flow	These indicators assess efficiencies in the delivery of care, particularly when this involves coordination between different health sectors. Indicators for this characteristic can be used to encourage the establishment of strategic partnerships between health sectors (for example, between hospitals and community and long-term care organizations). Other indicators for this characteristic might target specific patient groups—or specific hospital operations—that are of particular interest in terms of addressing inefficiencies.	*Integration With Other Health Sectors* • Percentage of alternate level of care days *Emergency to Inpatient Flow* • Percentage of episodes for which elapsed time from inpatient bed request to discharge from emergency room is within one hour *Discontinuity of Care* • Number of patients transferred (in or out), per 1,000 episodes
Cost-Efficient Care	For health care providers that collect case-cost data, these indicators analyze the actual cost of care for certain patient populations or for specific services and are extremely valuable to them in assessing cost-efficiency. Other indicators, such as cost per weighted case, can also be used to measure hospital-level cost-efficiencies. Indicators that look at length of stay are another option. Length of stay can be used as a marker of cost (for example, greater lengths of stay correspond to increased costs). Health care providers that have average lengths of stay lower than the national or provincial average might be viewed as cost-efficient. Indicators might also focus on areas in which ABF aims to shift patterns of service provision away from historical patterns that are known to be excessively costly. For example, if ABF is designed to reduce health expenditures by encouraging the provision of certain elective procedures in the day surgery setting rather than the inpatient setting, then an indicator might be used to monitor for these shifts. Indicators might track the care for different patient clinical groups to see if they were provided care in the lowest resource intensity setting that was appropriate for their level of acuity. Finally, indicators might identify markers of cost savings. For example, many of the *quality-of-care* indicators can be converted to *cost-efficient care* indicators by translating the improvements to quality of care into cost savings.[48]	*Efficient Production* • Cost per weighted case • Labour rate–adjusted cost per weighted case • Average actual cost for specific surgical interventions (patient-costing hospitals only) • Worked hours per weighted case *Length of Stay* • Ratio of average length of stay to ELOS • Proportion of long-stay cases *Service Provision* • Ratio of day surgery cases to elective inpatient cases for cataract surgery *Cost Savings* • Estimated avoided cost (in dollars) for reducing the rate of readmissions

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Table A1: Indicator Ideas for Evaluating Health System Performance (cont'd)

Characteristic	Considerations	Examples
Resource Usage	These indicators measure the ability of providers to allocate the available resource inputs necessary to maximize expected services. Such indicators might describe human resource staffing and equipment usage to measure the allocation of resources among different health care providers. Indicators that measure the use of new technologies also belong to this characteristic. The efficacy and cost-effectiveness of new technologies might vary for different subpopulations. Analyzing the use and effectiveness of new technologies is one way to ensure that device and case selection continue to provide value for money.	*Human Resources* • Overtime/premium costs • Number of full-time nursing hours per inpatient bed *Equipment Usage* • Volume of expired drugs and intravenous fluids • Percentage of operating room cancellations on day of surgery *Functional Integration* • Proportion of total budget spent on administrative costs (for example, at the regional level)
Costing Episodes of Care	These indicators assess the ability of the funder to predict the cost per episode of care. Indicators might assess the coverage of data, such as patient cost data and socio-economic data. Other indicators for this characteristic might assess the quality of clinical and financial data that is available.	*Coverage of Patient-Level Cost Data* • Proportion of hospital costs that are patient-costed (at the provincial level) *Availability of Non-Clinical Data That Affects Cost* • Regional and socio-economic data (for example, on wages) • Hospital characteristics (for example, age) *Quality of Data* • Compliance with patient-costing methodology • Prevalence of comorbid conditions that affect ABF payment price
Funding Equity	These indicators assess the extent to which resources are allocated equitably across health care providers. Equity is a concept based on fairness; this means that performing well on this characteristic does not require equal payments for similar patients. For example, an equitable funding allocation system may use higher ABF payment prices for hospitals that must pay higher salaries to staff given their geographical location. Good performance on this characteristic requires the funder to be able to differentiate between avoidable and unavoidable cost differences between health care providers. Other indicators might measure the overall province-wide change in association between hospital financial positions (for example, positive or negative total margin) with measures of their cost-efficiency (for example, CMI). As health system funding in a jurisdiction becomes more rules-based and tied to a consistent ABF approach, it is reasonable to expect cost-inefficient performers to run deficits and cost-efficient hospitals to run surpluses.	*ABF Payment Rate Adjustors* • Presence of adjustors to ABF payment rates for hospital characteristics (for example, teaching status) *ABF Effect* • Extent to which year-end funding adjustments override ABF allocations • Signs that the range of hospital-specific cost per weighted case values in hospitals is decreasing *Signs of Financial Stress* • Net difference between ABF revenues and hospital expenses

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Table A1: Indicator Ideas for Evaluating Health System Performance (cont'd)

Characteristic	Considerations	Examples
Funding Equity (cont'd)	If health system funders are unable to improve upon their ability to allocate funds equitably due to data being unavailable, then indicators that measure data availability or data quality (under the characteristic *costing episodes of care*) could be expanded.	
Health Care Equity	These indicators assess the extent to which access to health care and health outcomes are similar between different populations. These indicators tend to be population-based measures of performance. An example of such an indicator could be hospital admission per 100,000 people after adjusting for age and sex, with rates differentiated into emergent/medical admissions versus elective/surgical admissions. Variations in hospital admission rates between health regions could indicate inequities with health system use. Other health care equity indicators can be discovered by reviewing the indicators that assess quality of care and differentiating performance by subpopulation or socio-economic status (rather than by health care provider).	*Out-of-Pocket Expenses* • Total out-of-pocket expenditures, per capita *Use of Private Clinics* • Private clinic use for hip replacement surgery *Overall Health System Utilization* • Hospital admission per 100,000 people (after adjusting for underlying population disease burden) for elective admissions
Clinician Role	These indicators assess the degree to which information on the ABF policy goals is made known to clinicians. These indicators could measure the extent to which practices change in response to working in an ABF environment.	*Clinician Engagement in ABF* • Provincial medical association represented on ABF design team steering committee *Clinician-Specific ABF Performance Measures* • Actual costs of cases versus ABF payments, by clinician
Management Skills	These indicators assess the training and ability of managers to work in an ABF environment. Management's ability to hire the needed clinical staff, to buy the right medical equipment and to coordinate efforts with other health care providers translates to a properly staffed, well-equipped health facility that is fully integrated with other health sectors.	*Hospital Policies* • Compliance rate with Accreditation Canada's Required Organizational Practices *Management Engagement in ABF* • Percentage of department's budget that is influenced by ABF • Proportion of hospital managers who received ABF training *Informed Decisions* • Ability of managers to analyze patient-level data

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Table A1: Indicator Ideas for Evaluating Health System Performance (cont'd)

Characteristic	Considerations	Examples
Information Systems	These indicators assess the extent to which information systems assist health system managers and clinicians in performing their duties in an ABF environment.	*Availability of Health Information* • Timeliness of financial reports *Usability of Health Information* • Availability of technology or tools (such as dashboards), by health care provider • Number of data analysts per 10,000 patient discharges *Usefulness of Case-Mix System for ABF Purposes* • Alignment of CMGs with ABF payment categories • Alignment of cost weights with services funded by ABF

Appendix B: Glossary of Terms

activity-based funding: A method of funding hospitals for the care and services that they provide. ABF is defined by four features: a case-mix system is used to describe hospital activity and to define its products or outputs; a payment price is set for each CMG in advance of the funding period; providers are paid a set price for each patient they treat; and a hospital can affect its current-year budget by changing its current-year patient volume and patient mix.

activity target: The number of weighted episodes that a hospital is expected to treat during a period of time.

adverse selection: Favouring the provision of care to patients who are more likely to be profitable to the detriment of those patients who are more likely to be unprofitable. See also *cream-skimming*.

allocative efficiency: When marginal benefit equals marginal cost. In the context of health system funding design, this regards funding decisions that seek to maximize the value of health care services as a whole.

atypical cases: Cases in which an unusual or exceptional circumstance occurred during the patient care episode. CMG+ denotes patient episodes as atypical when they involve patient transfers into and/or out of an acute care facility, patient deaths in hospital or patients who signed out.

balanced-budget prices: ABF payment prices that use base values determined using the available budget and the expected activity volume. The base value is not derived using observed costs but rather is derived based on what can be afforded given expected volumes.

base value: The dollar amount associated with ABF payment for a case with a payment weight of one.

benchmark prices: ABF payment prices that use base values that are determined using some characteristic of the cost distribution other than the mean.

best practice payment weights: Payment relativities that are derived using only those costs for an episode of care that align with best practice clinical care processes or pathways.

capped funding: A means to control hospital expenditure or volume in a funding model.

case-mix groups: A classification that categorizes episodes such that the cases in a group have similar patterns of resource use (that is, they are resource homogeneous) and are also similar from a clinical perspective (that is, they are clinically homogeneous). See also *diagnosis-related groups*.

coding audit: The process of coders reviewing a sample of records and independently recoding them for the purpose of identifying data quality issues.

cost-modelling: Using hospital expenditure or length-of-stay data, together with cost weights from an independently developed case-mix system, to apportion costs to individual patient episodes.

cost-shifting: The profit a health care provider achieves through its efforts to change clinical practice such that some of its costs of providing care fall onto a different health sector or onto the patient. Depending on the scope of ABF implementation, this can result in funders systematically overpaying certain health care providers (and underpaying others).

cost weight: A dimensionless measure of cost that is represented as a relative cost compared with a reference standard, which is often the average typical case.

cream-skimming: Selecting patients for admission (or other treatment) who are better cost risks in an effort to achieve a greater profit/surplus for the hospital than it would achieve if it treated average patients. See also *adverse selection*.

diagnosis-related groups: A classification that categorizes episodes such that the cases in a group have similar patterns of resource use (that is, they are resource homogeneous) and are also similar from a clinical perspective (that is, they are clinically homogeneous). See also *case-mix groups*.

direct costs: All the expenses for salaries, supplies, equipment, amortization and other outlays seen in the accounts of the functional centre, including direct expense transfers. Direct costs exclude costs of absorbing cost centres that initially resided in the accounts of transient cost centres but have subsequently been allocated as indirect expenses.

fixed cost: A cost that remains relatively unchanged in total regardless of the volume of production or activity, within a fairly wide range of volume.

functional centre: A subdivision of an organization used in a functional accounting system to record the budget and actual direct expenses, statistics and/or revenues, if any, that pertain to the function or activity being carried out.

global budget: Budgets that are fixed and set for a fiscal period. They may take account of history, specific inputs and, in some cases, activity.

hard cap: A limit placed by the funder on a hospital's ability to generate revenue. A hard cap is designed either to directly control expenditure (by placing a limit on total revenue) or to indirectly control expenditure (by placing a limit on activity volumes).

indirect costs: Costs that previously were within the accounts of transient cost centres, as their direct costs, but through cost allocation procedures were allocated to functional centres based on their relative resource utilization. Indirect costs are also generally known as overhead costs.

intermediate products: Procedures and services provided during the patient care process.

loadings: Factors applied to the base value that take into account any further differences in costs that the underlying classification system is unable to detect.

long-stay case: A case with total length of stay greater than the trim point.

marginal cost: The amount by which total costs are increased by the last unit of output, at a given volume of production.

microcosting: Collecting detailed data on resources utilized and the value of those resources.

moral hazard: In economic theory, this is a situation where a party will tend to take risks (for example, a hospital will put less effort into reducing costly and potentially avoidable events) because the costs that could be incurred from those risks would not be felt by the party taking them (for example, the funder compensates for all costs incurred by the hospital whether or not they are avoidable).

overhead costs: Expenses that are incurred to produce a commodity or render a service but that cannot conveniently be attributed to individual units of production or service.

patient-level costing: Collecting detailed data on resources utilized and the value of those resources at the patient level.

payment rate: The dollar amount of funding to provide care to a case. In ABF, this is determined by multiplying the payment weight by the base value and then differentiating payments further by applying loadings.

payment weight: A dimensionless measure of payment that is represented as a relative payment amount compared with a reference standard, which is often the payment provided for the average typical case.

population-based funding: A funding formula that allocates funds to geographic regions such that the disease burden of the population served is taken into account.

readmission: A case is counted as a readmission if it is for a relevant diagnosis or procedure and occurs within a certain period of time (such as 28 days) after the initial episode of care for that same diagnosis or procedure.

relative value unit: RVUs act as a weight to distribute direct and indirect costs to the services provided by a functional centre. Examples include workload units and expected cost dollars.

skimping: Reducing the quality of care to a level that is below acceptable.

soft cap: Placing no (or limited) expenditure or volume controls in the current year and addressing any need to control expenditure by staggering the funding effects over time.

trim point: A value that represents a duration of time, which is used to identify cases that are length-of-stay outliers within a case-mix group.

typical cases: Cases without the presence of unusual circumstances that would otherwise define them as atypical or long stay.

unbundling: The act of dividing up what was formerly a single clinical process into separate components for the purpose of attracting separate payments for the components, replacing a single payment for the previously integrated service.

uncapped funding: Placing no expenditure or volume controls in a funding model.

upcoding: Changing coding practices away from choosing the codes that best describe the clinical course toward choosing codes that might positively affect payment.

variable cost: A cost that varies directly with volume of production or activity.

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