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CASE-BASED HOSPITAL PAYMENT SYSTEMS:
A STEP-BY-STEP GUIDE FOR DESIGN AND IMPLEMENTATION IN LOW- AND MIDDLE-INCOME COUNTRIES

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Cheryl Cashin

Sheila O'Dougherty

Yevgeniy Samyshkin

Alexander Katsaga

Ainura Ibraimova

Yevgeniy Kutanov

Konstantin Lyachshuk

Olga Zuys

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DEFINITION OF TERMS

Term	Acronym	Definition
Allocation basis		A rule used to allocate indirect costs to a cost center (hospital clinical department) in the step-down cost accounting process.
Allocation statistics		The data needed to apply the allocation basis to allocate indirect costs to a cost center (hospital clinical department) in the step-down cost accounting process.
Average length of stay	ALOS	Average number of days per hospital stay.
Base rate	BR	Aggregate average cost per hospital case across a group of hospitals
Bottom-up costing		A costing method that determines the unit cost of a service summing the cost of all inputs used to provide the service in the most recent year and divided by the annual total number of the service provided.
Budget neutral		The payment system is designed so that the total payment to providers the health sector, or a sub-sector such as the hospital sector, in a budget period is equal to the total amount of resources allocated to the sector.
Bundling of services		Grouping health care services into a higher level aggregated unit (e.g. hospital bed-days and all tests and procedures are grouped into a "discharge"), and charging or paying for the group of services rather than for each individual service.
Case-based payment method		A hospital payment method that reimburses hospitals a pre-determined fixed rate for each treated case.
Case group	CG	A group of hospital cases defined for a case-based hospital payment system to include cases with similar clinical characteristics and resources required to diagnose and treat the cases, or to complete a phase of case management.
Case grouping of cases		A set of criteria and a process for allocating hospital cases into clinical groups that have similar clinical characteristics and resource intensities.
Case group weight	CGW	The ratio of the average cost per case in a given case group divided by the global average cost per case, which reflects the resource intensity of diagnosing and treating cases in the case group relative to the average.
Case mix	CM	The relative complexity and intensity of services required to treat patients in a hospital due to diagnosis, disease severity, and patient characteristics.
Case mix index	CMI	A summary measure that describes the number and types of patients treated in a hospital according to the complexity and intensity of services required to treat the patients due to diagnosis, disease severity, and personal characteristics, such as age.

Term	Acronym	Definition
Coefficient of variation	CV	The variation (standard deviation) of a variable expressed as a percentage of the average (mean) of that variable.
Comorbidity		A condition that is not related causally to a patient's principal disease process, but increases a patient's total burden of illness.
Diagnosis-related group	DRG	A classification of hospital case types into groups that are clinically similar and are expected to have similar hospital resource use. The groupings are based on diagnoses, and may also based on procedures, age, sex and the presence of complications or comorbidities.
Economic adjustment coefficient		An adjustment factor multiplied by the base rate in a case-based hospital payment system to adjust for economic factors external to the hospital sector that would affect expenditures, such as inflation or regional variations in resource cost.
Hard budget cap		The amount of resources allocated to the health sector, or a sub-sector such as the hospital sector, which serves as a firm limit on expenditures in that sector during the budget period.
Health purchaser		An entity that transfers pooled health care resources to providers to pay for services for a defined population.
Hospital pool	HP	An estimate of the amount of funds that will be available to pay for hospital services in a defined geographic or administrative region for a specified time period.
Incentive		An economic signal that directs individuals or organizations (economic entities) toward self-interested behavior.
International Classification of Diseases	ICD	A system of categories used to classify morbidities according to established criteria. The classification system is currently in its 10th edition (ICD-10) and is published by the World Health Organization.
Major diagnostic category	MDC	A category of diagnoses generally based on a single body system or disease etiology that is associated with a particular medical specialty.
Outlier case		A hospital case with an atypically long or atypically short length of stay for a particular case group. The outlier case threshold is sometimes called the "trim point."
Prospective payment		The payment rate for a set of services is determined prior to the services being delivered.
Provider payment method		The mechanism used to transfer resources from the payers of health care services to the providers.

Term	Acronym	Definition
Provider payment system	PPS	The provider payment method combined with all supporting systems, such as information systems and accountability mechanisms, considered in the context of surrounding payment systems (e.g. for outpatient services) and referral rules.
Reserve fund		A portion of the hospital pool that is set aside and not used to calculate the base rate of the case-based payment system. The reserve fund is used to accumulate funds in surplus months and to pay for budget overruns in deficit months. Also referred to as a risk pool or contingency fund.
Retrospective payment		The payment rate for a set of services is determined after the services are delivered.
Soft budget cap		The amount of resources allocated to the health sector, or a sub-sector such as the hospital sector, which serves as a target, but providers are compensated for overruns if expenditures exceed the target in the budget period.
Top-down allocation		The proportion of total available funds allocated to a sector, or sub-sector such as the hospital, is determined administratively rather than based on the actual share of total costs.
Unbundling services		Ungrouping aggregated, or "bundled," units of health care services into individual service components (e.g. hospital discharge is ungrouped into bed-days and all tests and procedures), and charging or paying for the individual services rather than the higher level "bundled" unit.
Upcoding		The practice of assigning hospital cases to a case group that is reimbursed at a higher rate than the case group to which the case actually belongs based on the observed clinical characteristics of the case.

CHAPTER 1. INTRODUCTION

Provider payment systems can be a powerful tool to promote health systems development and achieve health policy objectives. A **provider payment method** may be defined simply as the mechanism used to transfer funds from the purchaser of health care services to the providers, and a **provider payment system** may be defined as the payment method combined with all supporting systems, such as management information systems and accountability mechanisms that accompany the payment method. In the context of health systems, therefore, provider payment systems accomplish far more than simply the transfer of resources to cover recurrent costs. The incentives that are created by the payment methods and the responses of the providers to those incentives, the management information systems to support the provider payment methods, and the accountability mechanisms established between providers and purchasers can have profound effects on the way health care resources are allocated and services are delivered.

Payment systems should further health policy objectives by encouraging access to necessary health services for patients, high quality of care, and improved equity, while at the same time promoting the effective and efficient use of resources and, where appropriate, cost containment. Provider payment systems may also lead to unintended consequences, however, such as incentives to increase the number of services provided beyond what is necessary or to reduce inputs used to provide care. Other unintended consequences of provider payment systems may include gaming of the system, cost shifting, or increased paperwork for providers. The effects of provider payment systems on the health care system vary widely depending on contextual factors, including the level of resources available for health care, the degree of competition and choice, and the opportunities and constraints facing providers to respond to incentives. The way the provider payment systems are designed and implemented, and the extent to which the contextual factors are addressed, will strongly influence how successfully the provider payment methods contribute to achieving health policy goals.

Because the hospital inpatient sector (hereafter referred to as “hospital sector” or “hospital care”) almost always consumes the greatest share of health care resources, the way hospitals are paid may have a particularly strong influence on the performance of the health care system as a whole. There are several alternative methods for paying hospitals that are used widely throughout the world, all of which have a variety of strengths and weaknesses, both in theory and in practice. There is no clear consensus about which hospital payment method is most successful in bringing about desired results

for the health care system while minimizing the unintended consequences. Some payment systems may be more appropriate for certain environments or countries at certain times, which payment system is most appropriate may change over time in any given environment or country, and often it is most effective to use more than one payment method in combination. In recent years, however, many countries have followed the lead of the U.S. Medicare system and have moved toward some variation of a **case-based payment method**, which reimburses all hospitals in the payment system a pre-determined fixed rate for each treated hospital case. Case-based payment systems have been seen as a valuable tool in a wide variety of contexts and settings for reorienting provider payment from inputs and maintaining hospital infrastructure to paying for outputs, and as a way to introduce efficiency incentives and competition into the hospital sector.

The U.S. Medicare system began reimbursing hospitals with a case-based payment method using **diagnosis-related groups** (DRGs) in 1983. Diagnosis-related groups classify each case according to the diagnosis and other characteristics of the case, and the payment rate varies according to the resource intensity of the DRG. Australia and several countries in Europe began experimenting with DRGs by 1985, and by the mid-1990s a number of countries began implementing variations of case-based payment systems for paying hospitals (e.g. Australia and Sweden), developing hospital budgets (e.g. New Zealand), or for allocating funds from central budgets to local health purchasers (e.g. Norway). More recently, a number of low- and middle-income countries have introduced case-based hospital payment systems, including Korea, Taiwan, and Hungary (Lin 2004 [42]; Kwon 2003 [40]; Kroneman and Nagy 2001 [35]; Saltman and Figueras 1997 [61]). These payment systems reflect varying degrees of complexity and refinements to account for differences in the nature of the treated cases and the resources required to diagnose and treat them, or to complete a phase of case management.

The purpose of this manual is to provide a step-by-step guide for developing appropriate and effective case-based hospital payment systems to be implemented by **health purchasers** in low- and middle-income country settings. Because of the international interest in case-based hospital payment systems and the potential relevance to conditions in low- and middle-income countries, this manual will focus exclusively on the design and implementation of case-based payment systems. Although other options for paying hospitals may be appropriate in any given country context, the design and implementation of alternative hospital payment systems is beyond the scope of this manual. Furthermore, payments made by individuals directly to hospitals, although potentially an important part of hospital payment,

will not be addressed in this manual. In order to adapt to different contextual factors within and beyond the health care system in different countries, the manual provides guidance for a range of options, from the simplest average cost per case to more complex systems based on diagnosis-related groups. The intended audience for this manual is health policymakers in low- and middle-income countries, and donor representatives or technical assistance specialists tasked with the design or implementation of health financing projects that include hospital payment reform.

The manual is based on a synthesis of international evidence and experience with the design and implementation of case-based hospital payment systems, summarizing lessons learned and consolidating specific technical recommendations. Many of the examples and illustrations are drawn from the experience in the Central Asian republics of Kyrgyzstan and Kazakhstan, where the authors have direct experience implementing health care financing reform. These countries have been implementing case-based hospital payment systems since the mid-1990s and have completed several iterations of development and refinement of their payment systems. Because the Central Asian republics inherited health care financing and delivery systems with many of the same challenges faced by health care systems in other low- and middle-income countries throughout the world, the experience in Kyrgyzstan and Kazakhstan implementing case-based hospital payment systems presented in this manual are relevant for many other countries in other regions of the world.

The manual is organized as follows: Chapter 2 discusses the characteristics of and incentives created by different hospital payment method options. Chapter 3 discusses the health policy context and goals for implementing a case-based hospital payment system and provides an overview of the components that comprise a case-based system. Chapters 4 through 6 provide technical guidelines for developing the components of a case-based hospital payment system. Chapter 4 provides a step-by-step guide for developing case groups and case group weights. Chapter 5 discusses the calculation of the base rate, and Chapter 6 provides a detailed guide to using a standard cost accounting methodology to calculate the full unit cost per hospital case, which is necessary for computing case group weights. Chapter 7 outlines parameters and guidelines for establishing a comprehensive information system for case reporting, administration of payments to hospitals, and monitoring the performance of providers and other consequences of the payment system. At the end of each of these chapters, there is a "policy choice checklist," which outlines the decision points where decisions are based on policy considerations rather than, or in addition to, technical criteria. Chapter 8 discusses general implementation issues, such as the transition to a new case-based hospital payment system and possible strategies for

counteracting the unintended consequences and responses to a case-based system. Chapter 9 provides a case study to share practical experience from the Kyrgyz Republic and Kazakhstan, respectively, in implementing different variations of a case-based hospital payment system. The case studies are meant to show the broader role of case-based hospital payment systems in a comprehensive reform program with a step-by-step implementation approach.

CHAPTER 2. OPTIONS FOR HOSPITAL PAYMENT SYSTEMS

2.1. Characterization of Provider Payment Methods

Provider payment methods may be categorized according to three characteristics:

1. Whether the price or budget that is paid to providers is *determined* prospectively or retrospectively;

2. Whether the payment to providers is *made* prospectively or retrospectively;

3. Whether the payment to providers is related to inputs used (costs) or outputs (services / outcomes) produced.

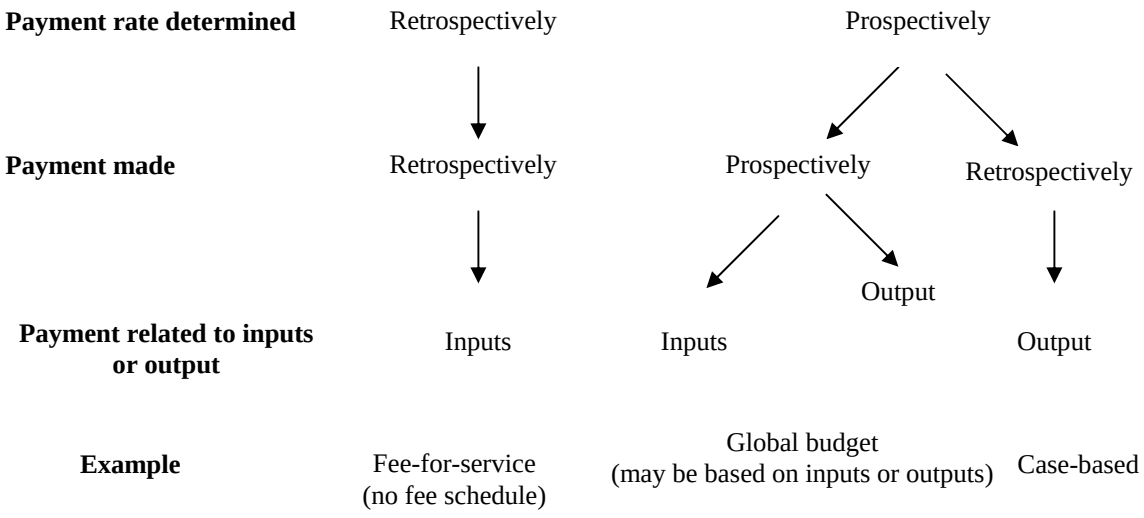
The first parameter that characterizes a provider payment method is whether payment rates for a set of services are *determined* prior to services being delivered (**prospectively**), or after services are provided (**retrospectively**). Payment rates may be set prospectively through fee schedules, regulations, or negotiation between providers and payers. Payment rates are set retrospectively if the provider is simply reimbursed the amount that is billed. If payment rates are set retrospectively and the reimbursement rates reflect the cost of providing the services, the purchaser bears all of the financial risk. If payment rates are set prospectively, and services are bundled into a package reimbursed at a fixed payment rate, some financial risk is transferred from the payer to the provider of services.

The second parameter is whether payment to the provider is *made* before or after services are delivered. If payment rates are set prospectively, payment may then be made to providers either prospectively or retrospectively. For example, in a per capita payment system, the price paid to providers to deliver a complete package of services for each individual is set prospectively, and the payment is also made prospectively. The provider receives an advance lump-sum payment for each individual covered or enrolled. In a case-based hospital payment system, however, the payment rate for each type of hospital case is set in advance, but the provider is paid after the services are delivered based on the price per case and the number of cases treated. So, the payment rate is set prospectively, but payment is made retrospectively.

The third parameter that characterizes a provider payment method is whether the payment that is made to providers is based on inputs used to provide services (i.e. the recurrent costs of providing services are financed) or outputs produced, such as cases treated, bed-days completed, or individual services provided. For example, if a provider is paid according to a budget to cover operating costs, that is an input-based payment method. The payment rates in input-based payment systems may be set prospectively or retrospectively, and similarly, payment may be made to providers prospectively or retrospectively. For example, in a line-item budget system, the payment to providers is both determined and made prospectively, but the basis of the budget is projected input use, which may be determined by past patterns of input use or regulations on the level and composition of inputs used. In the mid-1980s prior to hospital payment reform in Australia, public hospitals were paid by fixed line-item budgets based on regulations of inputs, including specification of the number and type of staff employed in the hospital and controls on non-salary expenditures (Duckett 1995 [17]).

In output-based payment systems, outputs may be defined at different levels of aggregation of services (Bodenheimer and Grumbach 1994 [5]). At the most disaggregated level, each individual service provided, including each test, procedure and consultation, is considered separately (ultimately, fee-for-service). More aggregated definitions of output include bed-days, treatment episodes, or treated cases. The most aggregated definition of output is at the per capita care level, covering all services for a person for a period of time. In output-based systems, the payment rates are determined prospectively, but payments may be made to the providers either prospectively or retrospectively. The relationship between the three parameters characterizing provider payment systems is shown in Figure 2.1.

Figure 2.1. Characterization of Provider Payment Methods



The combination of the three parameters shapes the **incentives** that are likely to be created by a provider payment method. Incentives are economic signals that direct individuals and organizations toward self-interested behavior. The idea of incentives, therefore, is based on the assumption in microeconomics that individuals and organizations attempt to optimize and take actions that further their own self-interests. All provider payment systems create economic signals, and individual providers and provider organizations respond to those signals to maximize the positive effects and/or minimize the negative effects on their income and other interests and motivations. Provider payment systems can be designed to create economic signals that lead providers to self-interested behavior that is also in the interest of the purchaser, the patients, and ideally in the interest of the health care system as a whole. Provider payment systems that are most desirable from a health care system perspective create a set of incentives that encourage providers to maintain or improve efficiency, while at the same time preserving or improving access to necessary care, equity, and quality of care.

An input-based payment method with payments both set and made prospectively, such as a line-item budget system, will stimulate providers to behave in a way that is different than if the payment method is output-based with payments set prospectively and made retrospectively, such as a case-based payment system. In payment methods in which the payment rate is determined retrospectively, it is implied that the provider's recurrent costs will be covered, and therefore there is little incentive on the provider side to decrease costs or improve productivity. When payment rates are determined prospectively, there is an incentive to reduce costs and decrease the intensity of care. A payment method that pays providers based on inputs creates the incentives to increase the number of inputs. A payment method that pays providers for outputs produced creates the incentive to increase the number of services. An output-based payment method has stronger incentives to increase the number of services the lower the level of aggregation at which services are defined as output.

The market structure, or the level of choice and competition in the system, and the ability of providers to select or refuse care to patients will enhance or mitigate the incentives created by provider payment methods. For example, per capita payment systems that are based on the number of people covered rather than services provided, with payment rates to providers both set and made prospectively, create incentives to provide fewer services or refer patients to other providers once an individual is enrolled, unless performance targets are set and monitored by the purchaser. If there is competition and choice in the system, however, providers lose financially if patients become dissatisfied and choose another provider, and therefore the incentive to under-provide services is mitigated. Providers will also have

the incentive to reduce their costs by encouraging healthier individuals to enroll for their services and discourage individuals with costlier health problems. In the context of low- and middle-income countries, however, providers are often government-owned monopolies, and effective choice is limited. Choice may be particularly limited in isolated or remote geographic areas (pockets) with only one provider available. There is therefore little opportunity for dissatisfied users to change provider and thus no competition. In such cases, the health purchaser may intervene and establish performance targets and monitor performance, for example through clinical audits, as part of the payment system.

Conversely, the provider payment system also may influence the level of competition and choice in the system. Some provider payment methods facilitate increased competition and choice, whereas others inhibit competition and choice. For example, per capita payment systems and case-based hospital payment systems create the conditions for competition and choice, because in these systems the money follows the patient. It is the next step in increasing competition to allow the patient's choice, or the patient's agent's choice, to determine to which providers the money flows. If the money follows the patient, and there is choice, providers will compete for patients, presumably with better quality of care and patient-centered services. Input-based payment systems, such as line-item budgets for recurrent costs, however, may inhibit competition and choice, because the money does not explicitly follow the patient. In some systems, however, input-based budgets have stimulated competition, because the budgets are based on the historical volume of care provided. For example, one study showed that hospital managers paid according to a line-item budget in Israel engaged in competitive strategies to attract patients, then used higher admissions and turnover rates to successfully argue for increases in the next year's budget (Chinitz and Rosen 1993 [11]). Typically, however, input-based budgets do not foster competition and lead instead to resource allocations that reflect historical patterns and political priorities, often independent of changes in utilization.

2.2. Options for Hospital Payment Methods

There are five main types of hospital service payment methods: (1) line-item budget; (2) global budget; (3) per diem (bed-day); (4) case-based; and (5) fee-for-service. The broad types of payment methods, their characteristics, and the incentives they are likely to create are outlined in Table 2.1. Within each type of payment method, there are variations that may create a different set of incentives, and the payment methods may be used in combination to enhance or mitigate the incentives that are created by each method individually.

Table 2.1 Types of Hospital Payment Methods, Characteristics and Incentives

Payment Method	Payment rate determined prospectively or retrospectively?	Payment to providers made prospectively or retrospectively?	Payment based on inputs or outputs?	Incentives for providers
Line-item budget	Prospectively	Prospectively	Inputs	Under-provide services; refer to other providers; increase inputs; no incentive or mechanism to improve the efficiency of the input mix; incentive to spend all remaining funds by the end of fiscal year
Global budget	Prospectively	Prospectively	Inputs or Outputs	Under-provide services; refer to other providers; increase inputs; mechanism to improve efficiency of the input mix
Per diem	Prospectively	Retrospectively	Outputs	Increase number of days (admissions and length of stay); reduce inputs per hospital day; increase bed capacity
Case-based	Prospectively	Retrospectively	Outputs	Increase number of cases, including unnecessary hospitalizations; reduce inputs per case; incentive to improve the efficiency of the input mix; reduce length of stay; shift rehabilitation care to the outpatient setting
Fee-for-service (fees schedule and bundling of services)	Prospectively	Retrospectively	Outputs	Increase the number of services including above the necessary level; reduce inputs per service
Fee-for-service (no fee schedule)	Retrospectively	Retrospectively	Inputs	Increase number of services; increase inputs

Source: Adapted from Kutzin 2001 and Maceira 1998

A line-item budgeting system is input-based with the payment to providers both set and made prospectively. Rules typically limit the ability of providers to transfer funds across line items, and therefore there is no incentive or mechanism to achieve the most efficient input mix. Because hospitals are not accountable for their resource allocation decisions, they do not even have the incentive to determine what the most efficient input mix would be. Once the budget is given to the hospital, there is typically little accountability for the number and quality of services provided. The level of payment is not related to output; although budgets may be adjusted in the current year to reflect changes in input use or

outputs (open-end line item budgeting), or the budget in subsequent years may be adjusted to reflect the level of inputs and outputs in previous years. Therefore, the incentives may be ambiguous, depending on the time horizon over which providers and managers respond, and the degree to which budgets are adjusted based on current or historical costs and output. If next year's budget reflects changes in costs or output, then the incentive may be to increase inputs or output in the current year to expand the budget in the future.

A global budget at the hospital level is a payment fixed in advance to cover the aggregate expenditures of that hospital over a given period to provide a set of services that have been broadly agreed upon. A global budget may be based on either inputs or outputs, or a combination of the two. For example, global budgets are determined largely on the basis of historical costs in Denmark, whereas France and Germany have incorporated measures of output, such as bed-days or cases, into global budgets for hospitals (Saltman and Figueras 1997 [61]). Ireland introduced a case-mix adjustment to global budgets for acute hospital services in 1993 (Wiley 1995 [75]). Payment to providers is both set and made prospectively, so the incentives are similar to a line-item budget system. There is flexibility to move funds across expenditure categories, however, so there is a mechanism to improve the efficiency of the input mix, although there may not be an incentive to do so. For example, the global budget system in France was found to lead to slower growth in overall hospital expenditures, but this was the result of lower volume of services rather than a reduction in the cost per service (Redmon and Yakoboski 1995 [59]).

In a per diem system, the dominant incentive is to increase the number of hospital days, increasing bed occupancy, and possibly increasing bed capacity and generally shifting outpatient and community-based rehabilitation services to the hospital setting. At the same time, there is an incentive to reduce the intensity of service provided during each bed-day. High occupancy rates are achieved through increasing hospital admissions and **average length of hospital stay** (ALOS). The incentive to increase ALOS is likely to be stronger than the incentive to increase admissions, because there is also an incentive to reduce inputs per day, and hospital days early in a hospital stay tend to be more expensive than later in the stay (Aas 1995 [1]).

The average per diem rate may be based on the total historical annual hospital costs divided by the total number of bed-days. The average per diem rate may also be adjusted to reflect characteristics of patients, clinical specialty and variations in case-mix across hospitals, and per diem rates can be dif-

ferent for different days in the hospital stay. For example, early days in the hospital stay may be paid at a higher rate than days later in the stay. These adjustments to the per diem rate affect the incentives that are created by this payment system. For example, higher payment rates for days earlier in the hospital stay may reduce the incentive to increase ALOS, but the incentive is made stronger to increase the number of admissions. Adjustments to the per diem rate based on case-mix may serve as a useful transition mechanism from a per diem payment system to a case-based payment system. In fact, a per-diem hospital payment system may be an appropriate intermediate step in the transition to a case-based system, because a per diem system is administratively simple to implement, and it can be used to begin collecting the data that are necessary to design a case-based system.

Case-based hospital payment systems simultaneously create the incentives to increase the number of cases and to minimize the inputs used on each case. Because providers have more control over resource use per case than the total number of treated cases, the latter incentive is typically stronger, and case-based hospital payment systems have been used as a mechanism to control costs and reduce capacity in the hospital sector. There is evidence worldwide of case-based hospital payment systems being associated with a reduction in the average length of hospital stay. In the U.S. Medicare system, the average length of stay fell by 15 percent in the first three years after the DRG case-based hospital payment system was implemented (Lave and Frank 1990 [41]), and researchers found that the decrease in ALOS was as much as 24 percent for some diagnoses, such as heart disease and hip fractures (Kahn et al. 1990 [33]). A decrease in the crude (unweighted) average length of hospital stay of 4.5 to 6 percent annually was observed in Kyrgyzstan after a case-based payment system was implemented (Samyshkin 1999 [64]). The observed decrease of the LOS was statistically significant mainly for chronic conditions and elective hospitalizations, while the ALOS for acute care was not significantly affected. Evidence on the effect of DRG case-based payment on the number of admissions is ambiguous. As all cases in a group are reimbursed at the same rate in a case-based system, it is beneficial for hospitals to try to avoid more costly cases, or to split expensive cases into multiple stays, both of which may create access barriers for severely ill patients. To counteract these incentives, sophisticated methods for differentiating between cases of different resource intensities, such as diagnosis-related groups, have been developed and are continuously being refined.

A principle of both per diem systems and case-based systems is that they are intended to provide payment to hospitals that reflects the average cost of producing a unit of output in an average hospital, which may be adjusted to account for regional economic conditions. This payment of average cost per

unit of output, such as a discharged case, creates the incentive to increase efficiency, whereas paying actual cost for each case would create little or no incentive for increased efficiency. It is not expected that the payment will match the costs of treating each individual patient, and an efficient hospital will generate a surplus on some cases and lose money on other cases. Pricing based on the average cost is also administratively desirable, because the variety of patient requirements is so vast and, as health systems develop, the technology for the production of health care changes so quickly that any attempt to match payment with the treatment provided to each patient would be counterproductive.

Case-based and per diem payment systems that pay a flat rate for a defined unit of output can serve to stimulate competition across hospitals, because more efficient hospitals will generate more surpluses and thus be able to compete for even more patients by investing their surplus in improving the quality of their services. On the other hand, a payment rate based on average cost per case also provides some incentive to reduce costs on more expensive cases. The incentive to reduce inputs per case and the incentives to improve quality that may be created by competition between hospitals are not necessarily contradictory, however. In Korea, for example, the average cost per hospital case declined by 14 percent on average during the pilot phase of a new case-based payment system, and some of that reduction was accounted for by more rational antibiotic use. Antibiotic use, which was considered to be excessive in Korean hospitals and contributing to increasing drug resistance, decreased by 30 percent during inpatient stays, which was only partially offset by an increase in antibiotic use before hospital admission and after discharge (Kwon 2003 [40]) .

In a fee-for-service system, the provider is reimbursed for each individual service provided. Fee-for-service provider payment systems may be either input-based or output-based. A fee-for-service system is input-based if services are not bundled, and fee schedules are not set in advance. In this case, providers are permitted to bill payers for all costs incurred to provide each service. A fee-for-service provider payment system is output-based if fees are set in advance, and services are bundled to some degree. In this case, the provider is paid the fixed fee for the pre-defined service regardless of the costs incurred to provide the service.

In a fee-for service system that has a fixed fee schedule and some **bundling** of services, there is an incentive to provide more services during the hospital stay and to reduce the inputs used to produce those services. Services that can be provided most efficiently and generate a surplus will be expanded most quickly. Fees can be set so that the prices paid to the hospitals are congruent with the costs of

producing those services, so surpluses are not excessive. In practice, however, there are numerous individual services provided by hospitals, and it is difficult, and not necessary, to obtain accurate cost information on each service. The more services are bundled, the greater the range in cost of production, and the less it is expected that the prices of the services will match the actual costs. In general, the international trend has been toward more rather than less bundling of health services. In a fee-for-service system that does not have a fixed fee schedule and bundling of services, the hospitals are reimbursed for their actual costs of providing the services, which amounts to a hospital-specific fee schedule. Input-based fee-for-service was the predominant provider payment system in the U.S. health care system prior to the advent of managed care, and the rapid cost escalation that was observed in the U.S. health care system during that time clearly reflected the incentives created by this payment system. In essence, as long as the insurer or purchaser had all the risk and was willing to pay, the costs of the health provider continued to increase. The incentives to provide more services and use more expensive inputs make this type of payment system unsustainable in most, if not all, health systems.

To choose among the options for hospital payment systems, it is necessary to first clarify the goals of the health care system and the issues that are intended to be addressed through a new hospital payment system. For example, if cost-containment is the main issue, then a payment system with incentives to reduce the volume and intensity of services provided may be most effective. In the health care systems inherited from the former Soviet Union, for example, excess hospital capacity has been a major health policy concern, and hospital payment systems that provide incentives to increase inputs, such as line item budgets and per diem systems, have been discouraged. On the other hand, if access to care is the main concern, the best strategy may be to choose a payment system that rewards more services being provided. Other criteria should also be considered, such as complexity, the administrative costs to run the system versus the benefits to be gained, the information systems that are available or that can feasibly be established, and the acceptability of new payment systems to providers and payers.

CHAPTER 3. OVERVIEW OF CASE-BASED HOSPITAL PAYMENT

3.1. Defining the Health Policy Context

A case-based hospital payment system should be designed in the context of broader health policy goals, the current capacity of the system, and the desired or expected changes in the system. The hospital payment system will likely stimulate changes in hospital care that also will be felt in other parts of the health care system. For example, if the new payment system creates incentives for shorter hospital stays, outpatient or community care must be ready to provide a greater degree of follow-up care. Therefore, planning of the new hospital payment system should include an analysis of the expected and potential unintended impacts not only within the hospital sector, but also on other parts of the health care system and community. The following questions should be addressed before a case-based hospital payment method is selected and the new system is designed:

- What is the system, organizational, and policy context of health care services?
- What are the goals of the case-based hospital payment system?
- What pre-conditions must be met and what steps are required to ensure the goals will be achieved?
- What changes, both intended and unintended, can be expected in the hospital sector and other parts of the health care system and community after the new hospital payment system is introduced?

3.1.1. Goals of a Case-Based Payment System for Low- and Middle-Income Countries

The goals of the new hospital payment system should be clarified before a new system is chosen and designed, and the goals should be consistent with broader goals related to the health financing and delivery system. Case-based hospital payment was introduced in the U.S. Medicare system with the primary goal of promoting cost containment in the hospital sector. In most low- and middle-income settings where per capita health expenditures are generally too low, however, goals related to improving management and resource use, shifting expenditures to more cost-effective services, or improving

the equity of health financing are likely to be more pressing. Goals to be supported by a case-based hospital payment system may include, for example, one or more of the following:

- Reorient the health system planners and providers to begin thinking in terms of providing health services to the population rather than creating or maintaining infrastructure (buildings)
- Create incentives for hospitals to supply higher quality services using fewer or lower cost inputs
- Introduce competition for providers and choice for patients to increase the responsiveness of the health system to patients and the population
- Allow payment by government health purchasers to private health facilities
- Drive restructuring of the health delivery system
- Re-profile or close inefficient hospitals and departments
- Improve the efficiency of resource allocation across hospitals, and between the hospital sector and other levels of care
- Improve the equity of health financing across, for example, hospitals, geographic areas, or population groups
- Generate information for better management of the health sector
- Increase provider management autonomy (in effect, decentralization of health facility-level management)

For example, in Kyrgyzstan, introducing a case-based hospital payment system was one element in a broader health financing policy that had the goal of shifting resources to the primary health care sector, streamlining the oversized hospital sector, particularly in urban areas, using resources more efficiently in the hospital sector, increasing the autonomy of hospitals to allocate their own resources, and increasing the responsiveness of the health system to patients and the population.

3.1.2. Pre-conditions for Implementation

In order for a case-based hospital payment system to reach any of the goals outlined above, certain pre-conditions must exist in the health system context. The new payment system will create new incentives for providers, so the most important pre-conditions have to do with determining the strength of the incentives that are desired and making it possible for providers to respond to them. Pre-conditions may include, for example:

- The ***capacity of the health purchaser*** must be developed to manage the new payment system, including capacity to develop and implement purchasing contracts, manage information systems and quality assurance systems, and monitor and evaluate purchasing policies. In many low- and middle-income countries, the function of health purchasing may be weak or non-existent, so not only will significant capacity-building be needed before a new hospital payment system is introduced, but the basic institutional structure and regulatory framework for health purchasing may need to be created.

- Some degree of ***pooling of health care funds*** must be established in order for the payment rate per case to be set as an average across a group of hospitals (a critical aspect of case-based payment), and for payment to actually follow hospital cases. If, for example, health financing is decentralized, and health funds are generated and disbursed at the administrative level (e.g. region or city) with no pooling across administrative units, then it is difficult to establish a consistent set of payment rates for hospital cases, and there is no opportunity for competition or reallocating funds across administrative units based on the number of treated cases. If the geographic area or group of hospitals for which health care funds are pooled is too small, the case-based hospital payment system approaches hospital-specific payment, and the incentives for efficiency will be limited.

- The ***relationship between the health purchaser and providers (hospitals) must be clearly established***, particularly between public health purchasers and private providers, including the development of contracts or other mechanisms that specify which services the providers agree to deliver and what prices the purchaser agrees to pay, which party has the authority to make which decisions, and what recourse is available to each party if the terms of the contract are not met.

- The ***conditions should be established for the appropriate degree of competition and financial risk*** that hospitals will be exposed to under the new payment system. For example, if one of the goals for the new system is to drive the restructuring of the delivery system, it may be decided that hospitals should be exposed to more competition and greater financial risk, so the new payment system leads to downsizing and closure of inefficient hospitals. Some steps may be required to determine the circumstances under which department or hospital closures will be permitted and how those decisions will be made, as well as how access to hospital care will be protected as inefficient providers exit the system.

- ***Providers must be aware of and understand the new incentives*** that will be created by the case-based hospital payment system. Substantial efforts may be needed to educate providers about the new payment system and understand which changes will be possible and necessary to do well under the new system. Providers must be aware of the possibilities for the re-profiling of services and to shift the focus of care to outpatient level to also benefit from the outpatient care payment methods.

- ***Providers must have some degree of autonomy***, or decision rights, with respect to re-organizing service delivery and managing their inputs in order to respond to the new incentives created by the new payment system. It must be decided how much autonomy providers will have regarding:[1]

    - *Staffing*: decisions about hiring and firing, remuneration and fringe benefits.

    - *Other inputs*: decisions about the quantity and type of drugs, supplies, and other inputs to use to deliver hospital care

    - *Physical assets*: decisions about disposing of existing capital stock, including buildings and equipment, or acquiring new capital

[1] Jakab, M., Preker, A., Harding, A., and Hawkins, L. (2002) [29] provide a thorough discussion of hospital autonomy and international experience with granting varying degrees of decision rights to public hospitals.

- *Organizational structure*: decisions about management structure, organization of departments and ancillary services, contracting out services, etc.
- *Output mix*: decisions about the types of services provided
- *Use of surplus revenues*: decisions about how surpluses revenues generated from efficiency gains are used.

- The ***providers must have the capacity to manage their internal resources*** under the new payment system, including accounting, billing, and information systems.

- The ***appropriate capacity and financing mechanisms must be created in other parts of the health care system*** to take on a larger share of service delivery as incentives for hospitals to decrease lengths of stay and make other changes in their services.

Legal and regulatory changes may be needed to create the pre-conditions, many of which are beyond the control of the health sector. For example, labor laws and regulations may interfere with health sector policies to grant hospitals autonomy over hiring and firing staff or setting salary levels. Or Ministry of Finance funds flow policies and procedures may restrict pooling of health care funds, reinvestment of savings, ability of providers to determine allocation of resources, or other financial management decisions. These regulatory changes may be addressed through temporary waivers in the short term, as policy dialogue and broader-based legislative reform is undertaken to achieve longer term solutions. In some contexts, the legal and regulatory challenges may be most easily addressed by changing the legal status of hospitals from public entities to some other type of enterprise, possibly, but not necessarily, privatized.

3.1.3. Anticipating Intended and Unintended Consequences of the New System

If the main pre-conditions are met and the payment system is properly designed, case-based hospital payment rewards results, and it can be expected that health care providers will examine the way they structure, organize and deliver care, motivate and supervise staff, and use resources (Eichler 2001 [20]). Profound changes in the way services are delivered are possible. As providers adjust to the system, however, they will adapt their behavior to further their own self-interests under the new system, which may also lead to some unintended consequences. The changes that are brought about by the

new payment system, both intended and unintended, will be determined by the way the system is designed and the context within which it is implemented. Table 3.1 shows some possible intended and unintended consequences of a case-based hospital payment system, as well as features that may be incorporated into the design of the system to mitigate the negative effects of unintended consequences. It should be noted that unintended consequences are not by definition negative, but whether negative or positive, they should be recognized and incorporated into a health policy framework.

Table 3.1 Possible Consequences of a Case-Based Hospital Payment System

Possible Intended Consequences	Possible Unintended Consequences	Design Features to Reduce Unintended Consequences
Shorter hospital stays	Increase in hospital admissions	Instruments for the purchaser to monitor and control volume and quality of care
More efficient use of hospital inputs	Increase in readmissions	
	Excessive reduction in intensity of care and poor quality	
	Increase in use of outpatient and community care for follow-up	Ensure capacity is adequate to increase outpatient and community care for follow-up
More efficient and effective mix of hospital services	Avoidance of high resource-intensity (severe) cases or cases with a low payment rate	Cross-subsidization across case payment rates to favor priority diagnoses and services
Better quality hospital data	Gaming of the system through upcoding, or systematically recording diagnoses that are reimbursed at higher rates than the actual diagnoses	Instrument for the purchaser to monitor coding patterns and identify upcoding trends
Closure of hospital beds, departments, and facilities	Inadequate access to hospital services in some geographic areas	Use a combination of planning and payment incentives to the achieve desired size and location of hospital infrastructure

3.2. Components of a Case-Based Payment System

In a case-based hospital payment system, the health purchaser pays all hospitals included in the payment system a fixed payment rate for each treated case that falls into one of a set of defined categories of cases. Payment rates for treated cases can be defined as the global average cost for all hospital cases, the average cost per case in each hospital department, or the average cost per case in the cate-

gory of the patient's diagnosis. The fixed payment rates are set for *a group of hospitals*, rather than for a single hospital, because implementing a new payment system for a single hospital has no inherent value and will not achieve any of the goals of a new payment system. Any underlying differences in cost across hospitals need to be addressed by the process of case grouping, or other adjustments across groups of cases or groups of hospitals, rather than by establishing hospital-specific payment rates. How a treated case is defined and the degree to which cases are differentiated to reflect different costs of treatment determine the incentives that will be created by the payment system as well as the complexity of the information and billing systems that are required to support the payment system. The objective of a case-based hospital payment system is to reimburse hospitals the average expected cost in an average-performing hospital to treat a case in a given category. The actual costs of treating individual cases will exceed the payment rate in some cases and be below the payment rate in other cases, which is the feature of the payment system that creates incentives to improve efficient hospital management. If a hospital within a system is paid its actual cost for each case, there is no reward, and therefore no incentive, to improve the efficiency of treating hospital cases. If, however, hospitals are paid an average cost per case, they have the incentive to change their cost structures so that they are able to treat more cases at a cost below the average cost and therefore generate a surplus. In this way, paying hospitals the average cost for treating a type of case stimulates competition. Hospitals that perform more efficiently than the average hospital will generate more of a surplus, which they can invest in improving the quality of their services and thus attract more patients and generate more revenue.

Case-based payment systems include a minimum of two components: (1) the set of parameters for calculating the payment rates for each type of case; and (2) an administration system (information and billing system) for hospitals to report their cases and be reimbursed by the purchaser. Case-based payment systems using diagnosis-based case groups also require an information system that computerizes the recording of cases by the hospitals and the grouping of cases into payment categories for the purchaser. The parameters for calculating the payment rate per case include at least a **base rate**, or global average cost per case, and **case group weights** to differentiate between cases with different resource intensities. The most general formula for computing payment rates in a case-based hospital payment system is shown in Equation (2.1):

$$\text{Payment per case}_i = BR * CGW_i \qquad (2.1)$$

where,

Payment per case$_i$	=	price paid by purchaser for cases in case group *i*
BR	=	base rate, or global average cost per case
CGW$_i$	=	case group weight for case group *i*

Case group weights reflect the average cost per case in a given case group relative to the global average cost per case. For example, a case group weight of 1.2 for case group X indicates that cases in case group X use on average 20 percent more resources to diagnose and treat than the average case in the payment system. In the simplest case-based payment systems that pay hospitals one global average cost per treated case, the case group weights (CGW$_i$) are all set equal to one.

Adjustment parameters, such as region-specific adjustment coefficients or facility-type adjustment coefficients, may also be added to the basic formula to determine the final payment rate for a particular case in a particular hospital. For example, a coefficient may be added to the payment per case formula to uniformly increase the payment rate to teaching hospitals or hospitals serving a disproportionate share of poor and socially vulnerable patients, or to reflect regional variations in the cost of hospital inputs, such as labor. In addition, coefficients for payment for unusually expensive cases (outliers), payment for transfers, incomplete cases, etc. can be applied to the basic formula to adjust for cost variations beyond the control of providers, reduce financial uncertainty, avoid duplication of payments, and promote equitable allocation of financing across services.

Possible Adjustment Coefficients to the Hospital Case Payment Rate

Coefficients that apply to groups of cases:

- Case group weights
- Outlier coefficients
- Transfers
- Incomplete cases

Coefficients that apply to groups of hospitals:

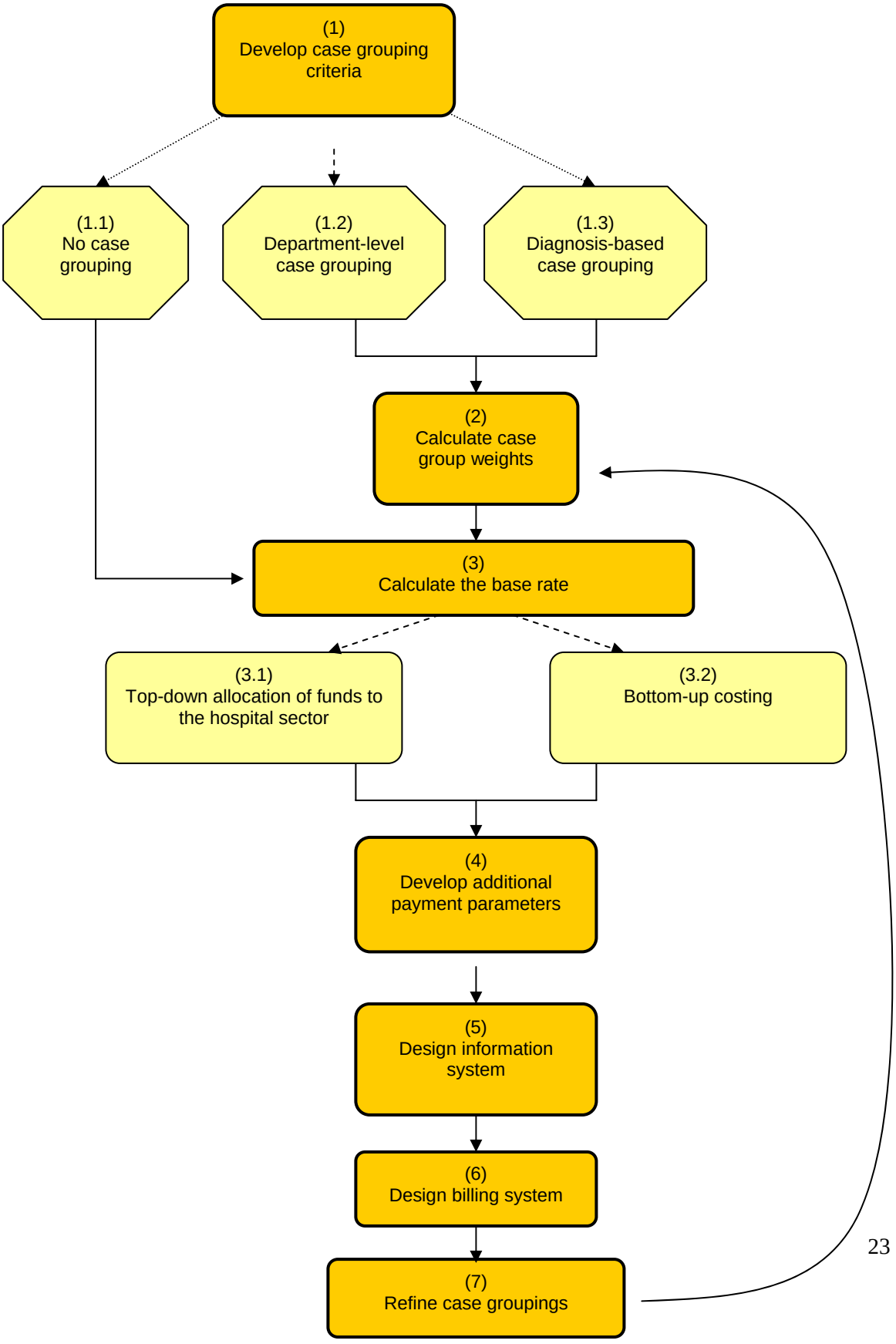
- Geographic coefficients
- Coefficients for teaching hospitals
- Coefficients related to the population served (e.g. poor and socially vulnerable)

A case-based hospital payment system that differentiates cases according to the diagnosis requires a tool to scale the level of complexity, or more precisely, resource consumption, of each case relative to the others. This tool is called the **clinical grouping of cases**, which is a set of criteria and a process for allocating hospital cases into **clinical groups** that have similar clinical characteristics and resource intensities. Case group weights are then computed for these clinical groups by calculating the cost of diagnosing and treating cases in each group relative to the average cost per case.

3.3. Steps for Designing and Developing a Case-Based Payment System

Figure 3.1 shows the steps in the process of developing each of the components of a case-based hospital payment system, which include: (1) Developing case grouping criteria; (2) Calculating case group weights; (3) Calculating the base rate; (4) Developing additional payment parameters; (5) Designing the information system; (6) Designing the billing system; and (7) Refining the case grouping. These steps are described in detail in Chapters 4, 5, 6 and 7 of this manual. Although the steps are depicted in Figure 3.1 as a sequential process, the development and implementation of a case-based hospital payment system is an ongoing iterative process of collecting and analyzing data, developing payment parameters and other components of the system, implementing the system, collecting more data through the process of implementation, monitoring system behavior and refining the system. In addition, several of the steps will be carried out simultaneously. For example, while case grouping criteria are being developed, some cost analysis should be initiated to get an idea of variation in resource intensity across cases to inform the definition of the groups. The average cost per case within each group is recalculated after the groups are defined and refined as more data become available during implementation of the payment system. Also, the development of the billing system can start simultaneously with the design of the payment system.

Figure 3.1 Steps in the Design of a Case-Based Hospital Payment System



CHAPTER 4. DEVELOPMENT OF CASE GROUPS AND CASE GROUP WEIGHTS

The case groups in a case-based hospital payment system group cases that have similar clinical characteristics and similar resource requirements for diagnosing and treating the cases, so these cases can be reimbursed at different rates. The simplest case-based payment system, which reimburses hospitals the average cost per case for all hospital cases, does not group cases into case groups. The next level of case grouping is to group cases by the department (aggregate clinical specialty) to which the case was admitted or from which it was discharged. The most sophisticated type of case grouping is grouping cases according to the diagnosis and major procedures. The level of complexity of the case-grouping that is possible is determined by the level of detail of the available cost and clinical data that are needed to compute the cost per case for each group of cases.

4.1. Data Requirements

The development of case groups and case group weights requires estimates of the cost per case for a group of cases. One way that estimates of the cost per case within a department or clinical group are obtained is by using the step-down cost accounting method discussed in detail in Chapter 6. The cost per case may be based on the average cost per bed-day in the department where a given type of case is treated, and the average length of stay for that type of case. If no data are available on costs and lengths of stay during the initial stages of developing the payment system, even at the department level, then the payment system will not be able to group hospital cases immediately, and a simple average cost per case may be used while the necessary data are being generated by the new payment system. It is also possible, however, to do a special survey of costs and average length of stay of cases in each department to develop initial estimates to begin a department-level case grouping system.

If some data are available on department-level costs and lengths of stay for some groups of cases, then a department-level case grouping system may be implemented immediately, or some hybrid of department-level case grouping and diagnosis-based case grouping. The hybrid approach was used initially in Kyrgyzstan, for example, because while detailed data on average length of stay were available for some cases, only department-level cost and clinical data were available for most cases. The case groups for the hospital payment system in Kyrgyzstan were developed in three phases, an initial phase and two refinements, as the type and amount of available data improved. The initial case grouping system was based on facility cost accounting and data available from the national health statistics sys-

tem. This data allowed the development of a hybrid of department-level and diagnosis-based case grouping with 28 case groups. These groups were split further into cases with and without a stay in the intensive care unit, so there was actually a total of 56 groups (see Box 4.1). For example, hepatitis was a separate diagnosis-based case group, because the national statistics system separated data related to this diagnosis, while all cases treated in the internal medicine department were treated as one case group, because the statistics system did not record disaggregated information on these cases.

Box 4.1

Case Groups and Case Group Weights from the Initial Case-based Hospital Payment System in the Kyrgyz Republic

0	UNCLASSIFIED	**1.0000**
1	SURGERY	**1.0585**
2	DIARRHOEAL INFECTIONS IN CHILDREN(001-009)	**0.8498**
3	DIARRHOEAL INFECTIONS IN ADULTS(001-009)	**0.6674**
4	HEPATITIS (A & B) IN CHILDREN (070)	**1.2455**
5	HEPATITIS (A & B) IN ADULTS (070)	**1.6301**
6	OTHER INFECTIONS IN CHILDREN	**1.3278**
7	OTHER INFECTIONS IN ADULTS	**1.1287**
8	INTERNAL DISEASES	**1.1111**
9	FRACTURES IN CHILDREN(820-829)	**1.1216**
10	FRACTURES IN ADULTS (820-829)	**1.3218**
11	OTHER INJURIES IN ADULTS AND CHILDREN	**0.9307**
12	UROLOGY W/ SURGERY	**0.9544**
13	UROLOGY W/0 SURGERY	**0.8236**
14	ENT W/ SURGERY	**0.8987**
15	ENT W/O SURGERY	**0.7834**
16	OPHTALMOLOGY WITH SURGERY	**1.1847**
17	OPHTALMOLOGY W/O SURGERY	**1.0209**
18	HYPERTENSION (401-404)	**0.8802**
19	CV DISEASES	**1.0706**
20	OTHER CARDIOLOGY	**1.0307**
21	NEUROLOGY	**1.0991**
22	PEDIATRIC CASES	**1.0700**
23	INTENSIVE CARE	**1.7611**
24	DELIVERY	**0.7218**
25	GYNECOLOGY	**0.6917**
26	NEONATAL PROBLEMS	**2.3235**
27	COMPLICATION OF PREGNANCY	**0.8349**
28	DAYBED CASES	**0.9000**

Actual implementation of the initial case grouping with an accompanying information system allowed the collection of much better data, including individual-level diagnosis and length of stay. During the first refinement, individual level data on 40,000 cases was used to construct a new case-grouping system with the number of groups increasing to 54 groups (108 groups with and without a stay in the intensive care unit). The second refinement was performed after the information system contained data on approximately one million cases, which resulted in a more stable case-grouping system based entirely on diagnosis with 139 case groups (Samyshkin and Lisitsin 1998 [62, 63]; Samyshkin 1999 [64]).

Cost per bed-day at the department level and individual level clinical data are necessary to design and implement a system with complete diagnosis-based case grouping. The clinical data for each case that are necessary to develop diagnosis-based case groupings include the age and sex of the patient, the **International Classification of Diseases** (ICD-9 or ICD-10) code for the primary diagnosis, the length of stay, and other details of the case, such as whether there was a surgery and whether the patient spent time in intensive care, which may be associated with the cost of treatment.

Table 4.1 Data Requirements for Case Grouping

Type of Case Grouping	Data Requirements	Data Sources
No case grouping	Average cost per hospital case	Historical hospital budgets; statistical data; other hospital expenditure and utilization data
Department-level case grouping	Department-level average cost per bed-day; department-level lengths of stay	Hospital budgets and cost accounting analysis; statistical data; other hospital expenditure and utilization data
Diagnosis-based case grouping	Department-level average cost per bed-day; individual-level diagnosis, length of stay, and other characteristics of the case	Hospital budgets and cost accounting analysis; statistical data; individual level data on age, sex, ICD-9 or ICD-10 code for the primary diagnosis, the length of stay, surgery, other characteristics of each case (intensive care)

It is unlikely that complete cost and individual level clinical data will be available when the case-based payment system is initially being designed. As part of the implementation of the case-based payment system, at whatever level of detail that is possible initially, the data systems necessary to develop case-

grouping criteria and case group weights will be put in place. As the payment system is implemented and more data become available, it will become possible to develop or refine case groups and case weights.

4.2. Types of Case-Grouping

4.2.1. No Case Grouping

The simplest case-based hospital payment system does not group cases, but pays for all hospital cases at the same rate, or the base rate.

$$\text{Payment per case} = BR \tag{4.1}$$

This type of case-based payment system is an option if no disaggregated data are available on the clinical characteristics or costs of individual hospital cases. The advantage of using no case grouping initially is that it is administratively simple, and it introduces the idea of case-based payment while the data are being collected for more sophisticated systems. A system with no case grouping should only be a starting point, however, and should not be implemented for more than one year, because reimbursing all hospital cases at the same rate creates a strong incentive for hospitals to increase admissions for low-cost cases and avoid costly cases. In Kazakhstan, for example, the newly established Mandatory Health Insurance Fund introduced a case-based hospital payment system with no case grouping in 1996. Experience showed that after only one year, there was a sharp increase in the number of treated cases, particularly of less severe cases that were "recruited" from outpatient polyclinics attached to hospitals (Katsaga 2000 [34]). To counteract this response of providers, health insurance funds in several regions of the country where new information systems were implemented as part of the new hospital payment system, such as Karaganda and Zhezkazgan regions, very quickly moved to introduce some form of case grouping. Another option when disaggregated clinical data are not available is to run a case-based system "on paper" only, without actually changing the payment to hospitals, during the time that data are being collected to design a more sophisticated system (see Chapter 8).

4.2.2. Department-Level Grouping

The next level of complexity is to group cases by the department to which the case was admitted or from which the case was discharged. Departments in a hospital are often dedicated to a broad clinical specialty, therefore department-level grouping also can be called specialty-level grouping. In a system with department-level grouping, all cases discharged from the same department or specialty group are paid the same rate.

$$\text{Payment per case}_d = BR * CGW_d \qquad (4.2)$$

where,

Payment per case$_d$	=	price paid by purchaser for cases discharged from department d
BR	=	base rate, or global average cost per case
CGW$_d$	=	case group weight for department d

Department-level grouping can be introduced even when only highly aggregated department-level data are available. If data on average length of stay are available at the department level, cost accounting data can be collected to calculate average cost per case and department-level case group weights. A set of departments must be defined that is comparable across all hospitals in the payment system, and then the average cost per case is calculated for each department. Case group weights are calculated from the cost in each department relative to the overall average cost per case (please see Section 4.4 below).

4.2.3. Diagnosis-based Case Grouping

The most sophisticated case-based hospital payment systems group cases by diagnosis, procedure/surgery, or case management approach. A case-based hospital payment system with diagnosis-based case grouping consists of a case classification system, which groups patients into different mutually exclusive (non-overlapping) categories defined by their type of diagnosis. These categories, also known as diagnosis-related groups, comprise a group of diagnoses that are both clinically cohesive and similar in the intensity of resources required to diagnose and treat a case, or to complete a phase of case management. Each category is given a relative weight based on its cost compared to the average cost for all cases. Payment to a hospital for a case is calculated as the base rate multiplied by the weight for the category to which the patient is assigned.

$$\text{Payment per case}_i = BR * CGW_i \quad (4.3)$$

where,

Payment per case$_i$	=	price paid by purchaser for cases in diagnosis-related case group *i*
BR	=	base rate, or global average cost per case
CGW$_i$	=	case group weight for diagnosis-related case group *i*

4.3. Process for Creating Diagnosis-Based Case Groups

4.3.1. Criteria for Developing Diagnosis-Based Case Groups

Case groups should be defined so that they are medically and economically homogeneous (Grimaldi and Micheletti 1982 [27]), so the definition of case groups makes sense to both clinical professionals and financing specialists. In addition, the average cost per case within a case group should be statistically stable in repeated samples. There are therefore three main principles that underlie the formation of diagnosis-related groups: (1) clinical coherence (medical homogeneity); (2) similar resource intensity (economic homogeneity); and (3) statistical representativeness.

Clinical coherence. Cases that are grouped into one diagnosis-based case group should be similar by anatomical system and belong to one group of diseases. Clinical coherence is important for the case classification system to be logical from a medical standpoint and to be understood and accepted by providers.

> A medically meaningful classification (scheme) stimulates expectations as to the natural history of the disease, the appropriate ways to manage the case, the prognosis, the likelihood of complications of specific kinds, and the risk of death. Determination of medical meaningfulness is therefore a subjective process, best accomplished by consensus of clinicians from the defined population (Wood et al. 1981 [76]).

The Australian National Diagnosis Groups (AN-DRG), for example, uses the following criteria to establish clinical coherence:

- grouping of body systems

- separation of medical and clinical cases
- hierarchy of procedures, medical problems and other factors that differentiate processes of care

*Similar cost or resource intensity***.** Each diagnosis in a diagnosis-based case group should have a similar resource intensity and cost for the range of diagnostic and treatment services needed to completely diagnose and treat the case, or complete a phase of case management. It is understood that there will be a distribution of costs within each group, but the distribution should be relatively tight. The resource intensity is estimated initially using the average length of stay and the average cost per bed-day in the department in which the case is typically treated, without costing out each service individually.

*Statistical representativeness***.** Each diagnosis-related group should contain a sufficient number of hospital cases to produce stable aggregate estimates of cost per case in repeated samples.

4.3.2. Steps for Developing Diagnosis-Based Case Groups

The process of developing mutually exclusive diagnosis-related groups that meet the above three criteria can begin when individual level data are available on the diagnosis, department, and length of stay for each hospital case, as well as the cost per bed-day in each department in each hospital. Ideally this individual-level clinical data will be available for each case treated in each hospital that will be included in the payment system, but diagnosis-based case groups also can be constructed using limited data on a subset of hospital cases. Before case groups are defined, it should be decided how surgical cases will be weighted in the payment system. There are three options for weighting surgical cases:

Option 1. A surgical case can be treated as a variation of the primary diagnosis, with a single "surgical multiplier weight" multiplied by the case group weight of the primary diagnosis in order to determine the final case group weight of each case. Under this option, the amount that surgery alters the case group weight, either upward or downward, of the primary diagnosis does not vary by case group.

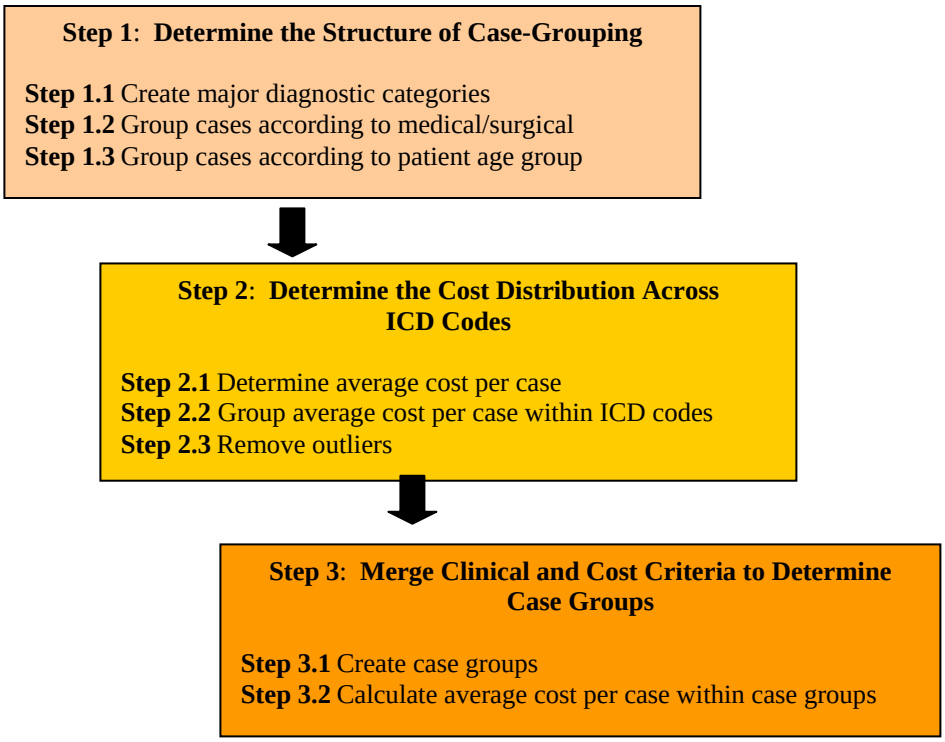
Option 2. Surgical cases can be treated as a completely separate group of cases with weights determined by the complexity of the surgical procedure. Under this option, the primary diagnosis does not determine the case group weight for surgical cases.

Option 3. A surgical case can be treated as a variation of the primary diagnosis, with surgical multiplier weights that vary by diagnosis.

Under Options 1 and 2, case groups and case group weights are developed separately for medical and surgical cases. Under Option 3, one set of case groups and case group weights is developed jointly for medical and surgical cases. Option 3 yields the most precise estimates of variation in resource intensity related to surgical procedures, but Options 1 and 2 are typical approaches when case data are limited. Option 1 was adopted in Karaganda, Kazakhstan, and Option 2 was adopted in Kyrgyzstan. Option 3 was used in the definition of DRGs under the U.S. Medicare hospital payment system.

After the option for weighting surgical cases is chosen, there are three basic steps for constructing diagnosis-based case groups, which vary slightly depending on which option for weighting surgical cases is chosen (Figure 4.1). Step 1 establishes a set of non-overlapping groups of hospital cases that are clinically homogeneous. In Step 2, the economic homogeneity criterion is applied to condense the groups into a smaller set of groups that have similar resource intensities without sacrificing clinical coherence. In Step 3, the clinical criterion and the cost criterion are merged to define the final set of diagnosis-based case groups.

Figure 4.1 Steps for Constructing Diagnosis-Based Case Groups



Step 1. Determine the structure of case grouping

Step 1.1: Create major diagnostic categories (MDC). In this step the approximately 4,000 ICD-9 or 14,000 ICD-10 codes are grouped into a smaller number of broad groups, **major diagnostic categories**, based solely on clinical criteria. Major diagnostic categories are developed taking into account the clinical coherence criterion, with the objective that each diagnosis-related group will completely fall into one of the broad categories. The broad categories may be formed according to the anatomical systems (e.g. nervous system, digestive system), or according to disease etiology (e.g. infectious or parasitic diseases). The broad diagnosis categories should conform to the ICD classes of diseases, and each should be related to a particular medical specialty, with some minor exceptions.

In the U.S. Medicare DRG system, there are 26 MDCs, and in the Australian system there are 23 MDCs (see Box 4.2), but fewer groups may be necessary in the early stages of a new system. For example, there are nine MDCs in the hospital payment system of the Korean national health insurance program (Kwon 2003[40]).

Step 1.2: Group cases according to medical/surgical. The process for determining the structure of case grouping under the three surgical grouping options is shown in Figure 4.2. Under surgical grouping Options 1 and 2, cases are divided into medical and surgical cases. A case is considered surgical if there was a significant surgical operation after admission, otherwise, the case is considered to be medical.[2] Medical cases are then grouped by the ICD code of the principal diagnosis and assigned to one of the MDCs. Surgical cases should be grouped by surgical code or procedure code if these codes are available. If surgical codes are not available, these codes can be developed, or a single code can be used initially for all cases with a surgical procedure. In Kazakhstan, the Karaganda Health Insurance Fund conducted a special study of 162,000 surgical cases to develop six groups of surgical complexity independent of the diagnosis. Under Option 3, all cases are grouped by the ICD code of the principal diagnosis and assigned to one of the MDCs. Cases are then divided into medical and surgical cases within each ICD code.

[2] What qualifies as a "significant" surgical operation will have to be determined in the local context, but may include, for example, surgical operations that require the use of an operating theater.

Box 4.2

MDCs in the Australian Refined Diagnosis Related Groups (AR-DRG) Classification

MDC 1:	Diseases and Disorders of the Nervous System
MDC 2:	Diseases and Disorders of the Eye
MDC 3:	Diseases and Disorders of the Ear, Nose, Mouth and Throat
MDC 4:	Diseases and Disorders of the Respiratory System
MDC 5:	Diseases and Disorders of the Circulatory System
MDC 6:	Diseases and Disorders of the Digestive System
MDC 7:	Diseases and Disorders of the Hepatobiliary System and Pancreas
MDC 8:	Diseases and Disorders of the Musculoskeletal System and Connective Tissue
MDC 9:	Diseases and Disorders of the Skin, Subcutaneous Tissue and Breast
MDC 10:	Endocrine, Nutritional and Metabolic Disorders
MDC 11:	Diseases and Disorders of the Kidney and Urinary Tract
MDC 12:	Diseases and Disorders of the Male Reproductive System
MDC 13:	Diseases and Disorders of the Female Reproductive System
MDC 14:	Pregnancy, Childbirth and the Puerperium
MDC 15:	Newborns and Other Neonates
MDC 16:	Diseases and Disorders of the Blood and Blood Forming Organs and Immunological Disorders
MDC 17:	Neoplastic Disorders
MDC 18:	Infectious and Parasitic Diseases
MDC 19:	Mental Diseases and Disorders
MDC 20:	Alcohol/Drug Use and Alcohol/Drug Induced Organic Mental Disorders
MDC 21:	Injuries, Poisonings and Toxic Effects of Drugs
MDC 22:	Burns
MDC 23:	Factors Influencing Health Status and Other Contacts with Health Services

Source: *Commonwealth of Australia, Department of Health and Ageing,*

Figure 4.2 **Grouping Cases According to Medical/Surgical Under 3 Surgical Grouping Options (Step 1.2)**

Option 1:

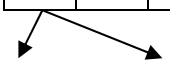
Medical Cases						Surgical Cases
MDC 1		…		MDC N		
ICD_1	ICD_2	..	..	..	ICD_n	

Option 2:

Medical Cases						Surgical Cases			
MDC 1		…		MDC N					
ICD_1	ICD_2	..	..	..	ICD_n	Surgical $code_1$	..	..	Surgical $code_N$

Option 3:

MDC 1					*MDC 2*					MDC 3					…					MDC N				
ICD_1	ICD_2	..	..	..	..	..	..	..	..	..	..	⋯	..	..	..	..	..	..	..	..	..	..	..	..	ICD_n



medical cases	surgical cases

Step 1.3: Divide cases into age groups. Divide cases according to the age of the patient if patient age influences the disease management and cost per case. Patients may be divided into two large age groups: adult (e.g. age 15 and over) and pediatric (e.g. age under 15).

Figure 4.3 Grouping Cases According to the Age of the Patient Under 3 Surgical Grouping Options (Step 1.3)

Option 1:

Medical Cases												Surgical Cases
MDC 1				…				MDC N				
ICD_1		ICD_2		..		..		..		ICD_n		
adults	children	adults	children	.	.	.	.	.	.	.	.	

Option 2:

Medical Cases												Surgical Cases					
MDC 1				…				MDC N									
ICD_1		ICD_2		..		..		..		ICD_n		$Surgical\ code_1$		..		$Surgical\ code_N$	
adults	children	adults	children	.	.	.	.	.	.	.	.	.	.	.	.	adults	children

Option 3:

MDC 1				…				MDC N			
Medical Cases		Surgical Cases		Medical Cases		Surgical Cases		Medical Cases		Surgical Cases	
adults	children	adults	children	adults	children	adults	children	adults	children	adults	children

Step 2. Determine the cost distribution across ICD codes

Step 2.1: Determine the average cost per case. Compute the cost per case for each case in the hospital case database by multiplying the length of stay for that case by the cost per bed-day in the department from which the case was discharged (See Box 4.3). This can be done by simply adding two columns to the hospital case database, which is described in detail in Chapter 7, one column for

the cost per bed-day in the department and one column that multiplies the length of stay by the cost per bed-day.

Box 4.3

Building a Case-Based Hospital Payment System:
Computing Average Cost Per Case

Let's start with individual level clinical data that are available from two hospitals, Hospital A and Hospital B. Hospital A treated five cases in ICD-9 #410 (acute myocardial infarction), three of which were treated in the internal medicine department and two in the cardiology department. The cost accounting analysis showed that the full **cost per bed-day** in the internal medicine department in Hospital A is $7/day, and the full **cost per bed-day** in the cardiology department is $10/day. Hospital B treated 7 cases in ICD-9 #410, two in the internal medicine department and five in the cardiology department. The cost accounting analysis showed that the **cost per bed-day** in the internal medicine department in Hospital B is $6/bed-day and the **cost per bed-day** in the cardiology department is $8/bed-day. The cost per individual case in ICD-9 #410 is computed by multiplying the cost per bed-day of the department of discharge by the length of stay for each case.

ICD-9 Code #410: Myocardial Infarction

Hospital	Case	Department from which case was discharged (d)	Length of stay (LOS)	Cost per bed-day in department d	Cost per case
Hospital A	1	Internal medicine	7	$7	$49
	2	Internal medicine	9	$7	$63
	3	Internal medicine	12	$7	$84
	4	Cardiology	15	$10	$150
	5	Cardiology	13	$10	$130
Hospital B	1	Internal medicine	7	$6	$42
	2	Internal medicine	8	$6	$48
	3	Cardiology	32	$8	$256
	4	Cardiology	15	$8	$120
	5	Cardiology	13	$8	$104
	6	Cardiology	12	$8	$96
	7	Cardiology	17	$8	$136
Average cost per myocardial infarction case					$106.50

Step 2.2: Aggregate Cases by ICD-10 Code. Each case in the complete hospital database is then aggregated or organized by ICD-10 Code. The primary goal of ICD-10 and ICD-9 was not to support the design and implementation of a payment system, but rather to perform comparative analysis of morbidity and mortality. In the design of payment systems, these classifications also can be convenient for payment purposes, but the level of detail available is not necessary for this application. There are approximately 4,000 ICD codes for ICD-9 and more than 14,000 for ICD-10, so it is likely that there will be many ICD codes for which there are few or no cases recorded in the hospital case database. The cost per case of ICD codes for which there are no recorded cases should be set at 0. If cases are grouped by surgical code, the cost per case in each surgical code should also be computed.

Step 2.3: Remove outliers. When the average cost per case is calculated for each main ICD code for which cases were treated, all cases with a cost more than two standard deviations above or below the average (outliers) should be discarded. The average cost per case in each ICD should be recomputed excluding the outliers (See Box 4.4). **Outliers cases**, or cases with an atypically long or atypically short length of stay for a particular case group, are discarded to keep the cost distribution within a case group tight and compute a more precise average. Eventually, however, the issue of payment for outlier cases must be addressed by the payment and quality assurance systems as they are refined (see Chapter 8).

Box 4.4

Building a Case-Based Hospital Payment System: Removing Outliers

The average cost per case for ICD-9 # 410 (myocardial infarction) cases computed in Box 3.3 is $106.50, with a standard deviation of 59.74. Two times the standard deviation is equal to 119.48. So, to compute the final average cost per case for myocardial infarction cases, we will only include those cases below $225.98 (between $106.50 + 119.48 and $106.50 – 119.48). Therefore, case #3 from Hospital B is discarded from the calculation. The average cost per case for myocardial infarction cases is recomputed as follows:

ICD-9 Code #410: Myocardial Infarction

Hospital	Case	Department from which case was discharged (d)	Length of stay (LOS)	Cost per bed-day in department d	Cost per case
Hospital A	1	Internal medicine	7	$7	$49
	2	Internal medicine	9	$7	$63
	3	Internal medicine	12	$7	$84
	4	Cardiology	15	$10	$150
	5	Cardiology	13	$10	$130
Hospital B	1	Internal medicine	7	$6	$42
	2	Internal medicine	8	$6	$48
	~~3~~	~~Cardiology~~	~~32~~	~~$8~~	~~$256~~
	4	Cardiology	15	$8	$120
	5	Cardiology	13	$8	$104
	6	Cardiology	12	$8	$96
	7	Cardiology	17	$8	$136
Average cost per myocardial infarction case					$92.91

The new average cost per case is $92.91, with a standard deviation of 38.56. Two times the standard deviation is equal to 77.12. So, in computing the final average cost per case for myocardial infarction cases, we will only include those cases between $15.79 and $170.03 (between $92.91 + 77.12 and $92.91 – 77.12). The cost per case for all of the cases in the database now falls into the acceptable range.

Step 3. Merge clinical and cost criteria to determine case groups

Step 3.1: Create diagnosis-based case groups. In this step, the clinical homogeneity criterion is combined with the resource use homogeneity criterion to group ICD codes within each MDC that are clinically coherent and have similar costs per case. All cases within each MDC should be examined together (adult and children, and medical and surgical under Option 3) to determine if there are real cost differences across these classifications. In Kyrgyzstan, for example, adult hepatitis cases were kept in a separate group from children's hepatitis cases, whereas adult ophthalmology cases were combined with children's ophthalmology cases. Ophthalmology cases with and without surgery, however, were kept in separate case groups.

Creating diagnosis-based case groups is a part of the process that is both an art and a science. Some grouping tasks can be completed using statistical analysis, while others rely on expert judgment, and many rely on a combination of the two. The cost criterion is applied empirically, which involves iterations of combining ICD codes into groups, running a cost analysis on the group to determine the cost distribution, and re-combining ICD codes to improve the distribution. While there are no clear guidelines about what the cost distribution should look like within each case group, optimally it should approach a relatively tight normal distribution. One measure of the homogeneity of costs within a group is the **coefficient of variation**.[3] The coefficient of variation measures the variation, or standard deviation, in cost among a group of patients as a percentage of the average cost for that group. Groups of ICD codes can be recombined until the coefficient of variation in each group is sufficiently small to characterize the group as homogeneous. Again, "sufficiently small" lacks a clear definition, and a tolerable coefficient of variation must be determined by the designers of the payment system. It is expected that there will be a relatively wide distribution of costs in the early stages of the system, which will become narrower over time as the case groups are refined.[4] Improvement of the system is inher-

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[3] Coefficient of variation (CV) = $\frac{\text{Standard deviation of the cost per case}}{\text{Mean cost per case}} = \frac{\sigma_{cost}}{\overline{X}_{cost}}$

[4] In the formation of DRGs under the U.S. Medicare system, case groups were formed using a computer program AUTOGRP. AUTOGRP partitioned the cases in the database into various subgroups based on diagnosis, procedures, age, sex and other variables believed to be related to resource use. Series of binary splits were used to subdivide cases, which were arranged in ascending order by length of stay. The objective of the process was to find the partitioning variables that minimized the sum of squared differences between the mean length of stay of

ent in implementation of the new payment system, as implementation generates the data that makes refinement possible. The clinical coherence criterion is applied more subjectively, and there are no clear guidelines for ensuring clinical coherence at this stage other than the final groups should make sense to local clinical specialists.

Step 3.2: Calculate the average cost per case in each case group. When the final set of case groups is determined, the average cost per case should be calculated. Outliers of two standard deviations more or less than the average should be discarded, and the final average cost per case should be calculated for each group without the outliers. It is also important to look at the actual distribution of cases in each group after the cases are split between normal and outliers (those beyond two standard deviations from the average), because the percentage of cases in the outlier group may be significant, and payment rules for the outliers may need to be established (see Chapter 8).

4.3.3. The Number of Case Groups

There is a trade-off between having a large number of case groups that include a small number of cases in each, and a small number of case groups that each includes a large number of cases. If the number of groups is large, the cost variation across cases within each group will be smaller, but the cost estimates may not be statistically stable, and the system may be administratively burdensome. In addition, the greater the number of groups, the closer the payment system comes to fee-for-service, and the efficiency incentives may decrease. On the other hand, if the number of case groups is too small, the groups will be less homogeneous, and legitimate differences in costs between cases will not be captured.

The initial case classification system should contain relatively few case groups, because patient level data are likely to be limited, and a large number of diagnosis-related groups with a few number of cases in each will not produce statistically stable cost estimates. As discussed earlier, when a case-based hospital payment system was piloted in Issyk-Kul Oblast in the Kyrgyz Republic in 1997, an initial list of 28 diagnosis-based case groups was defined. Over several years, as more hospital case

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the group and the length of stay of each individual case in the group (TSSQ):
$\min \text{TSSQ} = \sum \left(LOS_i - \overline{LOS} \right)^2$. The final DRGs reflect modifications suggested by more detailed cost data addition to length of stay.

data became available, the case groups were refined and expanded to 54 groups, then to 139 groups after further refinements. The national health insurance program in Korea had only 25 diagnosis-based case groups in 2000, three years into implementation of its DRG-based hospital payment system (Kwon 2003 [40]), and when Israel's national health insurance system introduced a case-based hospital payment system in 1990, only 15 case groups were used (Shmueli et al. 2002 [68]). Over time, as the volume of data available and administrative capacity of the system increase, it is possible to refine and increase the number of case groupings. For example, the U.S. Medicare DRG system currently has more than 500 groups.

4.4. Computing Case Group Weights

The case group weights are derived from the average cost per case in each case group calculated in Step 3.2 above, and dividing the case group cost by the global average cost per case to obtain the relative weight shown in Equation (4.4):

$$\mathrm{CGW}_i = \frac{\text{average cost per case}_i}{\text{global average cost per case}} \qquad (4.4)$$

To calculate the global average cost per case, it is necessary to first determine which hospital costs will be included in the hospital payment system, and remove all costs from the hospital expenditure data that will not be included in the reimbursable cost per case. For example, if a hospital has an outpatient department or polyclinic, any expenditures related to outpatient services should be removed from that hospital's total expenditure data. However, services provided by outpatient units to inpatients in the hospital may be included in the per-case payment, so it will be necessary to include those costs from outpatient departments. Other expenditure categories, such as capital or ambulance services should also be removed if they are not reimbursed through the case-based payment system. The global average cost per case can be then be computed by dividing the total expenditures of all hospitals included in the payment system (h) by the total number of hospital cases (sum of all cases in group i in hospital h), as shown in equation (4.5), or it can be derived from the weighted average of the cost per case in each case group, as in Equation (4.6).

$$\text{Global average cost per case} = \frac{\sum_{h}\left(\text{total expenditures}_{h} - \text{excluded expenditures}_{h}\right)}{\sum_{h}\sum_{i}\text{cases}_{i,h}\lim_{x\to\infty}} \quad (4.5)$$

or,

$$\text{Global average cost per case} = \frac{\sum_{h}\sum_{i}\left(\text{cost per case}_{i,h}\right)*\left(\text{cases}_{i,h}\right)}{\sum_{h}\sum_{i}\text{cases}_{i,h}} \quad (4.6)$$

The case group weight for group *i* is calculated as the cost per case in group *i* relative to the global average cost per case. Again, the average cost per case in hospital *h* is the cost per bed-day in the department from which the cases were typically discharged (*d*) multiplied by the average length of stay for that case group (ALOS*i*). The calculation of the case group weight for group *i* is shown in Equations (4.7) and (4.8).

$$\text{CGW}_{i} = \frac{\dfrac{\sum_{h}\left[\left(\text{cost per bed-day}_{d,h}\right)*\left(\text{ALOS}_{i}\right)*\sum_{i}\text{cases}_{i,h}\right]}{\sum_{h}\text{cases}_{i,h}}}{\dfrac{\sum_{h}\left(\text{total expenditures}_{h} - \text{excluded expenditures}_{h}\right)}{\sum_{h}\sum_{i}\text{cases}_{i,h}}} \quad (4.7)$$

or,

$$\text{CGW}_{i} = \frac{\dfrac{\sum_{h}\left[\left(\text{cost per bed-day}_{d,h}\right)*\left(\text{ALOS}_{i}\right)*\sum_{i}\text{cases}_{i,h}\right]}{\sum_{h}\text{cases}_{i,h}}}{\dfrac{\sum_{h}\sum_{i}\left(\text{cost per case}_{i,h}\right)*\left(\text{cases}_{i,h}\right)}{\sum_{h}\sum_{i}\text{cases}_{i,h}}} \quad (4.8)$$

Since the relative weight for each category is calculated by dividing the average cost for the category by the average cost for all cases, the average weight for all cases is 1.0.

Box 4.5

Building a Case-Based Hospital Payment System:
Computing Case Group Weights

Suppose there are two case groups in our payment system, **case group X** and **case group Y**. Cases in **case group X** have an average cost per case of $117, and cases in **case group Y** have an average cost per case of $45. There are two hospitals in our payment system, Hospital A and Hospital B. Last year, Hospital A treated 35 cases in **case group X,** with an average length of stay of 11 days. The average cost per bed-day in Hospital A in the department from which cases in group X are typically discharged is $9.00/day. Hospital B treated 25 cases, with an average length of stay of 14 days, and an average cost per bed-day of $10.16. Hospital A treated 15 cases in **case group Y,** with an average length of stay of 7 days. The average cost per bed-day in Hospital A is $7.50/day. Hospital B treated 25 cases, with an average length of stay of 6 days, and an average cost per bed-day of $6.80.

Suppose the global average cost per case is $90.00 per case. The **case group weight** for **case group X** is calculated as the average cost across hospitals of cases in **case group X** (summing across hospitals the cost per bed-day multiplied by the average length of stay multiplied by the number of cases in the hospital and dividing by the total number of cases in the case group) relative to the global average cost per case:

$$CGW_x = \frac{\left[\frac{(9.00)*(11)*(35)+(10.16)*(14)*(25)}{60}\right]}{90.00} = \frac{117}{90} = 1.3$$

And the **case group weight** for **case group Y**:

$$CGW_Y = \frac{\left[\frac{(7.50)*(7)*(15)+(6.80)*(6)*(25)}{40}\right]}{90.00} = \frac{45}{90} = 0.5$$

Therefore, cases in **case group X** are 30 percent **more** severe than the average case, and cases in **case group Y** are 50 percent **less** severe than the average case.

Box 4.6

"Where there are No Data"
The Kyrgyz Experience Developing Case Groups and Weights with Limited Data

The Kyrgyzstan experience demonstrates that implementing even a basic case-based hospital payment system sets in motion the process of collecting the necessary data for ongoing refinements of the payment system, and that these refinements often are demanded by the providers themselves. In the initial stages in Kyrgyzstan, only very limited data were available to develop case groups and case group weights. Patient-level clinical data were not available. The data that were available included cost accounting estimates of cost per case in each department, average length of stay for cases in each department, and average length of stay for some groups of diagnoses in each department. In the cardiology department, for example, the statistical report submitted by hospitals to the Ministry of Health included average length of stay for three groups of diagnoses:

- Hypertension in adults and children (ICD-9 #401-404)
- Cardiovascular diseases in adults and children (ICD-9 #430-438)
- All other cardiology cases

These groups of diagnoses were used as the first of case groups in the Major Diagnostic Category "Diseases and Disorders of the Circulatory System." Using the department-level cost-accounting data and the partially disaggregated average length of stay data, the following case group weights were computed:

Case Group	Case Group Weight
Hypertension in adults and children	0.88
Cardiovascular diseases in adults and children	1.07
All other cardiology cases	1.03

The providers began to understand the payment system and complained that it was unfair to combine cases that had very different costs to treat or that made no sense to group together from a clinical standpoint. For example, the providers agreed that acute myocardial infarction was much costlier to treat than other cases in the same case group, "Cardiovascular diseases in adults and children." As the payment system was implemented and data became available from the information and billing systems, the Health Insurance Fund was able to recalculate the cost per case and case weights for individual diagnoses by multiplying the average length of stay for cases in each ICD-9 group by the cost per case in the cardiology department. As a result of the new analysis, acute myocardial infarction was separated out as an individual case group, with a case group weight of 1.53, or about 50 percent more than when these cases were in the more aggregated case group.

Policy Choice Checklist for
Defining Case Groups and Calculating Case Group

- Decide on the type of case grouping (no case grouping, department-level, diagnosis-based, or a hybrid)
- Decide on the option for weighting surgical cases.
- Determine the amount of variation in cost within a case group that will be considered acceptable.
- Determine the number of case groups.
- Determine which hospital costs will be reimbursed on a per-case basis.

CHAPTER 5. CALCULATION OF THE BASE RATE

The base rate is the aggregate average cost per hospital case, which is the starting point for the set of prices per case that are developed when the base rate is multiplied by the case group weights. The base rate is an important policy variable that influences the allocation of health care resources between the hospital sector and other parts of the health care system, and the allocation of hospital resources across hospitals and regions. The base rate can be used as a tool to promote equity, for example, by increasing the base rate in areas that have been chronically underfinanced by historical budgeting processes. By including or excluding capital costs, the base rate also influences capital investment decisions by hospitals, the purchaser, or other government funders, and the overall allocation between labor and capital in the production of health care services. Therefore, the determination of the base rate is an important policy lever in a case-based hospital payment system.

5.1. Calculation of the Base Rate

In the simplest case-based hospital payment system, all hospital cases are reimbursed at the same flat rate, or the base rate. The base rate is computed from an estimate of the amount of funds that will be available to pay for hospital services for all hospitals included in the payment system in a defined geographic or administrative region, the **hospital pool**, divided by the projected total number of hospital cases across all hospitals in that region:

$$BR_t = \frac{HP_t}{\sum_h Cases_{h,\, t-1}} \qquad (5.1)$$

where,

BR_t	=	Base rate in year *t*
HP_t	=	Hospital pool in year *t*
$Cases_{h,\, t-1}$	=	Total number of cases in hospital *h* in year *t-1*

Box 5.1

Building a Case-Based Hospital Payment System:

Let's start with a case-based hospital payment system that has no case groups. Our purchaser pays two hospitals under this payment system, Hospital A and Hospital B. This year, the **hospital pool** is $10,000. Last year Hospital A treated 50 cases and Hospital B treated 50 cases. Let's calculate the **base rate**:

$$BR = \frac{\$10{,}000}{50 + 50} = \$100$$

The hospital pool serves as a ceiling on expenditures for hospital services, excluding direct out-of-pocket payments. The ceiling applies collectively to all hospitals included in the payment system, rather than for a specific hospital. The hospital pool may include funds for capital expenditures, or capital expenditures may be allocated separately. This ceiling may be a **soft budget cap**, meaning that providers are compensated for budget overruns in the hospital sector, or a **hard budget cap**, meaning that providers are not compensated and bear the financial risk for budget over-runs. Because the hospital pool is set as an aggregate pool for paying all hospitals included in the payment, the hard budget cap is determined jointly for all hospitals in a defined geographic or administrative area rather than for an individual hospital. If the hospital pool is a soft budget cap, hospital costs may increase unchecked, increasing the costs of the health care system as a whole, or crowding out expenditures in other parts of the health care system, such as primary health care, if the overall health care budget is capped but the allocation between levels of care is not.

If the hospital pool is a hard budget cap, then the construction of the base rate must also include a mechanism for maintaining **budget neutrality**, or the sustainability of the financing system. A budget neutral payment system is one that generates total payments to providers that are consistent with the level of funding in the system. In order to preserve budget neutrality, which is discussed in more detail in Section 5.3, the base rate is not computed from a simple average of resources available per hospital case, but rather from an average weighted by **case mix**, or average resource

intensity of hospital cases, which is also discussed in more detail in Section 4.3. If the hospital pool is a hard budget cap, the health purchaser must also decide how to respond to budget overruns once total payments to hospitals in the payment system reach the total amount in the hospital pool. The purchaser may simply stop paying for hospital cases that continue to be billed, stop paying for all cases except emergency cases, or some other response that maintains the budget neutrality of the payment system.

5.2. Estimating the Hospital Pool

5.2.1. Bottom-up Costing vs. Top-down Allocation to the Hospital Sector

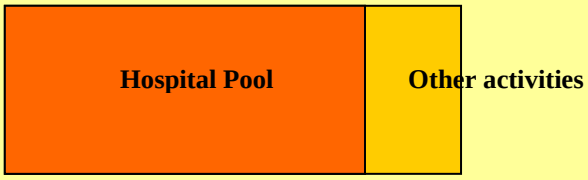
There are two main approaches to estimating the hospital pool, **bottom-up costing** and **top-down allocation** to the hospital sector. In bottom-up costing, the cost of all inputs used to provide hospital care in the most recent year(s) is added up and divided by the annual total number of hospital cases. The costs can be based on actual expenditures in the previous year or projections from historical expenditures and utilization. These methods of bottom-up costing assume that the current cost structure and overall internal resource allocation within and across hospitals are desirable, reflect the actual cost of production of services, and can and should be maintained. More complicated methods of imputing costs based on desired expenditure patterns can also be used to stimulate changes in the cost structure of hospital services.

The second approach to estimating the hospital pool is to use a top-down allocation of funds to the hospital sector. In this approach, the proportion of funds available that are to be allocated to hospital services is defined ex ante. If the hospital pool is derived from a top-down allocation from the overall health care budget, there is a clear mechanism to limit the growth of expenditures on hospital services. Using this approach, the hospital pool is typically specified as a percentage of the total health care budget, which can then be used as a policy tool to administratively direct health care resources toward or away from the hospital sector.

Box 5.2

Top-Down Estimation of the Hospital Pool as a Health Policy Tool

The hospital sector consumes the majority of health care resources in many countries. The top-down method for estimating the hospital pool is a powerful tool for priority-setting in the health sector, and it makes explicit the trade-off between expenditures on hospital services and other health sector activities. For example, if the total health sector budget is $1,000,000 a hospital pool estimated from bottom-up costing based on historical expenditures might total $750,000 or 75% of the health sector budget.

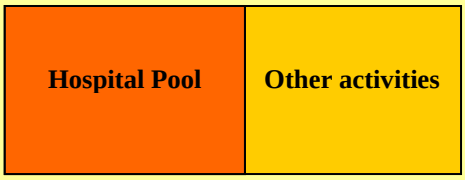


$750,000 $1,000,000

Total Health Sector Budget

If other priorities are to be adequately funded, however, the health purchaser may decide to actively limit the expenditures on hospital services by determining a top-down allocation to the hospital pool. For example, the purchaser may decide that only 50 percent of available health care resources will be allocated to the hospital sector. In that case, the base rate is calculated from a hospital pool that is determined from a top-down allocation of 50 percent of available health care resources.

Policy Tool



$500,000 $1,000,000

Total Health Sector Budget

Whichever method is used to estimate the hospital pool, the size of the pool is driven not only by the case mix, or average severity of treated hospital cases, and the resource intensity of the case management technologies, but also by historical funding patterns and policies. Particularly in low- and middle-income countries, the hospital pool may reflect under funding, either explicit or implicit, leading to chronic supply shortages or neglect of maintenance. For example, in Russia it is claimed that only about 30 to 50 percent of the financing needs to maintain the current level of technology for hospital services are met. The historical funding patterns may also reflect policies that distort hospital cost structures, such as subsidizing some services or writing off debts. Therefore, constructing the hospital pool based on historical or current funding patterns may perpetuate under financing of the hospitals or distorted cost structures. On the other hand, the process of estimating the hospital pool may be used to redress historical imbalances and distortions by, for example, reducing the projected volume of cases in exchange for a higher base rate for each case.

5.2.2. Types of Costs Included in the Base Rate

There are several options for the types of costs to include in the base rate. The base rate can include:

- all fixed costs and all variable (recurrent) costs;
- a subset of fixed costs and all variable costs;
- only variable costs; or
- only a subset of variable costs.

Including only variable costs or a subset of variable costs in the base rate initially may be a good option to gradually introduce the new payment system and give the hospital delivery system time to adapt, particularly in public systems that tend to be more rigid and introduce structural changes slowly. This was the option that was chosen for the case-based hospital payment system in Kyrgyzstan (See Chapter 8), where the base rate initially included only variable costs related to drugs, supplies, and performance-based salary bonuses. This policy choice was made to gradually address the mismatch between the funding available to the purchaser (Health Insurance Fund) and the volume of cases for which the Health Insurance Fund committed to pay. There are some costs that always should be excluded from the hospital pool and funded by a mechanism other than the case-based payment system, including research and other hospital functions that are not related to direct patient care and should be funded separately.

The reimbursement of health care institutions for capital costs has long generated a great deal of controversy and debate (Smith and Fottler 1985 [70]), because whether or not capital is reimbursed through the case-based hospital payment system will have a strong influence on investment decisions in the health sector and the capital-labor mix adopted by hospitals in the production of hospital services. If capital is included in the hospital payment system, the optimal labor-capital mix as well as the amount of reimbursement necessary to stimulate this optimal mix must be determined by the purchaser, which can be very difficult to predict. If capital is not included in the payment system, labor is treated as an operating cost and is therefore subject to limits under the payment system, whereas capital is not. If capital is reimbursed separately on a cost basis, there will be a strong incentive to substitute capital for labor. Under either option, distortions are possible in the labor-capital mix used to produce health services, although this could be partially mitigated through the use of clinical practice guidelines monitored by the health purchaser. Because of the importance of this policy decision and the lack of a clear superior alternative, the U.S. Congress delayed the inclusion of capital reimbursement in the Medicare hospital payment system and continued to pay hospitals for capital costs on a "reasonable cost" basis in the interim period while alternative proposals were being evaluated. In low- and middle-income countries, such as those of Central Asia, where the government owns and has always controlled hospital assets, the economic or opportunity cost of hospital capital assets may not appear in health care budgets as accounting costs, because depreciation is not made explicit and there is no rental or sale of buildings at a market price. In this case, there is no clear basis upon which to include capital costs in the hospital payment system.

If capital expenses are included in the case-based hospital payment system, there are three fundamental decisions:

1. Which capital expenses will be reimbursed?

2. How will capital expenses be incorporated into the base rate?

3. How can the provider use these funds?

Capital expenses can be divided into two categories: (1) expenses related to the physical plant (buildings, land, and major non-movable equipment), and (2) expenses related to major movable equipment and minor equipment. Most experts argue that the decisions about buildings (the physical plant), including facility expansion, renovation, or new facility construction should be

part of an overall health sector planning process rather than driven solely by the payment system (Smith and Fottler 1985 [70]). On the other hand, expenses related to major movable and minor equipment should eventually be included in case-based payment systems, because this capital equipment is involved in the direct provision of patient care.

If capital expenses are reimbursed through the case based payment system, there are several options for incorporating these expenses into the base rate. Capital expenses could, for example, be included as a fixed percentage of the base rate. It is also possible to link capital reimbursement with case mix. Because there is often a strong correlation between the complexity of the cases treated by a hospital and the use of equipment, hospitals with more complex cases on average could receive a proportionally higher capital allocation (Smith and Fottler 1985 [70]).

5.3. Budget Neutrality

If the hospital pool is a hard budget cap, then the hospital payment system will have to be budget neutral over a defined time period. To maintain budget neutrality, the base rate will not be a fixed parameter in the payment system but will have to be adjusted periodically. The base rate will have to be adjusted if either the total number of cases or the average severity of cases is higher than was projected for a given period, causing the total payments to hospitals to exceed the hospital pool. Alternatively, the purchaser can try to keep the base rate stable and make adjustments instead to the volume of cases. This is a potential policy for elective hospitalizations, the volume of which may be controlled by a rationing mechanism such as waiting lists.

The base rate is weighted by the estimated case mix to maintain budget neutrality. Case mix reflects the resource intensity of cases treated in a hospital or in the system as a whole defined by the complexity and intensity of services required to treat the cases. The **case mix index** is a summary measure of case mix using the average case group weight as a proxy for severity, volume of care, and resource intensity. The case mix index for a single hospital (*h*) is given in Equation (5.2):

$$\mathrm{CMI_h} = \frac{\sum_i \left(\mathrm{Cases}_{i,h}\right) * \left(\mathrm{CGW_i}\right)}{\sum_i \mathrm{Cases}_{i,h}} \qquad (5.2)$$

The case mix for the system is defined as the weighted average case mix across hospitals, as given in Equation (5.3):

$$\text{CMI} = \frac{\sum_h (\text{CMI}_h)*(\text{Cases}_h)}{\sum_h \sum_i \text{Cases}_{i,h}} = \sum_h \left[\frac{\sum_i (\text{Cases}_{i,h})*(\text{CGW}_i)}{\sum_i \text{Cases}_{i,h}} \right] * \left[\frac{\sum_i \text{Cases}_{i,h}}{\sum_h \sum_i \text{Cases}_{i,h}} \right] \quad (5.3)$$

As shown in Equation (5.4), to adjust for a variable number of cases and case mix, the base rate is calculated from the weighted average amount of funds per case available in the hospital pool, weighted by the historical resource intensity of cases in each hospital in the payment system.

$$\text{BR}_t = \frac{\text{HP}_t}{\sum_h \sum_i \left[(\text{Cases}_{i,\,h,\,t\text{-}1})*(\text{CGW}_i) \right]} \quad (5.4)$$

where,

$\text{Cases}_{i,h,\,t\text{-}1}$ = # of cases in case group *i* in hospital *h* in time *t-1*

CGW_i = case group weight for case group *i*

Rearranging terms, it is shown in Equation (5.5) that the base rate is proportional to the CMI and the total number of cases in the system:

$$\text{BR} = \frac{\text{HP}}{(\text{CMI})*\left(\sum_h \sum_i \text{Cases}_{i,h} \right)} \quad (5.5)$$

Therefore, as shown in Equation (5.6), if either the CMI or the number of treated cases is higher than projected, the base rate will need to be adjusted downward, so total payments do not exceed the hospital pool. Alternatively, the number of cases may be controlled to some extent by the health purchaser in order to maintain both a stable base rate and budget neutrality. Although there is greater uncertainty over the number of acute and emergency cases, the number of elective cases may be controlled through waiting lists, bed capacity, referral rules, or other rationing devices.

$$\text{HP} = \text{BR}*(\text{CMI})*\left(\sum_h \sum_i \text{Cases}_{i,h} \right) \quad (5.6)$$

The adjustment of the base rate should meet the dual objectives of preserving the budget neutrality of the payment system and establishing stable prices for hospital services that providers can respond to in making management and service delivery decisions. The flexibility of the base rate

during a year will depend on the flexibility of the national or regional budget system and the health purchaser. The hospital payment system is linked to the government budget cycle, and some systems may allow periodic adjustments to resources allocated to the health sector in a given year, while others may not. Furthermore, the base rate is often stipulated in a national law or regulation, so changing the rate may be a lengthy bureaucratic process, which may be outside of the control of the health purchaser.

To maintain the stability of the payment system, the base rate should be fixed for at least six months, but ideally is should not be adjusted more than once per fiscal year. The number of cases and the case mix will, however, fluctuate from month to month. The fluctuation in the volume and case mix will have random components as well as predictable seasonal variations, which should be incorporated into the process of planning the annual resource allocation and estimating the hospital pool.

In order to adjust to fluctuations in the number of cases and case mix and maintain budget neutrality, the purchaser can either establish a **reserve fund** (also referred to as a risk pool or contingency fund), or apply an **economic adjustment coefficient**, or a combination of the two. A reserve fund is a portion of the hospital pool that is set aside and not included in the calculation of the base rate. This reserve fund can be used to accumulate funds in months when there is a surplus in the hospital pool, which can then be used to cover deficits in other months. The other alternative to changing the base rate is to include an economic adjustment coefficient in the base rate formula that is under the control of the health purchaser and can be used to make minor adjustments to payment rates without changing the base rate:

$$BR = \frac{HP}{(CMI) * \left(\sum_{h} \sum_{i} Cases_{i,h} \right)} * E \qquad (5.7)$$

where,

E = economic adjustment coefficient

The economic adjustment coefficient can be used at the discretion of the purchaser to recalibrate the base rate to maintain budget neutrality following significant unanticipated changes in the number of cases, the case mix, or external economic factors, such as inflation or regional variations in the cost of resources. If the economic adjustment coefficient is not combined with a reserve fund,

it may in fact serve as a “legitimate” tool for under-funding hospital services in a possible trade-off between budget neutrality and the quality of hospital services.

In Kyrgyzstan, the Mandatory Health Insurance Fund uses a combination of a reserve fund and an economic adjustment coefficient to maintain the budget neutrality of the case-based hospital payment system. The MHI Fund estimates the hospital pool as follows (Kutzin et al. 2002 [38]):

Hospital pool = (MHIF revenue forecast) - (reserve funds) - (administrative costs) - (primary health care pool) - (funds for supplemental programs)

The MHIF forecasts the total number of hospital cases expected in the upcoming year and makes a first calculation of the base rate by dividing the hospital pool by the projected number of cases. This rate is then submitted and officially approved by the Health Reform and Health Insurance Coordination Commission under the President’s Administration (Kutzin et al. 2002 [38]). The base rate is revised periodically during the year, however, by multiplying the approved base rate by the economic adjustment factor necessary to maintain budget neutrality given the actual number of cases and the actual case mix.

Box 5.3

Building a Case-Based Hospital Payment System: Computing a Base Rate with Case Mix

Now let's add two case groups to our payment system, **case group X** and **case group Y**. **Case group X** has a **case group weight** of 1.3, and **case group Y** has a **case group weight** of 0.5. This means that cases in **case group X** cost 30 percent more to treat than the average case, and cases in **case group Y** cost 50 percent less to treat than the average case.

Last year Hospital A treated 35 cases in **case group X** and 15 cases in **case group Y**. Hospital B treated 25 cases in **case group X** and 25 cases in **case group X**.

Hospital	# Cases in Case Group X (case weight = 1.3)	# Cases in Case Group Y (case weight = 0.5)	Case mix
Hospital A	35	15	[(35)*(1.3)+(15)*(0.5)]/ [35+15] = 1.06
Hospital B	25	25	[(25)*(1.3)+(25)*(0.5)]/ [25+25] = 0.90
Total	60	40	[(1.06)*(50)+(0.90)*(50)]/ [50+50] = 0.98

Hospital A's **case mix** is 1.06, which means that Hospital A generally treats cases that are more severe than the average. Hospital B's **case mix** is 0.90, so Hospital B treats cases that are less severe than the average. Let's calculate the base rate for this year:

$$BR = \frac{\$10{,}000}{[(35)*(1.3)+(15)*(0.5)]+[(25)*(1.3)+(25)*(0.5)]} = \$102.00$$

or

$$BR = \frac{\$10{,}000}{(0.98)*(100)} = \$102.00$$

Now, suppose the case mix becomes more severe and increases to 1.2. To maintain budget neutrality, the new base rate will be:

$$BR = \frac{\$10{,}000}{} = \$83.33$$

5.4. Price Per Case

The hospital payment amount for each case is determined prospectively and consists of the base rate multiplied by the case group weight for the case group to which the case was assigned upon discharge. The final price per case shown in Equation (5.8) may vary slightly across hospitals, if the price includes adjustors, such as economic adjusters or adjustors for the type of hospital.

$$\text{Price per case}_i = \text{BR}*\text{CGW}_i*[\text{E}]*[\text{H}_t]*[\text{O}], \tag{5.8}$$

where

Price per case_i	=	price paid to hospital per case in case group *i*
BR	=	base rate
CGW_i	=	case group weight for case group *i*
E	=	economic adjustor
H_t	=	hospital adjustor for hospital of type t
O	=	other adjustors

Other adjustments may be made for particular characteristics of the case, such as for surgery if case groups are not defined for surgical cases, time in intensive care, or if the case is an **outlier**. Outliers are cases with atypically short or atypically long lengths of stay within a particular case group. The total payment that a hospital receives in the billing period is based on the number of cases that it treats and the average case mix of its cases, as shown in Equations (5.9) and (5.10):

$$\text{Total payment}_h = \sum_i (\text{cases}_{i,h})*(\text{CGW}_i)*\text{BR} \tag{5.9}$$

or

$$\text{Total payment}_h = \left[\sum_i (\text{Cases}_{i,h})\right]*[\text{CMI}_H]*\text{BR} \tag{5.10}$$

Policy Choice Checklist for
Calculation of the Base Rate

- Select method for estimating the hospital pool:
  - Bottom-up costing
  - Top-down allocation to the health sector
- Determine which types of costs will be included in the hospital pool:
  - all fixed and variable costs
  - some fixed costs and all variable costs
  - all variable costs
  - some variable costs
- Determine whether and how capital expenditures will be included in the hospital pool.
- Decide whether the hospital pool will be a hard or soft budget cap.
- If the hospital pool is a hard budget cap, determine which mechanism(s) will be used to maintain budget neutrality
  - reserve fund
  - economic adjustment coefficient
  - a combination

CHAPTER 6. STANDARD METHODOLOGY OF COST ACCOUNTING AND ANALYSIS

As discussed in Chapter 4, the creation of case groups for hospital payment requires that cases grouped into each category be both clinically coherent and of similar cost or resource intensity. A cost accounting process is used to determine the unit cost per case, which together with expert clinical opinion is then used to assign each diagnosis code to a case group. The purpose of this chapter is to describe an illustrative cost accounting process, which is used to determine the cost per case and develop the case groups for the national case-based hospital payment systems in Kyrgyzstan and Kazakhstan. The process was adapted from the Medicare Cost Reports used in the U.S. to determine costs for the federal Medicare Program providing health services for the elderly. There is a wide variety of potential cost accounting processes available, and there is no absolutely right or wrong method (Young 2003 [79]; Finkler and Ward 1999 [21]; Sheppard et al. 1998 [67]). This process was selected in Central Asia due to its simplicity, consistency, and fit with the hospital organizational structure in Kyrgyzstan.

An underlying principle of a case-based hospital payment system is worth repeating: hospitals are reimbursed not for maintaining infrastructure or building capacity but for providing services to individual patients. Unlike outpatient services where defining a discrete unit of service may be difficult, in inpatient services there is general consensus that the appropriate final unit of service is a treated case, or discharged patient, at least for acute care. The cost accounting process for hospitals, therefore, is intended to allocate all of the hospital's costs to the final unit of output and determine the cost per case for a discharged patient. It is often difficult to determine the cost per individual hospital case, however, as costs tend to be collected and aggregated by organizational units of the hospital, or hospital departments. Furthermore, hospital clinical departments, for example cardiology, generally produce the output of a discharged patient, but administrative departments such as accounting and paraclinical or ancillary departments such as laboratory also contribute to the services and costs involved in a case or discharged patient. Because the case-based hospital payment system pays hospitals based on a discharged case, the objective of the cost accounting exercise is to allocate the full costs, direct and indirect, from administrative and ancillary departments to clinical departments producing the final unit of service (discharged case) to estimate the full unit cost.

The simple cost accounting process described here accepts the assumption that the department is the lowest unit at which costs can be reliably and consistently determined (typically referred to as a cost

center). Hospital budget data showing the allocation of direct costs across departments is typically fairly accurate. Figure 6.1 shows an example of one type of worksheet that can be used to collect budget data and other data necessary for cost accounting (the "CH" terminology stands for type of budget line item and needs to be consistent with the relevant budget classification for the country). The cost accounting process determines the total costs in each clinical department by adding the direct costs of that department, the indirect costs of that department, and the allocation of costs from administrative and ancillary departments. The average cost per case of each individual case within each clinical department is then calculated by multiplying the cost per department bed-day by the length of stay (LOS) for each individual case.

The example used to illustrate a cost accounting process is the Issyk-Kul Oblast (State) Hospital in the Issyk-Kul region of Kyrgyzstan. The analysis in the Issyk-Kul Hospital completed in 1995 was used to develop the initial Kyrgyzstan case-based hospital payment system, and it was the first cost accounting analysis ever done in the health sector in Central Asia. The currency is the Kyrgyz som, the exchange rate at that time was approximately 10 som to a U.S. dollar. The average cost per bed day in the hospital was 26 som, or $2.60, and the average cost per case was 383 som, or $38.30. The cost per bed-day ranged from 17 som in the Neurology Department to 210 som in the Intensive Care Department, and the cost per case ranged from 292 som in the Otolaryngology Department to 2,004 som in the Intensive Care Department. The detailed steps in the cost accounting process used in the Issyk-Kul Hospital are outlined below.

Step 1: Standardize the Hospital Departments. To develop a case-based hospital payment system, the list of departments for all hospitals for which cost accounting data are collected needs to be standardized to ensure consistency. Even if data are only being collected from several hospitals, in effect, the data are being collected to be representative an entire system of hospitals. Hospital departments are separated into three categories:

1. **Administrative** departments: departments that provide support services to other departments, such as accounting services

2. **Ancillary** or **paraclinical** departments: departments that provide clinical services but do not discharge patients, such as laboratory and radiology services

3. **Clinical** departments: departments that discharge patients, such as the Cardiology Department

A standardized list of departments in each category should be developed to be applied to all of the hospitals included in the payment system, even if not all of the hospitals have all of the departments on the list. In this step it is important to ensure that the scope includes only inpatient costs. For example, some hospitals may have an outpatient department included in their total budget. These costs should be removed, as the case based payment system is intended only for inpatient care, and outpatient care should be reimbursed using a different payment system.

Standardizing Hospital Departments: Adapting to the Local Context

The classification of the Emergency Department in the Issyk-Kul Hospital is an example of adapting the classification of departments to the local environment. During the time the cost accounting analysis was being performed in Kyrgyzstan, patients seen in the Emergency Department could not be discharged from that department and first had to be admitted to a clinical department. As the definition of a clinical department is a department that discharges patients, the Emergency Department was classified as an ancillary department.

Box 6.1 and the cost accounting worksheet for Issyk-Kul Hospital in Figure 6.2 show the hospital department structure for the entire state. Even though Issyk-Kul Hospital is the largest hospital in the region, it does not include many of the departments or provide many types of services. As the hospitals in the Former Soviet Union, including Kyrgyzstan, were very specialized, pediatric services were provided at the Pediatric Hospital, delivery and gynecology services were provided at the Maternity Hospital, oncology services at the Oncology Hospital, tuberculosis services at the TB Hospital, and mental health and substance abuse services at the Psychiatric-Narcology Hospital. This specialization, contributing to excess capacity and fixed costs, was one of the major problems in the health delivery system and the incentives of the new hospital payment system were intended to encourage mergers and the creation of multi-profile or general hospitals.

Step 2. Determine Direct Costs for Each Hospital Department. Direct costs are costs that can be directly attributed to each department. Examples include salaries, social taxes, medicines and supplies, and food. In the Issyk-Kul hospital, direct costs for each department were available from department-level line-item budgets. In Figure 6.2, the "Direct Cost" column shows the direct costs for all departments in the Issyk-Kul hospital listed in the rows.

Box 6.1

Cost Accounting Process in Issyk-Kul Hospital Kyrgyzstan: Standardized Hospital Departments

Department Category	Department	
Administrative	Administration	Accounting
	Laundry	Kitchen
	Security	Transport
Paraclinical	Blood transfusion	Dental
	Diagnostic	Laboratory
	Operating theater	Pathology
	Pharmacy	Physiotherapy
	X-Ray	
Clinical	Cardiology	Gynecology
	Internal medicine	Infectious diseases
	Intensive Care	Maternity
	Mental health	Neonatal
	Neurology	Oncology
	Ophthalmology	Otolaryngology
	Pediatrics	Substance abuse
	Surgery	Trauma
	Tuberculosis	Urology

Step 3. Determine Allocation Basis to Allocate Indirect Costs to Each Hospital Department. Indirect costs are costs that may be difficult to attribute directly to each department. The primary example of an indirect cost is utilities. These costs are allocated to each department using a rule, or **allocation basis**. The allocation basis is intended to reflect the factors that determine a department's use of the resources included in the indirect costs. In Issyk-Kul, the initial thought was to use the space occupied by each department as the allocation basis for indirect costs, because indirect costs consisted mainly of utilities, and space is related to the amount of utility cost incurred. There were some difficult issues, however, in calculating the space for each department in each hospital in the region, and keeping the methodology simple was the overriding decision factor. Therefore, the decision was made to define the allocation basis for indirect costs as the share of the department's direct costs in the total direct costs for all departments, because the larger the share of direct costs, the more people in the department, and presumably the greater amount of space occupied.

In Figure 6.2, the "Indirect Cost" column shows the allocation to each department performed by dividing the direct costs for each department by the total costs to get that department's share in total direct

costs, then multiplying the direct cost share by the total indirect costs. For example, the indirect costs are allocated to the Administration Department as follows:

$$\text{Indirect Costs of Administration Department} = \left(\frac{\text{Administration Department Direct Costs}}{\text{Total Hospital Direct Costs}}\right)*\left(\text{Total Hospital Indirect Costs}\right) =$$

$$\left(\frac{34,669}{3,105,112}\right)*\left(793,200\right) = 8,856$$

Step 4. Determine Allocation Basis to Allocate Administrative and Ancillary Department Costs to Clinical Departments. After the indirect costs are allocated to each department, the total (direct + indirect) costs of the administrative departments are allocated to the ancillary departments. The total costs of the ancillary departments are then allocated to the clinical departments. Allocating the costs of the administrative and ancillary departments also requires an allocation basis as a proxy basis for determining what proportion of the costs of these departments should be received by other departments and ultimately allocated to each clinical department. The data needed to apply the allocation basis, or **allocation statistics**, must be collected during this step. In this step, the cost accounting process is both a science and an art. There are no perfect allocation basis and allocation statistics, so they should be selected to balance the relationship to cost and the need for a simple and consistent process. Table 6.1 shows the allocation bases and statistics that are used to allocate administrative and ancillary department costs to the clinical departments in the Issyk-Kul Hospital.

The "Basis" column shows the statistic that the department costs will be allocated upon, the "Rationale" column states why that allocation basis was chosen, the "Total" column states the total actual value of the allocation statistic, and the "Allocation Statistic" column states the figure actually used for allocation. For example, the Administrative Department costs are allocated to other departments based on the proportion of total staff each department has, as managing staff is one of the main functions of administration. The Laundry Department is allocated based on the number of bed days in each clinical department, as this is directly related to the amount of linen needed. The Laboratory Department costs are allocated to clinical departments based on the number of laboratory tests used by each department, etc. The difference between the total basis column and the allocation statistic column is that administration doesn't allocate costs to itself so 709-698=11 or the number of staff in the administration de-

partment itself. This difference is only needed for total staff, direct costs, and total costs as the other allocation statistics don't apply to the department whose costs are being allocated.

Table 6.1 Basis for Allocation of Costs of Administrative and Ancillary Departments to Cost Centers for the Issyk-Kul Hospital

Department	Basis	Rationale	Total Basis	Allocation Statistic
Administration	Total Staff	Major functional responsibility to manage staff	709	698
Accounting	Direct Cost	Most of accounting transactions are for indirect costs	3,030,533	3,019,602
Security	Total Cost	Assumes level of effort proportional to total cost	3,917,832	3,789,413
Laundry	Bed Days	Linens needed directly related to bed days in dept.	150,058	150,058
Kitchen	Bed Days	Number of meals needed directly related to bed days	150,058	150,058
Transport	Discharges	People or discharges are transported	10,179	10,179
Laboratory	Tests	Number of tests used by each clinical department	138,250	138,250
Pharmacy	Bed Days	The number of prescriptions for each clinical department was not available so number of bed days was used	150,058	150,058
X-Ray	X-Rays	Number of x-rays used by each clinical department	4,411	4,411
Diagnostic Tests	Tests	Number of tests used by each clinical department	5,634	5,634
Physiotherapy	Physiotherapies	Number of physiotherapies used by patients in each clinical department	154,953	154,953
Pathology	Deaths	Number of deaths in each clinical department	127	127
Dental	Discharges	Number of discharges in each clinical department assumes proportionate use by each patient	10,179	10,179
Blood Transfusion	Surgeries	Number of surgeries in each clinical department	2,603	2,603
Operating Theater	Surgeries	Number of surgeries in each clinical department	2,603	2,603
Emergency	# Doctors in Clinical Depts.	Assumes transfers from emergency proportional to capacity of clinical dept. measured by # of doctors	51	51
Admission	Discharges	Number of discharges in each clinical department	10,179	10,179

Step 5. Perform Step-Down Cost Accounting. Figure 6.2 visually shows why the cost allocation process is called step-down cost accounting, as costs from the administrative and ancillary departments are literally "stepped-down" as they are allocated from the administrative to the ancillary departments, then from the ancillary departments to the clinical departments. This allows calculation of a final cost per bed-day and average cost per case that includes all the costs of the hospital. The order of the departments in the rows is important, as costs are only allocated downwards. Departments providing

services to the most other departments are placed at the top of the list, so their costs can be allocated "downward" to other departments. Allocations for specific departments are described below:

1. Administration Department: The total Administration Department costs to be allocated of 43,525 som are shown in both the Administration row in total costs and above the bold-outlined box in the Administration column. The allocation statistic of 698 total staff is contained within the bold-outlined box. As all departments have staff, the allocation statistic of total staff results in a cost allocation to all departments, which is reasonable, as the Administration Department serves all departments. Allocation statistics for each department are not shown but can be calculated. For example the Accounting Department with staff of 12.5 divided by total staff of 698, multiplied by 43,525 som results in an allocation of 779 som from the Administrative Department to the Accounting Department.

2. Accounting and Security Department: The Accounting and Security Departments are allocated to the remaining departments below them in the same way as the Administration Department costs, except the costs allocated from Administration already have been added to their total cost. The total cost for the Accounting Department, above the bold-outlined box in the Accounting Department row, is now 64,608 or 63,828 + 779.

3. Laundry, Kitchen and Transport Departments: The costs of the Laundry, Kitchen, and Transport Departments are allocated to the remaining departments below them either using bed-days or discharges as the allocation basis. The costs of these departments are not allocated to the ancillary departments but directly to the clinical departments, which are generally the only departments using laundry, kitchen and transport services.

4. Laboratory and X-Ray Departments: The costs of ancillary departments, such as the Laboratory and X-Ray Departments, which provide services both to clinical departments and other ancillary departments, should be allocated first before allocating the costs of the ancillary departments that provide services only to clinical departments. The Laboratory Department costs are allocated to the other departments based on the number of tests provided to each department. Generally, Laboratory Department costs are allocated only to the clinical departments, but some ancillary departments also receive tests, such as the Emergency and Admissions Departments. The X-Ray department also provides services to

other ancillary departments, such as to the Dental, Emergency, and Admissions Departments, so X-Ray Department costs should also be allocated to these departments.

5. Other Ancillary Departments (Pharmacy, Diagnostic Test, Physiotherapy, Pathology, Dental, Blood Transfusion, Emergency, and Admissions Departments): The costs of these departments are all allocated according to the allocation statistics shown in Table 6.1. Figure 6.2 shows the impact of using the different allocation statistics. For example, the Pathology Department costs are allocated only to departments with deaths, and the Blood Transfusion Department and Operating Theater costs are allocated only to departments with surgeries.

Step 6. Determine Cost Per Bed-Day and average Cost Per Case. After allocating the costs of the administrative and ancillary departments, the bottom right side of Figure 6.2 shows the new total cost of each of the clinical departments. The department-level total cost is calculated by adding the costs allocated from each administrative and ancillary department to the individual department's total (direct + indirect) costs. Using the total number of bed-days and cases summed across the clinical departments, a total average cost per bed-day (26 som) and average cost per case (383 som) is calculated for the hospital (or the set of hospitals being analyzed).

It is important during this step to check the cost accounting worksheet for internal consistency. For example, the total cost of all departments after the cost allocation should match the total cost before allocation, which it does in this example at 3,898,312 som. The cost per bed-day and cost per case in each clinical department also should be checked to be sure they are reasonable. It is interesting that in this case, other than the Intensive Care Department, the cost per bed-day and cost per case does not vary that much across departments. This is probably attributable to the collapse in health financing that occurred in Kyrgyzstan before this analysis was completed, which substantially reduced funds available for variable costs such as supplies and drugs, which left mainly only fixed costs, which are spread relatively evenly across departments. The low variability in the total cost per bed-day and per case in this example may also be due to the administrative rules governing clinical practice at the time of the analysis, which required patients to stay in the hospital for a certain length of time. One of the beneficial aspects of implementing a case-based hospital payment system in Kyrgyzstan was that hospitals were allowed to reinvest savings from reducing fixed costs, money they would have lost under the old budget system, which was inflexibly partitioned into line items. Rationalization and reinvestment of savings then led to an increase in the availability of funds for variable costs directly related to

patient care. The new financial incentives of the case-based hospital payment system also facilitated a movement toward modernizing the content of medical practice (see Chapter 9).

Step 7. Incorporate the Cost Accounting Analysis into the Development of Case Groups. The next step is to calculate the cost per case for each individual case contained in the hospital discharge database. As described above, it is not possible or necessary to calculate the exact cost of each individual case, so it is estimated by multiplying the cost per bed-day of the department from which the patient was discharged by the actual length of stay for that case. The length of stay is contained in the hospital clinical information database (see Chapter 7), so the cost for each individual case can be calculated and then attached to the individual patient record within the database. The hospital discharge database used to construct the initial case groups in Kyrgyzstan contained about 50,000 cases. The national database now used for hospital payment in contains about 3 million cases.

As described in Chapter 4, the clinical and cost per case information is used to create the case groups and calculate the relative case-group weights. The first case groups in Kyrgyzstan were largely based on department with only a few separate groups based on diagnosis, which were separated by whether or not the patient had a stay in the Intensive Care Department. The cost accounting worksheet in Figure 6.2 clearly shows the rationale for the separation by Intensive Care Department stay. The average cost per bed-day in the intensive care department (210 som) is more than eight times the average cost per bed-day across all departments (26 som). If the hospital payment system did not account for this cost difference, the payment system would not have been fair and could have created perverse incentives, such as moving patients from the Intensive Care Department too soon.

Step 8. Continue Using Cost Accounting Analysis for Management Accounting. In addition to the contribution to the system level case based hospital payment system, the cost accounting process also has considerable value as a tool to improve management at the facility level. This is particularly true in formerly centralized health systems in which each provider institution is paid a fixed budget, and there is not a lot of facility-level autonomy.

Before implementation of a new provider payment system, the hospital can use the cost accounting process to identify and answer questions such as why is the cost of the Neurology Department significantly lower than other medical departments? Or what is the nature of the relationship between surgery and medical departments? After implementation of a new case based provider payment system,

the hospital can use cost accounting to match the payment with costs of each department in order to assess financial condition and identify where increases in productivity or efficiency are needed.

Figure 6.1 Illustrative Line-Item Budget by Department for the Issyk-Kul Hospital

	CH1	CH2	CH3_TOTAL	CH4	CH9	CH10	CH12	CH14	CH16	CH18	TOT_STAFF	DOCS	NURSES	SURGERIES	X_RAYS	LABS	BAC_LABS	PHYSIOTHER	ENDOSCOPY	ULTRA_SND	EKG	BEDDAYS	DISCHARGES	DEATH
Administration	25776	8893									10.5	4.5	5		0	0	0	0	0	0	0			
Accounting	37800	13041									12.5				0	0	0	0	0	0	0			
Security	12096	4173									8				0	0	0	0	0	0	0	0	0	
Laundry	23832	8222									17.5				0	0	0	0	0	0	0		0	
Kitchen	21384	7377									19.5	0.5	2		0	0	0	0	0	0	0	0	0	
Transport	51924	17913									17.5				0	0	0	0	0	0	0	0	0	
Laboratories	139824	48239									47.75	13.5	25 8		0	139978	19068	0	0	0	0	0	0	
Pharmacy	25116	8665									11		5		0	0	0	0	0	0	0	0	0	
X-Ray	32052	11052									11	3	6 5		4529	0	0	0	0	0	0	0	0	
Endoscopy and Diagnos ic	30094	10382									12	5	5		0	0	0	0	2295	1810	2714	0	0	
Physio herapy	68292	23560									28	2.75	18 3		0	0	0	154953	0	0	0	0	0	
Pathology	29079	10032									11	3.5	4 5		0	0	0	0	0	0	0	0	0	
Dental	8077	2786									3	1	1		0	0	0	0	0	0	0	0	0	0
Blood transfusion	68900	25500				95500					39	9	16	0	0	0	0	0	0	0	0	0	0	0
Operating Theater	80268	27692									31.25	6.5	13 3	0	0	0	0	0	0	0	0	0	0	0
Emergency	85212	29398									30.5	8.5	16	0	2144	0	0	0	0	0	0	0	0	0
Admission	52428	18088									24	5	6	0	99	0	0	0	0	0	52	0	0	0
Surgery	71437	24645			75411	55270	10170	3866			40	3.5	19 5	1221	99	13490	1059	10486	418	378	242	21156	1620	16
Traumatology	104176	24645			80248	46424	10170	3866			53	8.75	25	468	1465	12847	785	23667	48	39	50	18981	1304	5
Urology	50754	17510			57969	24555.7	7627	2900			28	2.75	14	148	234	11793	5231	22948	87	351	150	15564	1115	0
Otolaryngology	61000	21000			54248	13587.7	5085	1933			25.5	3	11	546	55	5721	866	15264	18	26	32	14364	1216	0
Ophthalmology	38468	13271			36103	13554.8	5085	1933			21	2.5	9 5	220	33	2984	602	11368	9	0	16	9555	550	0
Therapy (Internal Medicine)	78590	27113			78371	33084.5	10170	3866			45	4.25	19 8	0	144	19943	6119	24856	636	263	64	20990	1125	3
Cardiology	87067	30038			77789	36632.2	10170	3866			47	5.5	26	0	30	18356	391	22619	482	195	1610	20767	1154	16
Neurology	34028	11740			42138	13448.1	5085	1933			17	1.5	7	0	34	4455	169	23745	51	46	148	11661	606	1
Infectious Diseases	98394	33945			58014	29137.4	10170	3866			55.5	4.5	27	0	11	9104	2493	0	88	48	14	15267	1305	8
Intensive Care	97034	33477			6610	48587.4	847	322		0	42.75	14.25	21	0	63	21182	660	0	18	9	46	1753	184	78
TOTALS	**1,513,102**	**512,397**	**727,600**	**8,900**	**566,901**	**409,782**	**74,579**	**28,351**	**23,200**	**33,500**	**709**	**113**	**304**	**2,603**	**4,411**	**119,875**	**18,375**	**154,953**	**1,855**	**1,355**	**2,424**	**150,058**	**10,179**	**127**

Figure 6.2 Illustrative Step-Down Cost Allocation for the Issyk-Kul Hospital

Departments	Issyk-Kul State Hospital	Direct cost	Indirect cost	Total Costs	Administration	Accounting	Security	Laundry	Kitchen	Transport	Laboratories	Pharmacy	X-Ray	Diagnostic Tests	Physiotherapy	Pathology	Dental	Blood Transfusion	Operating Theater	Emergency	Admission	Total cost of Department	# Beddays	Average Cost per Bedday	# Cases
					43,525																				
Administrative	Administration	34,669	8,856	43,525	698	64,608																			
	Accounting	50,841	12,987	63,828	779	3019602	21,272																		
	Security	16,269	4,156	20,425	499	348	3770533	42,246																	
	Laundry	32,054	8,188	40,242	1,091	686	227	150,058	38,143																
	Kitchen	28,761	7,347	36,108	1,216	615	204	0	150,058	90,757															
	Transport	69,837	17,840	87,677	1,091	1,494	495	0	0	10,179	244,436														
Paraclinical or Ancillary	Laboratories	188,063	48,041	236,104	2,976	4,024	1,332	0	0	0	147,063	44,058													
	Pharmacy	33,781	8,629	42,410	686	723	239	0	0	0	0	150,058	56,028												
	X-Ray	43,104	11,011	54,115	686	922	305	0	0	0	0	0	4,477	52,716											
	Diagnostic Tests	40,476	10,340	50,816	748	866	287	0	0	0	0	0	0	5,634	119,677										
	Physiotherapy	91,852	23,464	115,316	1,745	1,965	651	0	0	0	0	0	0	0	154,953	50,901									
	Pathology	39,111	9,991	49,102	686	837	277	0	0	0	0	0	0	0	0	127	14,960								
	Dental	10,863	2,775	13,638	187	232	77	0	0	0	0	0	826	0	0	0	10,179	246,249							
	Blood Transfusion	189,900	48,510	238,410	2,431	4,063	1,345	0	0	0	0	0	0	0	0	0	0	2,603	140,561						
	Operating Theater	107,960	27,578	135,538	1,948	2,310	765	0	0	0	0	0	0	0	0	0	0	0	2,603	181,435					
	Emergency	114,610	29,277	143,887	1,901	2,452	812	0	0	0	5,551	0	26,831	0	0	0	0	0	0	51	102,856				
	Admission	70,516	18,013	88,529	1,496	1,509	499	0	0	0	9,097	0	1,239	487	0	0	0	0	0	0	10179				
Clinical	Surgery	240,799	61,512	302,311	2,493	5,152	1,706	5,956	5,378	14,444	24,182	6,212	1,239	9,712	8,099	6,413	2,381	115,509	65,933	12,575	16,370	606,064	21,156	29	1,620
	Traumatology	269,529	68,851	338,380	3,304	5,767	1,909	5,344	4,825	11,627	22,658	5,573	18,334	1,282	18,279	2,004	1,917	44,274	25,272	31,437	13,177	555,360	18,981	29	1,304
	Urology	161,316	41,208	202,524	1,745	3,452	1,143	4,382	3,956	9,941	28,296	4,570	2,928	5,502	17,724	0	1,639	14,001	7,992	9,880	11,267	330,941	15,564	21	1,115
	Otolaryngology	156,854	40,068	196,922	1,590	3,356	1,111	4,044	3,651	10,842	10,948	4,217	688	711	11,789	0	1,787	51,653	29,484	10,778	12,287	355,859	14,364	25	1,216
	Ophthalmology	108,415	27,695	136,109	1,309	2,320	768	2,690	2,429	4,904	5,960	2,805	413	234	8,780	0	808	20,812	11,880	8,982	5,558	216,761	9,555	23	550
	Internal Medicine	231,194	59,059	290,253	2,805	4,947	1,637	5,909	5,335	10,031	43,318	6,163	1,802	9,011	19,197	1,202	1,653	0	0	15,269	11,368	429,901	20,990	20	1,125
	Cardiology	245,562	62,729	308,291	2,930	5,254	1,739	5,847	5,279	10,289	31,160	6,097	375	21,399	17,470	6,413	1,696	0	0	19,760	11,661	455,659	20,767	22	1,154
	Neurology	108,372	27,684	136,056	1,060	2,319	768	3,283	2,964	5,403	7,686	3,424	425	2,292	18,339	401	891	0	0	5,389	6,123	196,822	11,661	17	606
	Infectious Diseases	233,526	59,654	293,181	3,460	4,997	1,654	4,298	3,881	11,635	19,276	4,482	138	1,404	0	3,206	1,918	0	0	16,167	13,187	382,883	15,267	25	1,305
	Intensive Care	186,877	47,738	234,615	2,665	3,998	1,324	494	446	1,641	36,304	515	788	683	0	31,262	270	0	0	51,197	1,859	368,061	1,753	210	184
	Pediatric	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Delivery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Gynecology	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Neonatal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Substances Abuse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Mental Health	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Oncology	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	TB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
TOTALS		**3,105,112**	**793,200**	**3,898,312**	**43,525**	**64,608**	**21,272**	**42,246**	**38,143**	**90,757**	**244,436**	**44,058**	**56,028**	**52,716**	**119,677**	**50,901**	**14,960**	**246,249**	**140,561**	**181,435**	**102,856**	**3,898,312**	**150,058**	**26**	**10,179**

CHAPTER 7. INFORMATION SYSTEMS TO SUPPORT PAYMENT SYSTEMS

A case-based hospital payment system requires information and billing systems for hospitals to record the information about each case to be used by the purchaser to determine the payment rate, and to document the billing and payment process. In addition, the health information systems that support case reporting and billing should support improved management at both the provider and purchaser levels, including information that can be used by providers to improve their resource allocation and service delivery, and information that can be used by purchasers to improve quality assurance systems, resource use, and overall management of the health system. The purpose of this chapter is to describe the operational aspects of the health information systems needed to support the design, development and implementation of a case-based payment hospital system. The health information system of the Mandatory Health Insurance Fund (MHIF) of Kyrgyzstan is used to illustrate the structure, elements and operational procedures of the health information system.

The health information system described in this section focuses on the process of hospitals billing the purchaser for treated cases, but the data and information that are generated through the billing process also feed the systems that are used to manage health services delivery, resource allocation, and purchasing. These information systems should, therefore, be integrated into a larger health information system framework although this is not discussed as it is beyond the scope of this manual.

The health information system to support the development and implementation of the case-based hospital payment system should both support the goals of the new provider payment system and fit into and be compatible with the overall information system structure in the national health care system, which can be separated into three levels:

- **Datasets integrated and maintained at the national level** to form an information infrastructure, such as a national provider database, physician databases, clinical codebooks and health information standards, particular disease registers, drug classification system, strategic management and analytical information, etc.

- **Data collected and maintained at the regional level**, such as national population register(s), regional hospital and physician databases, financial reports, routine medical statistics, and quality management data.

- **Data collected and maintained at the health provider level,** including service delivery data, provider-level financial data, population enrollment detail and patient databases, and internal quality management data.

There are two main components of a basic information system to support the development and implementation of a case-based hospital payment system, both of which are established at both the provider and the purchaser level:

- **Hospital case database**, including basic discharge information about each hospital case at each hospital included in the payment system; and

- **Financial database**, including cost accounting and expenditure information.

The hospitals submit the information about their treated cases (discharge forms) to the purchaser, and the purchaser calculates and transfers payment to providers. In the simplest case-based hospital payment systems, the billing system can be a paper system without the use of computers. In the more complicated or diagnosis-based case-based hospital payment systems, or using the billing system to monitor trends in case mix and refine the case grouping and case weights requires a computerized information and billing system. The information system developers should work closely with the purchaser and regulators to make sure that the information flow follows the cycle of health service purchasing, and to develop accounting reports and relevant processes and flows of documents that generate the required information in the most useful way and that are compatible with existing regulations.

The information system should support billing and payment calculations, but should also generate routine statistical reports that can be used for planning, quality assurance, hospital management, and other purposes. Implementation of the case-based hospital payment system requires a relatively small volume of data, including the disease code (ICD-9 or ICD-10) of the principal diagnosis, a surgical operation code, patient's age, admission date, discharge date, and basic accounting information in the financial database. Nevertheless, when developing the information system, wider uses for the databases should be taken into account. Moreover, developing a particular information subsystem must fit in the national health information strategy and system architecture (standards). In Kyrgyzstan, for example, one of the reasons the development of the information system and operational procedures

of the hospital payment system were successful is because the information systems development was integrated and institutionalized within the overall Ministry of Health and MHIF systems. The information systems development was also used as a mechanism to build human resources capacity. The design of the information system should support such functions as internal health services delivery and management decision making processes, a quality monitoring and quality assurance system, and computerization of health sector statistical reports.

7.1. Hospital Case Database

The hospital case database system includes three core modules:

(1) hospital level data entry and case grouping;

(2) data transfer between providers and the purchaser; and

(3) the billing/payment system.

Each of the modules should be installed at both the provider and the purchaser level. At the provider level, the system is used to enter the data on discharged cases and to estimate the volume of activity and anticipated payment. At the purchaser level, the system receives case discharge data from all the hospitals in the region and calculates payment to the hospitals. Figure 7.1 shows the flow of information between the hospitals, the health purchaser, and the national health statistics system.

7.1.1. Data Entry Module

The data entry module supports hospital-level data entry for all discharged patients. The data entry module is based on the hospital discharge form that is standardized nationally and approved by the health purchaser. The data entry module should be compliant with the relevant national health information standards (which can include ICD-9 and/or ICD-10 diagnosis classification, national surgical procedure coding, etc.). The module design may also allow verification of information, such as the eligibility status of patients (e.g. insurance enrollment), to maintain the consistency and integrity of data.

The main data entry form for the hospital case database is the discharge summary form that is filled out at the time of a patient's discharge. In many instances the existing discharge forms that are filled

for statistical purposes can be adapted to the needs of the payment system. The developers of the patient administration system should make sure that the flow of information and activities in the hospital are optimal and there is no fragmentation of systems and duplication of paperwork for providers. These goals are usually achieved through appropriate procedures for information systems development and commissioning. The form should be designed to make data entry and processing efficient at each stage through process mapping and optimization. A sample hospital discharge data entry form used in the Kyrgyz Republic is shown in Figure 7.2.

The basic principles for data entry programs should be followed in designing the hospital database data entry interface. Data entry systems must be compliant with the national health information standards and other procedures that may be required by law. At the design phase, rules should be established for data that can only be retrieved from national/regional databases and data elements that can be generated in hospital (e.g. personal data for patients who are not found in the enrollment or any patient list available to hospital). In some sophisticated systems, and with the advance of information technology, some data may be maintained by the health purchaser and accessible to the providers via the internet. For example, the national health purchaser in Turkey maintains all of the databases relevant to health insurance payments at the national level, which large institutional providers and small vendors such as pharmacies can access from their web-based interface. Pharmacies can verify patient identity and eligibility by logging on to the webpage of the purchaser, where the eligibility of each person to receive particular drugs is listed. It is recommended that information not be entered if it can be generated from existing data in the database. For example, there is no need to enter patient's age if the date of birth was entered, or the number of bed-days if the dates of admission and discharge are entered. It is also recommended to minimize the amount of subjective information that cannot be used to directly support the objectives of the system or to generate further meaningful information.

The data entry program should be developed to include verification functions to minimize errors during data entry. Examples of some possible checks may include:

- Verification of date of birth information;
- Verification of entry of hospitalization and discharge dates;

Relationship of the patient's age and sex to specific diagnosis, for example, a gynecology diagnosis should correspond only to women.

Figure 7.1 Information Flow in the Hospital Case Database System

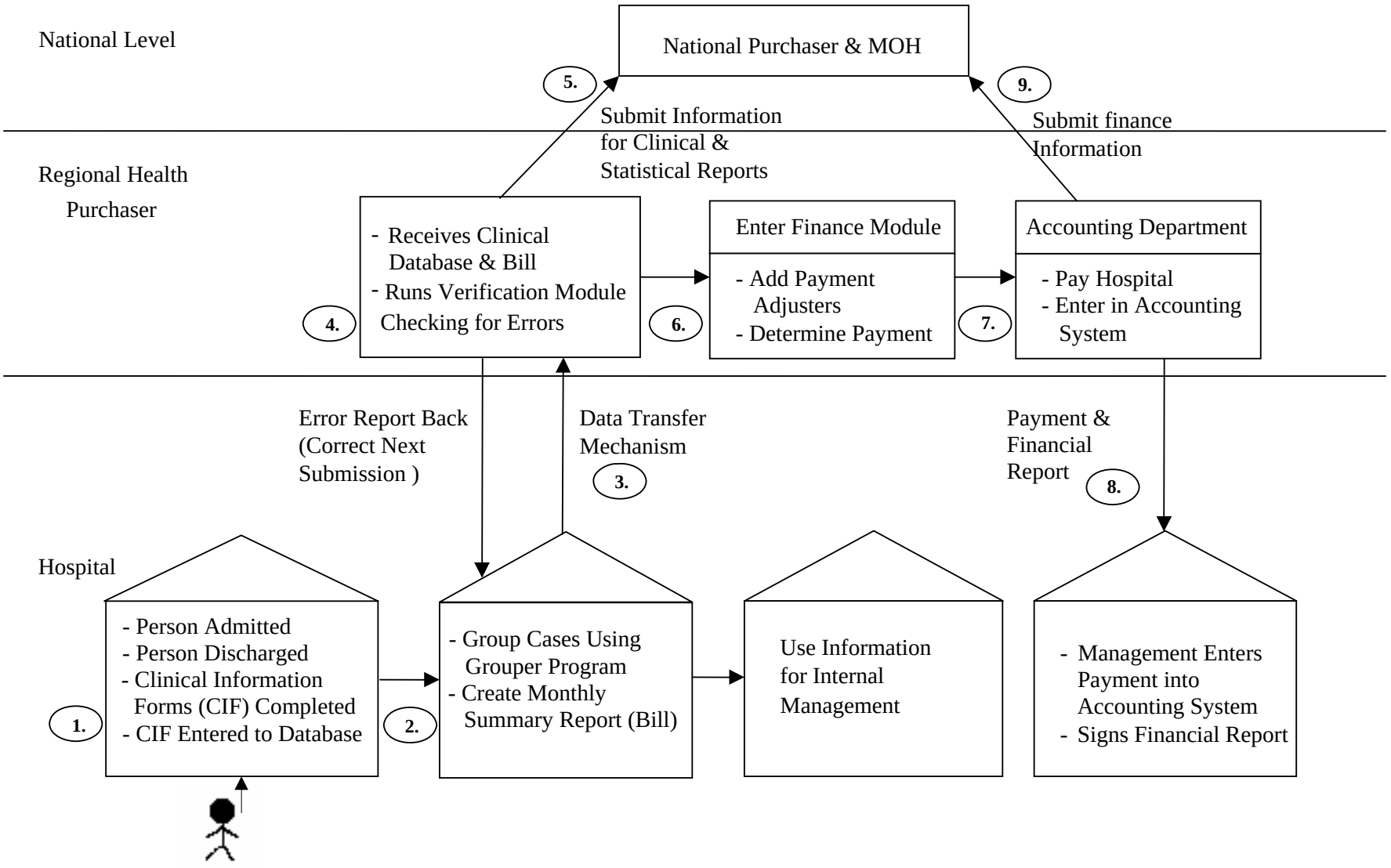
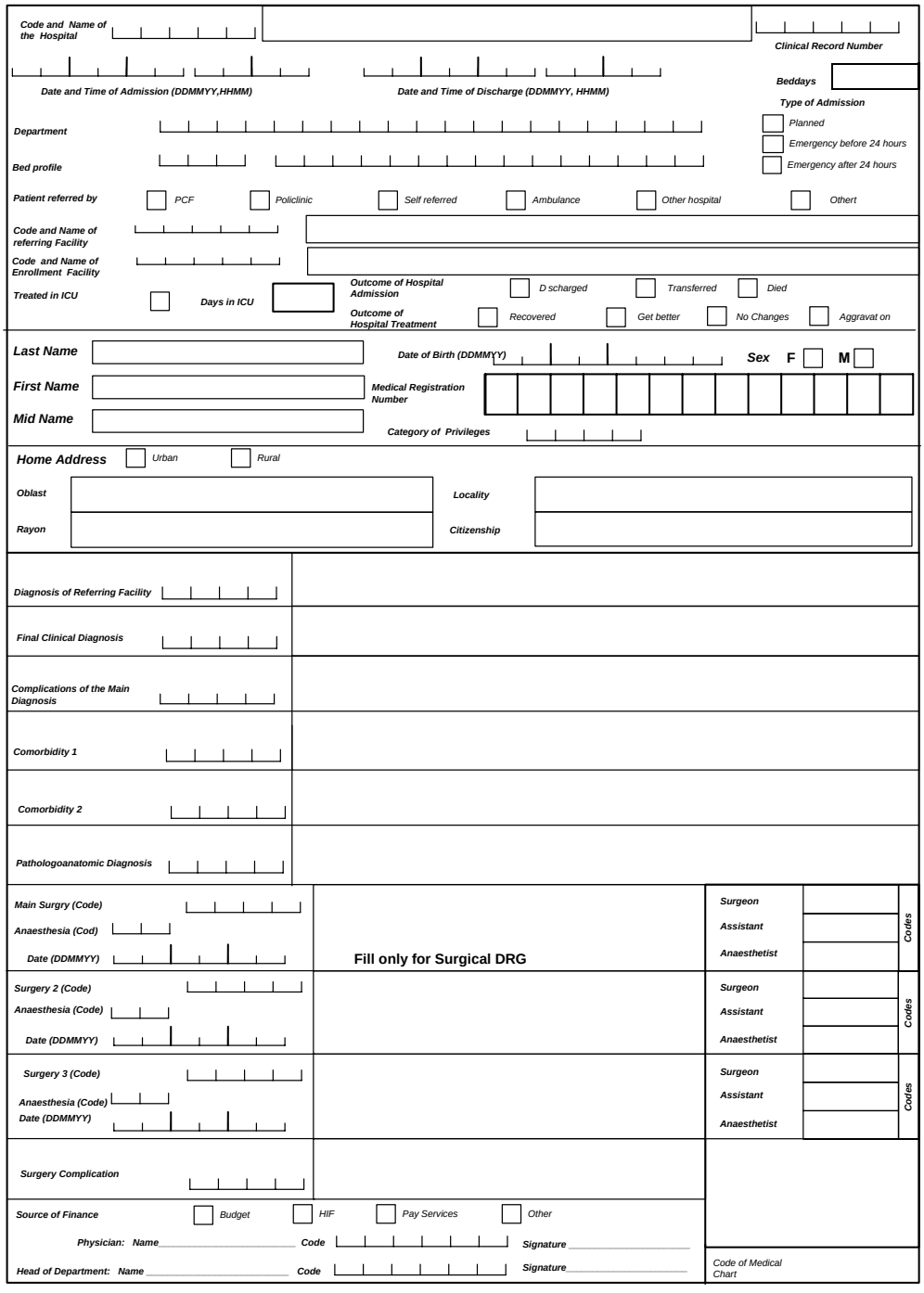


Figure 7.2. Example: Hospital Discharge Form and Data Fields



Code and Name of the Hospital

Clinical Record Number

Date and Time of Admission (DDMMYY,HHMM)

Date and Time of Discharge (DDMMYY, HHMM)

Beddays

Type of Admission

Planned

Emergency before 24 hours

Emergency after 24 hours

Department

Bed profile

Patient referred by

PCF | Policlinic | Self referred | Ambulance | Other hospital | Othert

Code and Name of referring Facility

Code and Name of Enrollment Facility

Treated in ICU

Days in ICU

Outcome of Hospital Admission

D scharged | Transferred | Died

Outcome of Hospital Treatment

Recovered | Get better | No Changes | Aggravat on

Last Name

First Name

Mid Name

Date of Birth (DDMMYY)

Sex F M

Medical Registration Number

Category of Privileges

Home Address

Urban | Rural

Oblast

Rayon

Locality

Citizenship

Diagnosis of Referring Facility

Final Clinical Diagnosis

Complications of the Main Diagnosis

Comorbidity 1

Comorbidity 2

Pathologoanatomic Diagnosis

Main Surgry (Code)

Anaesthesia (Cod)

Date (DDMMYY)

Fill only for Surgical DRG

Surgeon

Assistant

Anaesthetist

Codes

Surgery 2 (Code)

Anaesthesia (Code)

Date (DDMMYY)

Surgeon

Assistant

Anaesthetist

Codes

Surgery 3 (Code)

Anaesthesia (Code)

Date (DDMMYY)

Surgeon

Assistant

Anaesthetist

Codes

Surgery Complication

Source of Finance

Budget | HIF | Pay Services | Other

Physician: Name _____ Code _____ Signature _____

Head of Department: Name _____ Code _____ Signature _____

Code of Medical Chart

Statistical Form of Discharged Hospital Patient

Although, data management may be at the discretion of each provider (unless there are software interface standards recommended for use), there should be procedures in place for monitoring the quality of the data and recommendations on data improvement at provider level developed through a collaborative process between the purchaser and the providers.

An example of a computerized system for the hospital discharge information developed for the national case-based hospital payment system in Kyrgyzstan is illustrated in the following series of screenshots.

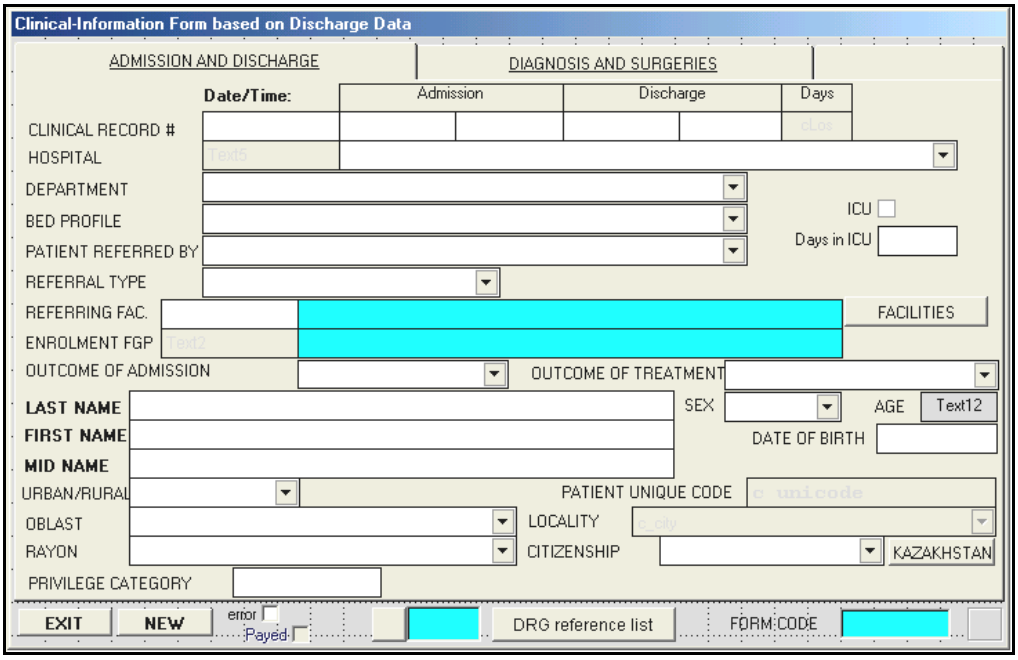
Screenshot 1 shows the main operator window. This window shows the name of the hospital and the record I.D. (top of the window), and a list of the cases for the hospital, including the case I.D. number, the date of admission, the date of discharge, the number of bed-bays for the case, the number of days in intensive care and the date the record was entered or last changed. The screen also shows highlighted records with errors that cannot be transferred and used for payment. The screen provides access to information in each form.

Screenshot 1. List of Completed Discharge Forms with Search, View, and Editing Functions

Source: Kyrgyzstan HIF / ZdravReform, 2001

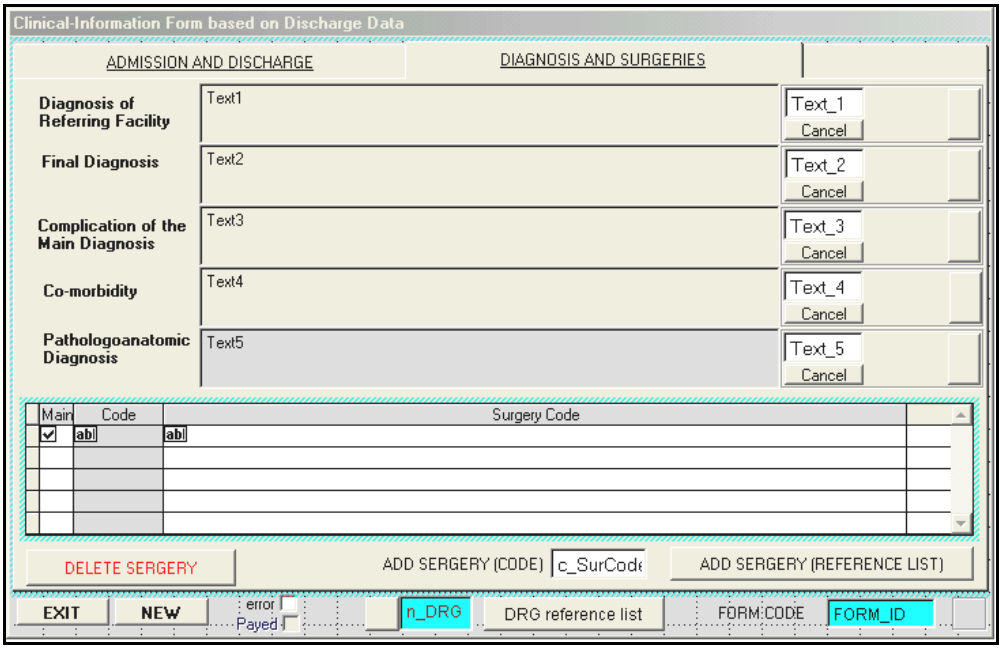
The discharge data entry screen (below) is divided into two section: a registration section with general patient information (**Screenshot 2**), and a clinical block with information about the clinical characteristics of the hospital case (**Screenshot 3**).

Screenshot 2. Data Entry Screen Registration Information Block



Source: Kyrgyzstan HIF / ZdravReform, 2001

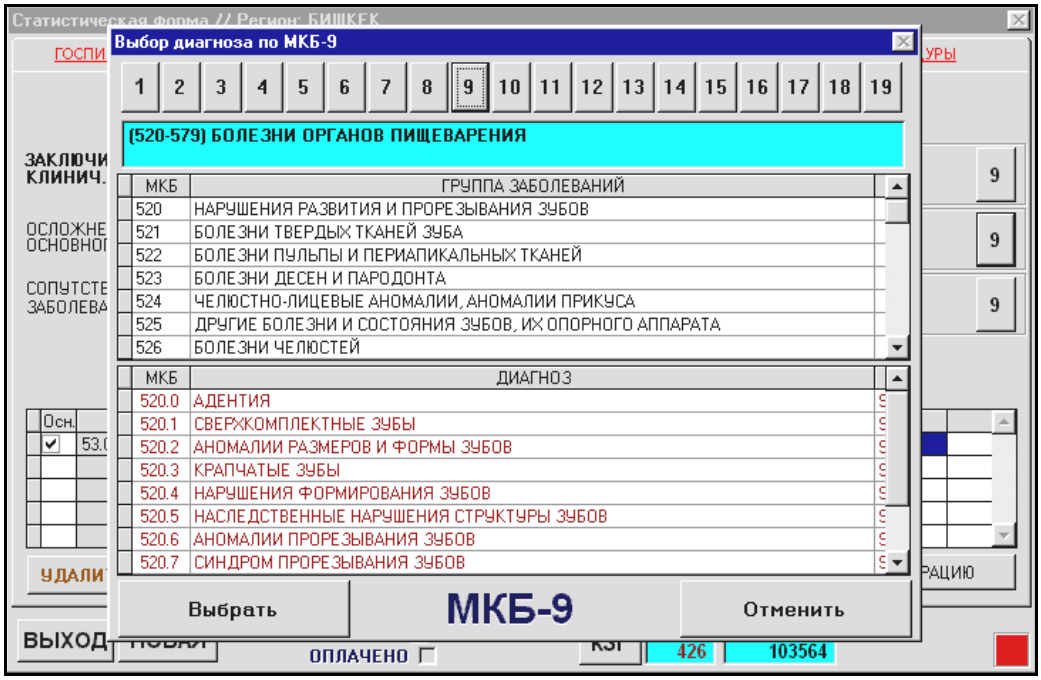
Screenshot 3. Data Entry Screen Clinical Information Block



Source: Kyrgyzstan HIF / ZdravReform, 2001

The database program may include ICD-9 or ICD-10 disease classification, which makes it possible to enter diagnoses by code (**Screenshot 4**). If a code is entered correctly, the corresponding diagnosis name will automatically appear on the screen.

Screenshot 4. Disease Classification Codes (ICD-9)



Source: Kyrgyzstan HIF / ZdravReform, 2001

7.1.2. Data transfer module

The data transfer module supports data exchange between the hospitals and the health purchaser. Data can be transferred on a diskette, by e-mail, or over a network or the internet. The following operations are included in the process of data exchange and must be supported by the data transfer module:

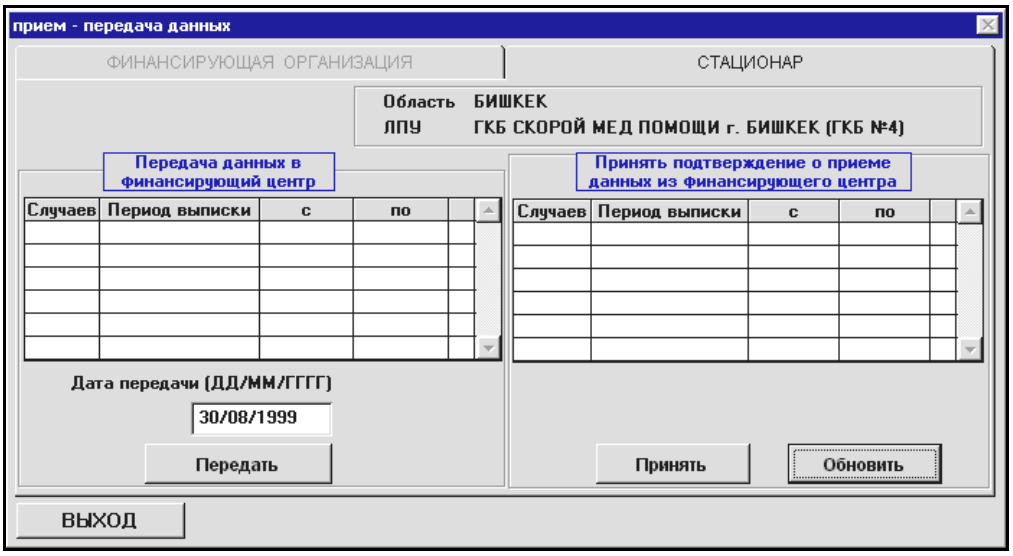
- *At the hospital level*: preparation of data for export, including proper coding and formatting, data transmission, and confirmation of successful export to the financing center.

- *At the health purchaser level*: receipt of data from hospitals and confirmation of successful data receipt.

The data transfer module should allow the hospitals to verify the hospital data prior to export, and create summary reports for exported records. The module should allow the purchaser to create a log-file and summary reports of received records.

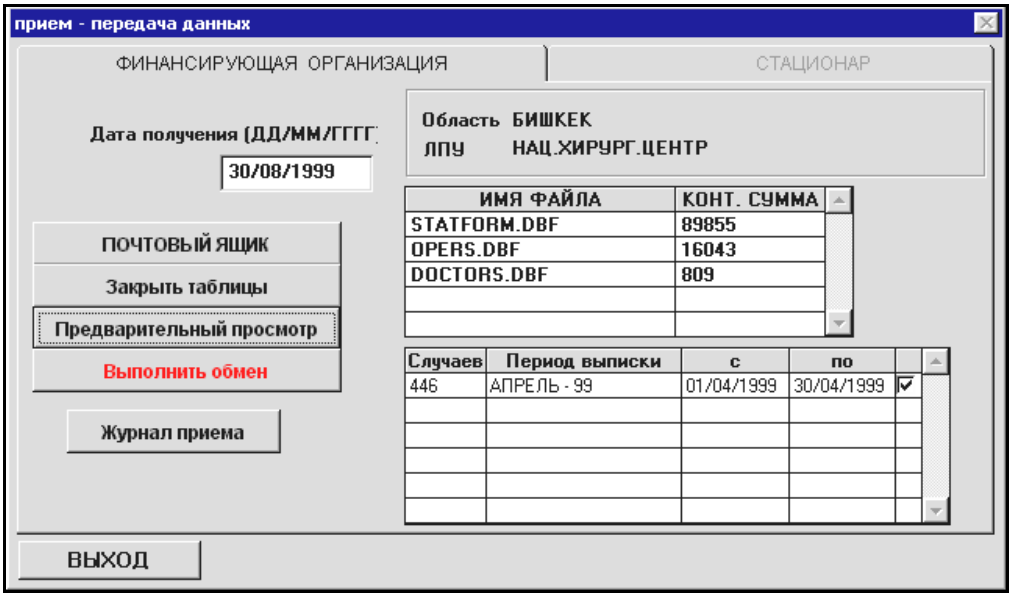
Screenshot 5 shows the data exchange dialog screen at the hospital level. The out-box, which is on the left side of the screenshot, lists the records that are ready to be sent to the purchaser. The confirmation box, which is on the right side of the screen, lists confirmation of the successfully imported records from the purchaser.

Screenshot 5. Hospital Data Exchange Dialogue Screen



Screenshot 6 shows the data exchange screen at the purchaser level. The top box on the right side of the screen displays the name of the source hospital. The second box displays the name and size of each file received from the hospital. The third box displays the total number of hospital records received and the time period covered. The screen also contains *pre-import preview* and *records import* buttons. During the import process the system compares data in the mailbox with the records in the database. The system also maintains a *receiving log file* where the database administrator can keep track of data exchange sessions and to make sure that the data exchange procedures are compliant with the accounting regulations of the purchasing organization.

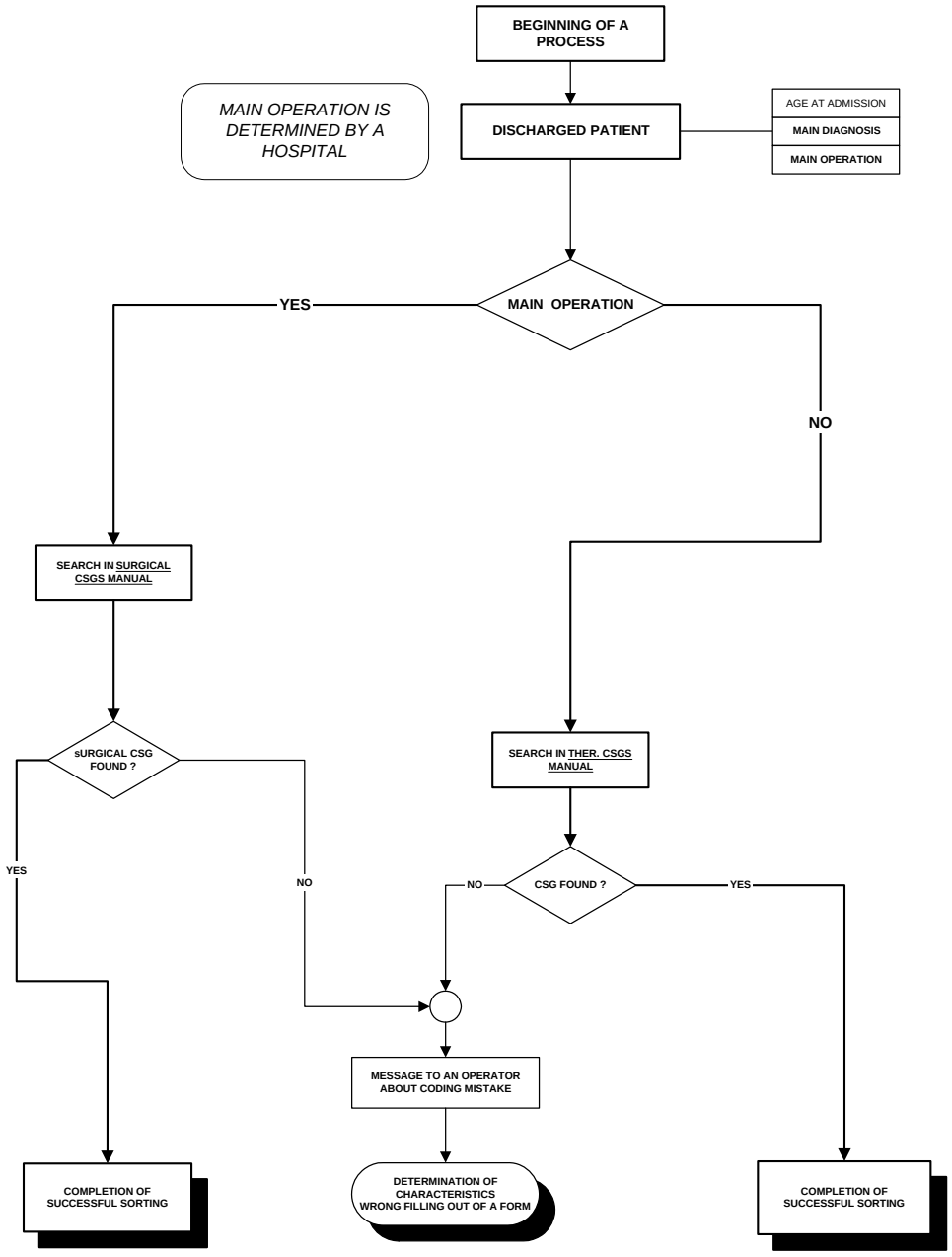
Screenshot 6. Health Purchaser Data Exchange Dialogue Screen



7.1.3. Grouper and Billing/Payment Module

The grouping parameters for cases entered into the hospital case database are used to assign each case to a case group. The process of assigning cases to case groups is performed by using a case-grouper algorithm (or a grouper module, which is a special software module). The grouper module uses an algorithm to compare the characteristics of each case to the case grouping criteria to assign the case to a case group. The decision tree on Figure 7.3 shows the algorithm used for case grouping in Kyrgyzstan.

Figure 7.3. Algorithm for Hospital Case Grouper in Kyrgyzstan



Source: Kyrgyzstan HIF / ZdravReform, 2001

The grouper program can be run by the hospitals, the health purchaser, or both. In addition to submitting the hospital cases electronically, a paper bill is usually also submitted by the hospitals to the health purchaser as official request for payment. Examples of two possible formats for hospital bills are presented below in Figures 7.4 and 7.5.

Figure 7.4. Simple Hospital Bill

Budget form of treated patients registration for financing purposes

Hospital code: < >

Hospital name: < >

Reporting period: < >

Case Group	Case Group Weight	# of Patients	Total Charge
Total on hospital:			

Chief Physician_____

Chief Accountant_____

Figure 7.5 More Detailed Hospital Bill

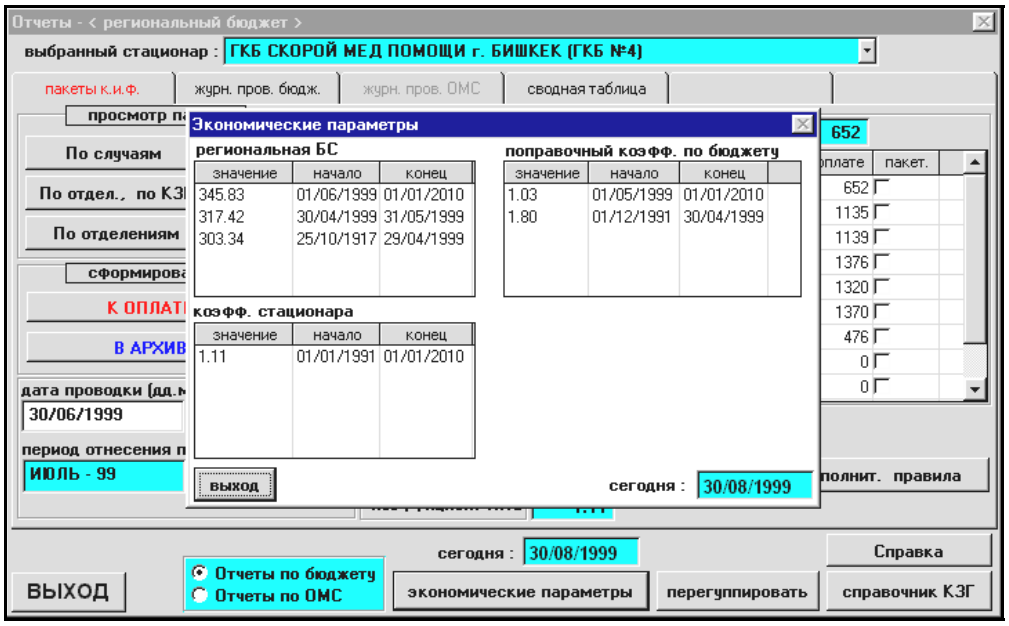
Budget form of treated patients
Health facility name: **Health facility code:**

#	# of medical card	Name	Sex	Date of birth	Admission date	Discharge date	Bed days		Emergency/elective	First/secondary	Diagnosis			Operation code	Anesthesia code	City/village	Result	Eligibility category
							In department.	ICU			Final clinical Code	Complication Code	Concomitant Code					
Name of department:																		

Chief Physician_____
Chief Accountant_____

After the system assigns cases to case groups, packages are created for data exchange, which are sets of discharge records for a selected hospital and selected discharge period marked with a *package unique code*. The packages form the basis for payment to individual hospitals. The date of the data exchange transaction determines which economic parameters will be applied to the calculation of the hospital's payment, since such parameters as base rates and facility-specific adjustors change over time and are recorded in the information system's journals. **Screenshot 7** shows the pop-up screen for economic parameters.

Screenshot 7. Pop-up Screen for Economic Parameters (purchaser side)

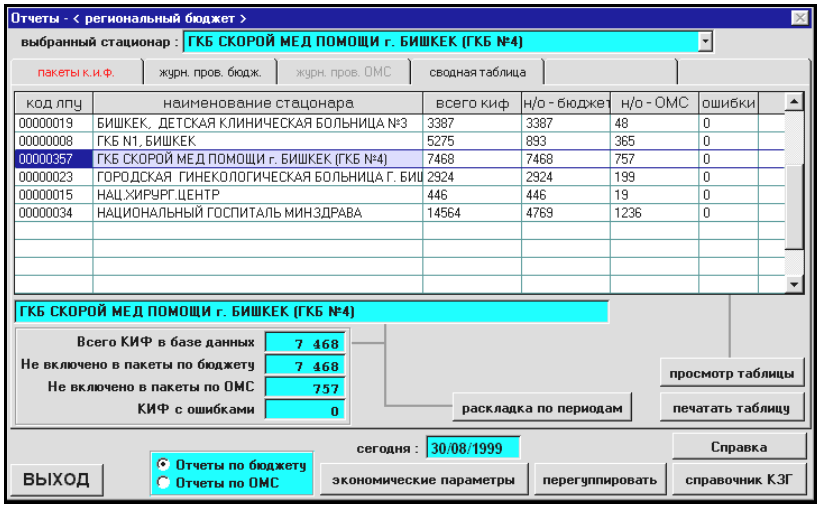


Source: Kyrgyzstan HIF / ZdravReform, 2001

Before a package of records is formed the administrator can preview the case report, the DRG-grouped report, as well as the sub-reports by departments.

Screenshot 8 shows the summary table of data packages for the region. The screen displays the list of hospitals located in the region, the number of discharge records for each hospital, and the number of records not included yet in the packages. The operator can preview the table contents in the report format, and print the report.

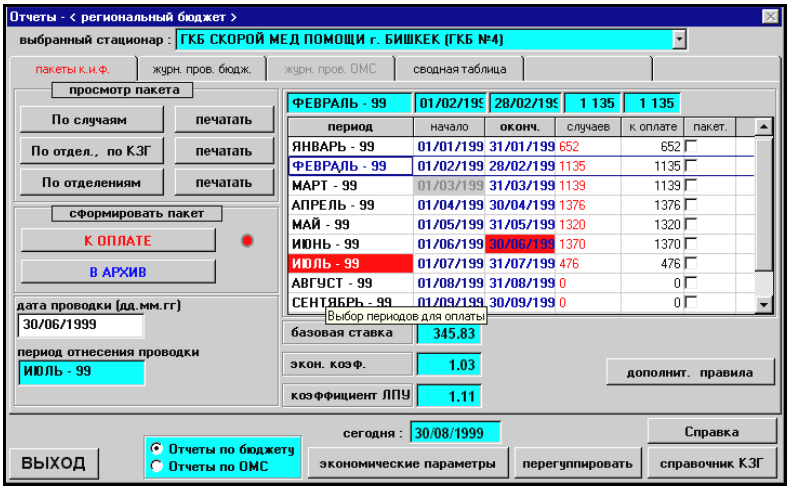
Screenshot 8. Summary of Packages for All Hospitals in the Region (purchaser side)



Source: Kyrgyzstan HIF / ZdravReform, 2001

The administrator can select a hospital from the list and obtain a detailed breakdown of billing by the hospital for previous periods. **Screenshot 9** shows the package dialogue screen for an individual hospital.

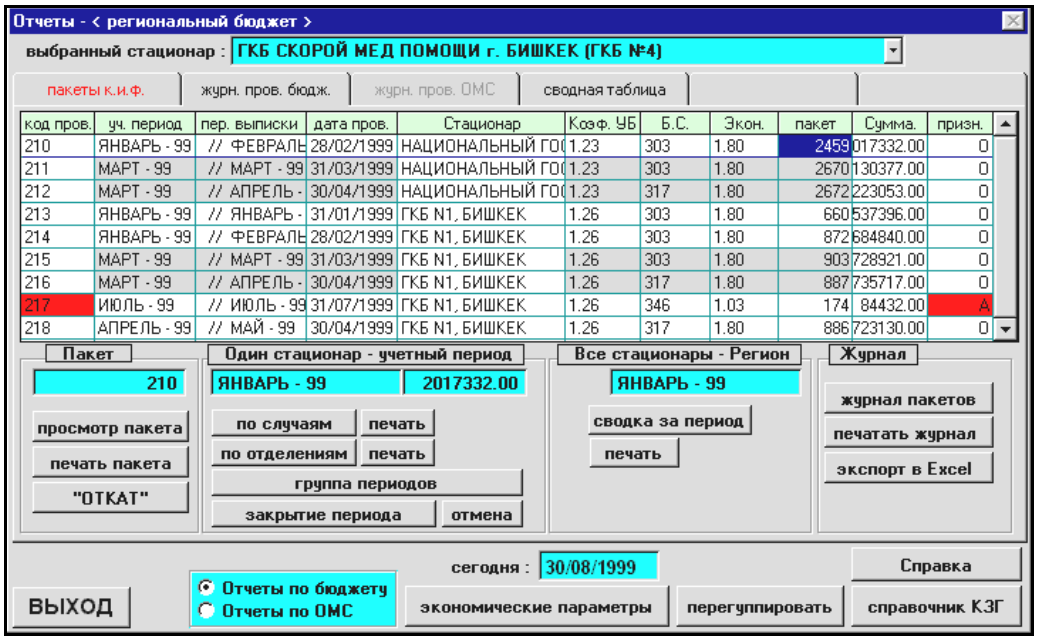
Individual Hospital Package Dialogue Screen



Source: Kyrgyzstan HIF / ZdravReform, 2001

Screenshot 10 shows the main payment report screen, which displays all of the packages in the database. The journal of packages can be sorted by package unique code, by discharge period, by accounting period, or by hospital. The table can be previewed in the report format, printed, or exported into a spreadsheet. In the provided example, suspended packages are highlighted in red in the first and the last column of the table. Closed fiscal periods are highlighted in grey. The system administrator can create payment reports for a selected hospital for a selected fiscal period (one payment report may include more than one package), decide on the closing of the fiscal month, and preview and print summary reports. Monthly payment reports are used for actual payment to hospitals.

Screenshot 10. Main Payment Report Screen for the Region

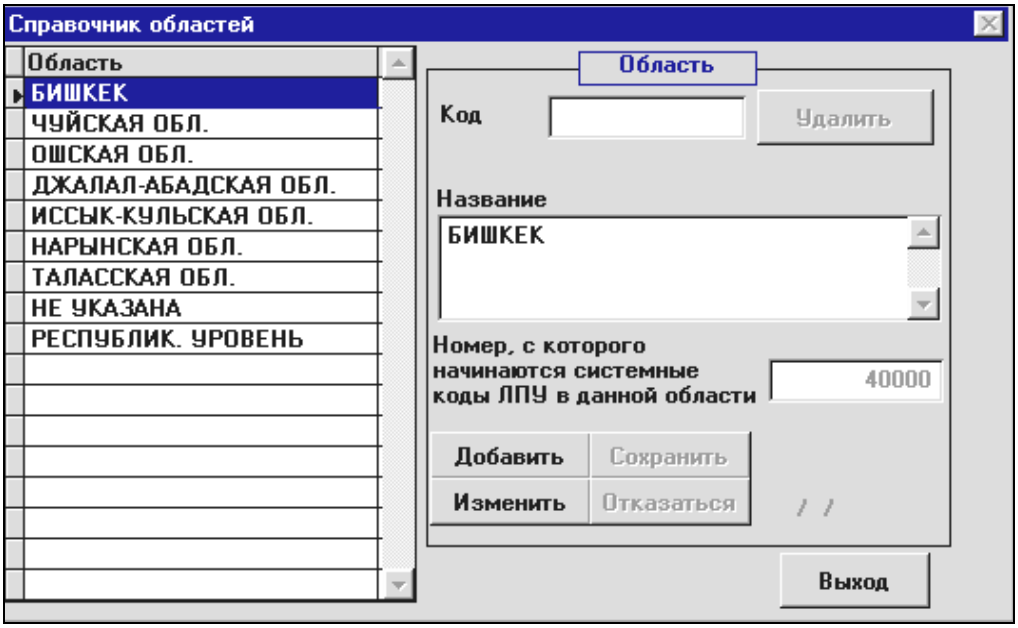


Source: Kyrgyzstan HIF / ZdravReform, 2001

7.1.4. Other Features of the Hospital Case Database

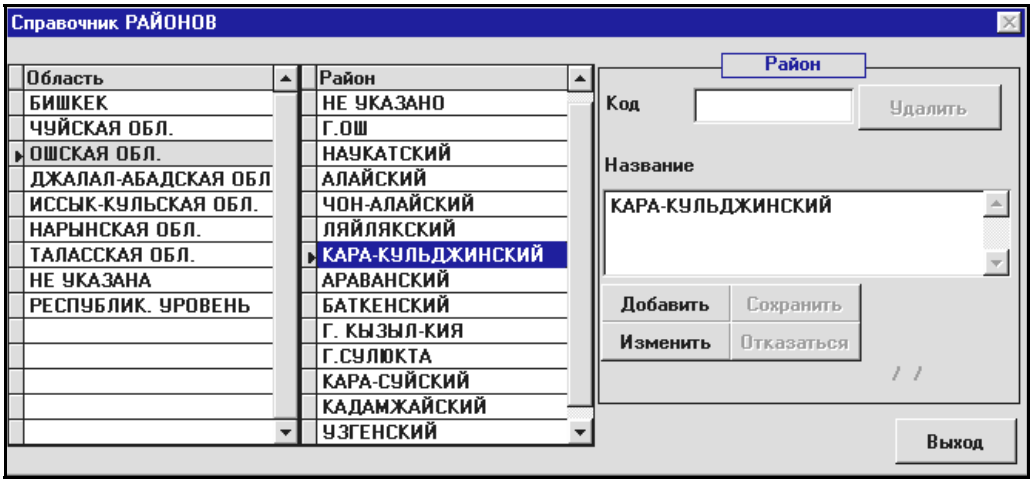
The hospital database can contain pop-up screens linking with other databases to facilitate data entry and analysis. For example, the purchaser's system may include links to government administrative databases that list all regions and districts in the country, a hospital database that lists all hospitals and their relevant characteristics, and a physician database. **Screenshot 11** shows an example of a pop-up screen from the Kyrgyzstan hospital database showing all regions in the country, and **Screenshot 12** shows a pop-up screen of all districts in each region.

Screenshot 11. Administrative Regions in Kyrgyzstan



Source: Kyrgyzstan HIF / ZdravReform, 2001

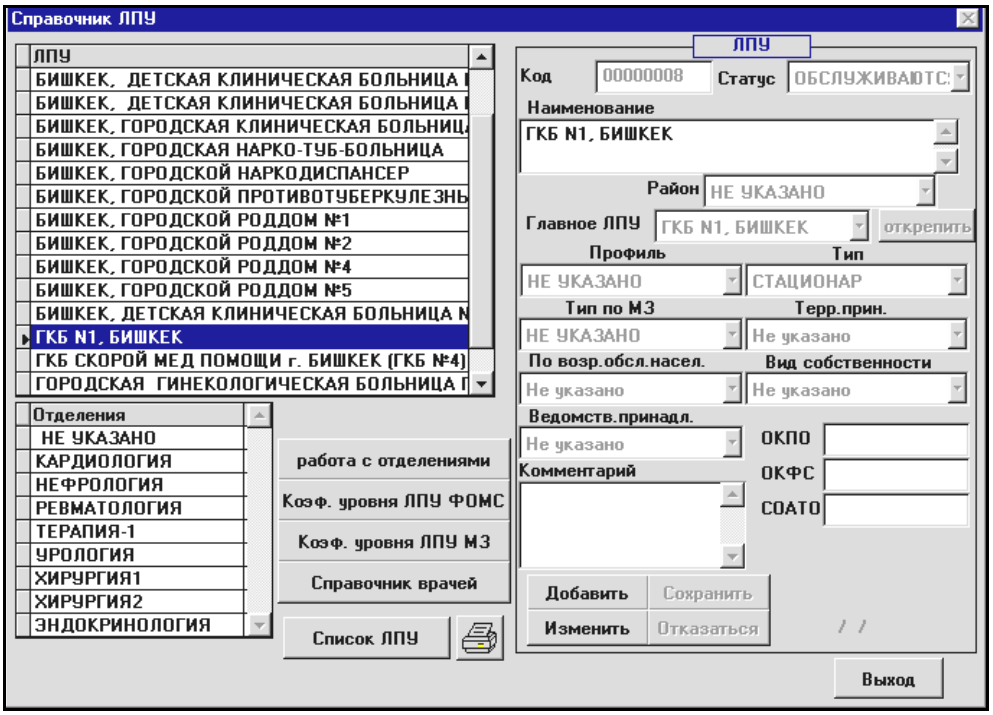
Screenshot 12. Districts in the Regions of Kyrgyzstan (part of the national information standards system)



Source: Kyrgyzstan HIF / ZdravReform, 2001

Screenshot 13 shows the pop-up screen linking the hospital case database to the database of all hospitals in the country. This database contains information about the type and specialty of each hospital, departmental structure of the hospitals, as well as additional hospital profile parameters useful for data analysis. The hospital database also contains the journal of facility-specific adjustors for the case-based payment system.

Screenshot 13. Pop-up Screen Linking to Hospital Database



Source: Kyrgyzstan HIF / ZdravReform, 2001

7.2. Financial Database

A financial database unit should established to compile the results of hospital cost accounting analysis, which is completed initially to develop the case-based payment system (see Chapter 6), but also should be updated to include recent cost accounting information from all hospitals in the payment system. The information in the financial database allows the purchaser to analyze changes in the cost structure of hospitals that may be brought about by the payment system and which should be used to update the calculation of the base rate and any adjustment factors. As the payment systems develop

and data are collected through the payment administration system, the process of submitting cost accounting reports from facilities should be standardized and made compulsory.

7.3 Information System Requirements

7.2.1. Manuals and Codebooks

An important component of the information system is the set of core rules that govern the development of national and regional health financing and management policies and, consequently, health information standards. This process can (and should) be modular and incremental, but there also should be an awareness of the need to build a scalable and consistent health information system with core standards to allow such flexibility. Consequently, policies and procedures should be developed that define the rules and outline how they should be implemented, as well as the procedures that must be used to amend the rules. Information manuals as well as their updates should be embedded in the health information system, so they can be accessed throughout the process of data entry and analysis. The development of the manuals is a process and should involve all key stakeholders, including those responsible for the health care and clinical information systems. The health information standards and manuals define the architecture of information systems and the degree of flexibility available to designers and developers. The standards and manuals define the framework within which a particular system can be developed. Potential developers of systems should be given access to minimum compulsory requirements. Examples of health information standards and the increasing recognition of standards as the architecture framework include HL7, SNOMED, and CEN TC251 (European healthcare informatics standards framework).

7.2.2. Infrastructure Requirements

The infrastructure needed to support the information systems is largely determined by several factors: (1) the *throughput* of the data entry system, or the volume of discharged inpatient cases in the payment system each month and the time it takes to enter each form; (2) the *capacity* of the communication channels, which may depend on the technology available (network speed, internet connection speed, posting diskettes, email availability and security, etc.); and (3) *verification and data audit procedures* at the provider and purchaser levels. The number of PC workstations that will be needed by the purchaser may be estimated as follows:

$$\text{Number of Computers} = \frac{\text{Number of forms to be entered each month}}{\text{Number of forms that can be entered each month per computer}}$$

$$\text{Number of Computers} = \frac{\#\ \text{cases} / \text{month}}{\left(\text{forms} / \text{hour}\right) * \left(\text{hours} / \text{month}\right)}$$

For example, if the hospital discharges 3,000 cases per month, the hospital discharge form takes five to six minutes to enter, and the computer is operated for one 8-hour shift per day during a five-day work week, then the number of computers needed by that hospital will be as follows:

$$\text{Number of Computers} = \frac{3{,}000\ \text{cases} / \text{month}}{\left(10 / \text{hour}\right) * \left(160\ \text{hours} / \text{month}\right)} \approx 2$$

Taking into account that additional time will be needed for system maintenance activities, development, editing and transmission of reports, analysis of collected information implemented by a health facility staff, the number of PC workstations calculated by the above formula should be scaled-up by a coefficient of 1.4. In the example above, the number of PCs needed would be rounded up to 3. Discharge data for the purpose of payment can be generated in hospitals that have well developed information systems, and in this case discharge forms can be produced as part of the hospital's overall information analysis rather than through a billing system designed only for that purpose.

With more sophisticated computer technology becoming increasingly affordable, it is advisable for hospitals to maintain data entry at the hospital level and to integrate the data entry for payment purposes into the facility's general management information system. With the wide availability of the internet, more of data entry and transmission operations can be performed on-line with connection to shared database at the facility or the purchaser level.

The operating costs for the information system include salaries for computer operators, costs of software maintenance and upgrading, technical maintenance and training of personnel. The matter of operating costs of provider payment systems has been a subject of controversy and debate. The generally accepted rule is that any provider payment system more complex than simple budget transfers is more

expensive than a team of paper-based accountants, so the investments in administrative systems should be justified by the benefits of implementing them. The benefits of implementing new payment systems that justify increased administrative costs, and which belong to the domain of broad health policy, may include: better outcomes, better cost-effectiveness, cost savings from reallocation of resources across types of care, and cost minimization of care provision.

Information administration costs of health insurance and health financing schemes vary across countries and types of systems. The most expensive information administration costs are in multi-payer insurance systems (15-20 percent), streamlined single-payer systems showing much more reasonable costs for information administration. For example, the administrative costs of the single-payer U.S. Medicare program is only about 2 percent of Medicare expenditure (inclusive of the information systems), while administration accounts for 20-24 percent of the total expenditure of commercial insurance (Liu 2003, [43]).

7.2.3. Requirements for System Development and Implementation Issues

The hardware and software capacity of the information system may start with basic infrastructure, evolving as the needs for the system and capabilities of the purchaser evolve. The information systems in Central Asia, for example, were initially developed using low-cost software platforms, such as Windows-based MS Access, MS FoxPro, etc. The databases developed required PCs of average capacity available on the market, and the local staff had previous experience working with the software platforms that were used. As the systems evolved, however, more demand for data was created and capacity to manage information systems was developed within the Ministry of Health and Mandatory Health Insurance Fund. As this evolution took place, it became necessary and possible to scale-up the data and knowledge management, and the capacities were upgraded from simple PC-based systems to Oracle and MS SQL Server platforms at the national level. These changes were also driven by the simultaneous development of pension reform and an accompanying population register, which made it possible to establish data exchange between the Ministry of Health and the Ministry of Social Protection. Despite the technical specifics of the information systems and the processes of development, there are some general lessons that can be learned from the successes, and occasional pitfalls, of the development and implementation of the hospital information and payment system in Central Asia, including:

- ***Information systems are successful where they are part of a well-managed organizational change and development process***. This may seem obvious, but often information system projects are perceived as having value in and of themselves, and the connection between the goals of organizations and new information systems often is not part of the decision framework.

- ***A health information strategy should be developed,*** which conceptually unites particular systems and subsystems and is essential for the continuity and sustainability of future development.

- ***It is essential to involve key stakeholders, strong and sustainable leadership and ownership*** to ensure the success of organizational change where information systems play a substantial role.

- ***The realization of benefits of the information system should be made obvious to leaders and managers*** who implement the payment and information system at every stage of development.

- ***Establishing national standards for information systems development is essential.*** Rather than developing a compulsory software program to be given to providers, the role of the information systems regulators is to develop standards that can be used by purchasing institutions to develop or procure specific information systems. This is a core and essential requirement for the success of new information systems. On the other hand, standards also are essential to ensure that information systems developed in one country or region are compatible and interoperable, and that multiple information systems do not emerge that cannot be united or compared in the future.

- ***The development of well documented standards and upgrading them should be*** **modular, incremental *and* scalable**, because technology and concepts are developing rapidly, and any information system will become obsolete within a few years. Standards and conceptual consistency allow the system designers to maintain data integrity when upgrading the systems.

- **Modular development** means that a large scale information project, such as the hospital payment system in Central Asia, can be divided into modules that are small in size and manageable in development and implementation and can "talk to each other" (exchange data securely, safely and with no loss of meaning).

- **Incremental development** means that the developer can start working on different modules and gradually expand the functionality of each module as the system evolves.

- **Development can be simultaneously modular and incremental,** particularly for large-scale projects. This was the approach that was successfully employed in Kyrgyzstan. Modular development, proper documentation of the systems, and standards all make the development of information systems scalable and the platform independent.

The above approaches were tested in Kyrgyzstan and proven effective in that context. Currently, the case-based hospital payment information system has expanded from a pilot implementation largely backed by donor investment and technical assistance to a full-scale national system fully functional and evolving within the Ministry of Health and the Mandatory Health Insurance Fund. The information system was entirely transferred to the national institutions, where it is constantly upgraded by the developers in a way that is consistent with organizational requirements and the availability of technology.

CHAPTER 8. IMPLEMENTATION LESSONS AND ISSUES

The way that case-based hospital payment systems are implemented and tailored to the specific contextual factors in a country or a region will strongly influence how successfully the new payment systems contribute to achieving health policy goals. In this section several key aspects of implementation are discussed and examples of specific implementation strategies and experience are presented. Key implementation issues that are addressed in this chapter include:

- Planning the transition to a case-based payment system;
- Designing measures to counteract the adverse incentives that may be created by a case-based payment system; and
- Refining the case groups and case group weights to better capture heterogeneity between cases within groups.

There are many other important implementation issues, which are not addressed in this manual, either because they are beyond the scope of the manual or because they tend to be highly country-specific. Other important implementation issues to consider include: creating the legal and regulatory framework for implementing the new payment system; getting leadership and the support of key stakeholders; establishing the roles and relationships between the health purchaser and providers; establishing new internal management and accounting systems in hospitals; linking the case-based payment system to provider payment methods at other levels of the health system, such as primary health care, and to physician payment; and monitoring and evaluation of the new payment system.

8.1. Transition to a Case-based Payment System and Risk Management

It is typically recommended to implement a new case-based hospital payment system incrementally, because of the potentially large effects on resource allocation between hospitals, and the time needed to accumulate the data necessary to design more sophisticated payment systems. Incremental implementation gradually shifts financial risk to hospitals, allowing them time to adapt to the new incentives, and provides the opportunity to establish information systems and accumulate the data necessary to develop and refine the payment system. It is often best to pilot a new case-based hospital payment

system first as a safe "paper system" without any real change in the flow of funding. This is part of the process of organizational learning for both the purchaser and providers, and may help gain the understanding and support of key stakeholders. The paper system is also useful to model the changes and benefits that will be brought about by the new way of working under the case-based payment system. The pilot paper system also puts the information systems in place and begins collecting hospital case data to simulate the changes in resource allocation that would occur under a case-based payment system. The paper system can be used to show hospitals how their budgets would have been affected if the new payment system had been introduced, so they can begin to adapt their internal management to the new payment system before facing any actual financial risk.

After the pilot paper system, a case-based payment system may be implemented incrementally in several ways. For example:

(1) Transitioning from other output-based hospital payment systems, such as a per-diem (per bed-day) payment system;

(2) Incremental inclusion of hospitals: introducing the new payment system in some hospitals and gradually adding new hospitals to the payment system, or introducing the payment system in all hospitals in a geographic area and gradually adding new geographic areas;

(3) Incremental inclusion of costs reimbursed by the payment system: initially reimbursing a subset of hospital costs through the new payment system and gradually increasing the types of costs reimbursed by the system.

(4) Incremental inclusion of types of cases: initially reimbursing a subset of cases on a per-case basis, then gradually including other types of cases in the payment system;

(5) Incremental adoption of a system-wide base rate moving from facility specific rates: introducing facility-specific adjustors to the base rate to maintain historical allocation between hospitals, and gradually shifting to a single base rate for all hospitals in the payment system.

In Zhezkazgan region, Kazakhstan, a case-based hospital payment system was introduced through a transition from the Soviet-era input-based budgeting system to a per-diem payment system in 1995, and then to a case-based payment system in 1996. This gradual transition allowed the hospitals to begin to adjust their internal management systems to an output-based payment, while data systems were put in place to develop a case-based payment system. The first case-based payment system introduced in 1996 grouped cases by department. As more data were collected in the hospital case database, the payment system was refined to a diagnosis-based payment system in 1998.

In Israel, a case-based hospital payment system was implemented incrementally by gradually increasing the types of cases reimbursed under the new system. During the first three years of the new payment system in Israel, hospitals were paid on a per-case basis for cases in the surgery and intensive care departments, but cases in all other departments (such as internal medicine or geriatrics) and readmissions were paid on a per-diem basis. After three years, all hospital cases were paid according to the new case-based system (Shmueli 2002 [68]). In the U.K. a performance-based payment system (known as Payment by Results) is being introduced throughout 2003-2008 by incremental inclusion of increasing numbers of clinical specialties in per-case payment, but on a full cost basis.

The U.S. Medicare DRG hospital payment system was implemented incrementally by gradually introducing a nationwide base rate. The payment system began with a base rate that was a blend of each individual hospital's historical costs, a regional base rate, and a national base rate during the early transition period. In addition, an adjustment was added for teaching hospitals, and a rural/urban adjustment was included to further reduce sudden changes in the revenues of individual hospitals (Jencks et al. 1987 [31, 32]). The transition from the blend of a hospital, regional, and national base rate to only a national base rate is shown in Table 8.1.

Table 8.1 Transition to a National Base Rate in the U.S. Medicare DRG Hospital Payment System

Time Period / Source of Base Rate	Composition of Base Rate				
	10/1/83-9/30/84	10/1/84-9/30/85	10/1/85-9/30/86	10/1/86-9/30/87	after 10/1/87
Hospital-specific	75%	50%	50%	25%	0%
Regional	25%	37.5%	37.5%	37.5%	0%
National	0%	12.5%	12.5%	37.5%	100%

Source: Federal Register 1986 reported in Jencks et al. 1987

The Kazakhstan Mandatory Health Insurance Fund also implemented facility-specific adjustors to move to a region-wide base rate gradually. As the data systems were put in place, however, it became clear that the hospitals with the highest historical costs, and therefore the highest facility-specific adjustors to the base rate, were not always those with the most severe case mix. For example, in Karaganda region, the regional teaching hospital had the highest average cost per case, but the hospital case database revealed that the average case mix for the hospital ranked 11th out of 16 hospitals in the region (Katsaga 2000 [34]). Facility-specific adjustors often serve to compensate hospitals for cost variations that are not related to the types of cases they treat, but rather to differences in efficiency of input use. Therefore, facility-specific adjustors to the base rate should be used only for a brief transition period to allow hospitals time to adjust their cost structures. As a word of caution, however, facility-specific adjustors are often politically difficult to remove once they have been introduced, even temporarily.

Incremental implementation of a new case-based hospital payment system often involves some combination of the five approaches outlined above. For example, in Kyrgyzstan, the Mandatory Health Insurance Fund incrementally expanded the geographic areas covered by the new payment system, gradually included hospitals in the new payment system through an accreditation process, and started with a subset of variable costs reimbursed by the case-based payment system. In Korea, the case-based hospital payment system was introduced initially in a small number of hospitals and for a small number of disease categories. A case-based hospital payment system was introduced on a pilot basis for nine disease categories (25 case groups) in 54 health care facilities in 1997. The nine disease categories accounted for only about 25 percent of all hospital cases. In the second year of the program, coverage of the new payment system expanded to 132 facilities, and by 2000, nearly 800 facilities participated voluntarily in what was still considered to be a pilot of the new payment system (Kwon 2003 [40]).

8.2. Measures to Counteract Adverse Incentives

The main incentives created by a case-based hospital payment system are to increase efficiency by reducing excess inputs used to treat each case. These incentives can be quite strong, however, and there is the potential problem that hospitals will reduce inputs excessively to the point of undertreating cases, discharging patients prematurely from the hospital, or otherwise reducing quality of care. Because hospitals are paid according to output, discharged cases, there is an incentive to in-

crease the number of admissions/discharges. Furthermore, when cost differences between cases within a case group are large, there is an incentive for hospitals to avoid more costly cases, which may pose a barrier to access to necessary hospitalization for severely ill patients.

Upcoding, or assigning cases to a case group that is reimbursed at a higher rate than the case group to which the case actually belongs, is an additional adverse incentive created by the payment system. Upcoding does not affect the quality of patient care directly, but it is an important source of excessive costs and inefficiency in the system. Other perverse incentives can include gaming with transfers, repeated admissions after discharge, and shifting some services to before hospital admission and after hospital discharge. In Korea, for example, there was some evidence that hospitals performed a larger share of diagnostic tests before hospital admission after a case-based payment system was implemented (Kwon 2003 [40]). All of these adverse incentives are inherent in the case-based payment system and will not be avoided without explicit measures to counteract them.

Therefore, all case-based hospital payment systems should be accompanied by measures to counteract the adverse incentives inherent in the payment system. These measures may be part of an integrated quality assurance system to monitor the performance of hospitals in the payment system, or they may be individual administrative regulations that are enforced by the purchaser and/or regulator. Examples of measures that may be used to counteract the adverse incentives of a case-based hospital payment system include:

- Reduced or denial of reimbursement for hospital readmissions. For example, in Israel, readmissions that occur within seven days of discharge are not reimbursed (Shmueli et al. 2002 [68]).

- Minimum lengths of stay. For example, federal legislation introduced in the U.S. in 1996, "Newborns' and Mothers' Health Protection Act," mandated that group health insurance plans may not restrict benefits for hospital stays for new mothers and their infants to less than 48 hours after vaginal delivery or 96 hours after cesarean delivery (Madlon-Kay et al. 2003 [47]).

- Measures for the purchaser to monitor and control the volume of admissions, e.g. in the form of rationing for elective cases above certain level

8.3. Refining Case-Grouping

Perhaps the most important measure to counteract the adverse incentives to reduce inputs or avoid costly cases is to adequately compensate hospitals for legitimate cost differences between cases. Implementation of a case-based hospital payment system must include routine revision and refinement of the case groups and case group weights to periodically incorporate new data from the hospital case database into the cost-per-case estimates, case groups, and case group weights. Case groups may be refined by increasing the number of case groups; increasing the number and range of clinical characteristics used to group the cases, such as adding co-morbidities or severity measures; and developing supplementary payment mechanisms for **outlier cases**, which are cases with unusually long or short lengths of stay. These refinements become possible as more data become available from the information system.

8.3.1. Increasing the Number and Range of Clinical Characteristics for Case-Grouping

The diagnosis-related groups may also take into consideration characteristics of the case other than the main diagnosis, and characteristics of the patient. This step is typically done only after some iterations of the system have already been implemented, and further refinement is feasible because the volume of available hospital case data and the administrative capacity of the system have increased. A common way to increase the range of clinical characteristics for case-grouping is to differentiate cases with different degrees of severity. Severity has been shown to be an important determinant of cost of care in individual cases (Brewster et al. 1985 [7]).

Severity of illness is a rather subjective concept, embodying short-term and long-term prognosis, as well as the general health of the patient (Jencks et al. 1987 [31, 32]). Because of the difficulty defining and measuring severity, a variety of proxies are used to estimate the variation in resource use associated with different degrees of severity. Case grouping inherently captures some differences in severity by differentiating between primary diagnoses and by age. These variables, however, only account for a portion of differences in the severity of cases. Other characteristics of the case that may be related to severity include a secondary diagnosis or **comorbidity**, whether the patient spent time in intensive care, and whether the patient was transferred between departments. Comorbidities, which are conditions that are not related causally to the patient's principal disease process but increase a patient's total burden of illness (Shwartz et al. 1996 [69]), have been shown to be related to the cost of treating individual cases and are therefore valid proxies for severity.

Other clinical characteristics of the case that may be included in the case grouping that can be expected to affect the cost of an individual include whether the patient was transferred between departments, and whether the patient died in the hospital. The initial team that designed the U.S. Medicare DRG system decided that death would be used to classify patients only if it resulted in lower overall resource consumption, because Medicare did not want to reward hospitals if patients died (Jencks 1987 [31, 32]).

8.3.2. Outlier payment

An outlier is a hospital case with an atypically long or atypically short length of stay for a particular case group. Early research and evaluation of the U.S. Medicare DRG system found that outliers were an important determinant of cost variations between hospitals (Jencks et al. [31, 32]). Therefore, a policy for reimbursing outliers is necessary to maintain equity in the system, protect hospitals from random risk, protect certain hospitals with a large number of outliers, and to ensure that the most severely ill patients are not denied hospital care (Carter et al. 2001 [9]; Carter and Farley 1993 [10]). Outlier payment policy must be designed carefully, however, because outlier payments may create additional incentives that weaken the efficiency incentives of the case-based payment system, and outlier payment may make it more difficult to for the purchaser to predict total expenditures and therefore achieve budget neutrality (Carter et al. 2001 [9]).

Outlier payment policy must include a definition of which cases will be considered to be outliers, and a mechanism to pay hospitals differentially for outlier cases. The definition of outlier cases in a payment system depends on the "trim points" (cutoffs) for each case group that differentiates cases with typical and atypical lengths of stay. Each case group will have at least one trim point (a long-length-of-stay trim), and some may have a short-length-of-stay trim (Grimaldi and Micheletti 1983 [26]). Trim points may be based on statistical or medical criteria as well as the policy decisions of the health purchasers and regulators. Trim points are often defined in terms of the average and standard deviation of the length of stay within a case group. For example, defining the trim points as two standard deviations above or below the mean length of stay within a case group has been found to adequately identify high-cost cases (Cots et al. 2003 [14]). Other definitions of trim points include three times the average length of stay for the case group, which is used in a number of states in Australia, and the third quartile of the length of stay distribution for the case group.

There are a number of options for the method of payment for outlier cases. In Australia, different states have adopted different approaches to paying for outlier cases. For example, in New South Wales, hospitals are paid on a per-diem basis for days beyond the trim point in an outlier case. In Western Australia, hospitals receive additional funds for high-length-of-stay outliers, but funding levels are deliberately set below the actual estimated costs of care, on the assumption that a portion of the additional costs are a consequence of inefficiency (Russell-Weisz and Hindle 2000 [60]). In Queensland, hospitals are paid a discounted per-diem price for short-stay outliers and an additional per-diem rate for long-stay outliers. There are two long-length-of-stay trim points, for "long" and "extra long" stays. Extra-long-stay outliers are paid twice the "inlier" payment plus per-diem payment for days above the extra high trim point. The U.S. Congress initially mandated that hospitals be paid the actual marginal cost of outlier cases. This approached proved impractical, however, because the marginal costs could not be determined from available data. This approach was also abandoned, because there was no incentive for hospitals to contain costs once the outlier "threshold" was crossed in an individual case (Jencks et al. 1987 [31, 32]).

CHAPTER 9. CASE STUDY FROM THE CENTRAL ASIAN REPUBLICS

In this chapter, the experience of the Central Asian Republics of Kazakhstan and Kyrgyzstan in implementing new case-based hospital payment systems is presented in the form of a brief case study. New case-based hospital payment systems were introduced in Kyrgyzstan and Kazakhstan as part of comprehensive health sector reforms, which were initiated in the context of broader economic liberalization following independence from the former Soviet Union in the early 1990s. At that time, both countries faced similar crises in their health care systems, which were brought about by a combination of economic collapse following the break-up of the Soviet Union and the burdens of the inherited health care systems. Case-based hospital payment was selected as the new hospital payment method in both countries, because case-based payment systems were considered to be appropriate in the post-soviet environment to address many of the challenges faced by the health system in general, and the hospital sector in particular. In addition to addressing these specific health system challenges, in both Kyrgyzstan and Kazakhstan the implementation of a case-based hospital payment system played a broader role in health reform and the process of health system development.

The following sections describe why a case-based hospital payment system was appropriate for these two countries and the role they played in the broader health reform process. These case studies also provide contrasting examples of how the process of design and incremental implementation of a new case-based hospital payment system may lead to permanent shifts in health sector roles and relationships both in a more centralized system with a coherent national health policy agenda, as is the case in Kyrgyzstan, and in a more decentralized and at times unstable health policy environment, as has been the case in Kazakhstan. These case studies also illustrate how policy decisions and technical design issues can be addressed, and the compromises that are often necessary to implement a new case-based hospital payment system in the context of the political, economic and social realities faced by low- and middle-income countries.

9.1. Health Policy Context

As discussed throughout this manual, there is no perfect hospital payment system, and each of the options has advantages and disadvantages. Some hospital payment systems may, however, be more appropriate for certain environments or countries at certain times. In addition, any hospital payment system should be designed in the context of broader health policy goals, the current capacity of the sys-

tem, and the desired or expected changes in the system. Following the collapse of the former Soviet Union, newly independent states such as Kazakhstan and Kyrgyzstan in Central Asia faced similar health system reform and development challenges, and a case-based hospital payment system was considered to be the best hospital payment option in order to address the following common issues:

- Excess capacity, inefficiency, and lack of competition
- Changing health sector roles and relationships and the need to increase provider autonomy
- Need to increase consumer responsiveness of the system
- Need to improve health information systems

9.1.1. Excess Capacity, Inefficiency, and Lack of Competition

The legacy of the Soviet system and the turbulent transition to a market-based economy had dramatic consequences for the health sector in Central Asia. Resources available to maintain the health care system fell drastically, with health care expenditures as a percentage of GDP declining from approximately six percent at the end of the Soviet period to three percent in the mid-1990s (World Bank 2004). In addition, GDP fell by approximately 50 percent, resulting in a significant reduction in real per capita health expenditures. As health financing collapsed along with the economies of Kazakhstan and Kyrgyzstan, informal payments grew rapidly to fill in the financing gap, further eroding access to necessary health care services.

The health delivery system inherited from the former Soviet Union can be likened to an inverted pyramid. The hospital sector at the top of the pyramid is overdeveloped, and the primary health care sector, which should serve as the broad base of the pyramid, is underdeveloped, underfinanced, and underutilized. The declining health sector resource base could not sustain the current service infrastructure. The overly specialized system contains excess capacity, massive amounts of bricks and mortar, and high fixed costs. Because facilities have historically received their funding based on a combination of capacity and utilization rates, the incentives facing providers have been to maintain large, inefficiently utilized physical structures and excess medical staff.

The allocation of health resources in Central Asia has followed the traditional Soviet line item budgeting process, allocating health funds across facilities by input measures rather than by the quantity and quality of services delivered. Budgets were guaranteed, and providers did not have to compete to attract the population by providing lower cost, higher quality health services. Specifically, the hospital payment system was a line-item budget for inputs based on normative standards. The normatives included number of beds, so hospitals had a strong incentive to increase the number of beds as well as overall infrastructure capacity.

The incentives of an input-based budget, combined with multiple government units managing health delivery systems, an overspecialized hospital sector, weak primary health care sector, and clinical practice characterized by over-utilization of health services, led to significant excess capacity in the health sector. Each government unit (national, state, city, and district) owned and operated often overlapping and duplicative hospitals. The hospital sector was overspecialized and fragmented. For example, each major city would have separate hospitals serving adults, women, and children, as well as specialized hospitals such as emergency care, cardiology, oncology, endocrinology, ophthalmology, tuberculosis, dermato-venerology, as well as other specialties. The nature of clinical practice also fed into an environment of excess capacity and low efficiency in the hospital sector. Primary health care was inadequately provided through catchment area physicians with poor clinical skills and incentives to refer quickly to hospitals. Clinical practice was not based on evidence and promoted the over-utilization of health services, consistent with the large physical capacity in hospitals.

After independence, some attempts were made to rationalize excess hospital capacity using a central planning approach. In general these attempts were unsuccessful, as they focused mainly on reducing beds not buildings, and generating the significant unintended consequence of further decreasing the health budget as capacity in the system was reduced. As budgets were largely based on the number of beds, when beds were reduced the budget was decreased without a decrease in underlying costs such as utilities. It quickly became clear that it was not possible to reduce excess capacity and increase efficiency by rationalization or central planning alone. Changes in financial incentives brought by a new hospital payment system were also necessary to allow shared responsibility between health purchasers and health providers for streamlining the delivery system. Such shared responsibility could not be achieved using centrally planned rationalization. A case-based hospital payment system, however, was able to contribute to creating the conditions for rationalization of the delivery system. Case-based payment requires a pool of hospital funds and the calculation of output-based payment rates,

which allow providers to rationalize excess capacity and increase efficiency without subsequent or consequential budget decreases.[5] The need to reduce excess capacity and increase efficiency in the hospital sector was a major rationale for the introduction of a case-based hospital payment system in Kazakhstan and Kyrgyzstan.

In addition, the new case-based hospital payment system served as a mechanism to stimulate competition, which in some circumstances such as large urban areas, was considered as a necessary step for increasing efficiency and consumer responsiveness. Competition was not seen as relevant or beneficial in all situations, however, such as in remote rural areas, where there may be no effective competition, and it is critical to invest in just one hospital to serve the population. The case-based payment system can still generally be appropriate for remote rural areas, however, since increasing hospital autonomy to allocate internal resources is also vital in these areas. There are a number of ways to adapt the case-based hospital payment system for remote rural areas where increasing competition is not the goal. For example, the type and number of cases treated can be used as an input into the creation of a global budget, or an additional payment adjustment can be added to compensate for low population density and the related low numbers of admissions.

Finally, the introduction of a case-based hospital payment system contributed to increasing overall health sector efficiency by facilitating a shift of resources to primary health care. The hospital payment system relies on a pooling mechanism, which allows transparent policy decisions to be made about the allocation of health resources to different levels of the system, so resources can be explicitly shifted to the primary care sector. The hospital payment system also provides a mechanism to rationalize excess capacity and increase efficiency in the hospital sector, which can free up health care resources that can gradually be shifted to the more cost-effective primary health care sector.

9.1.2. Changing Health Sector Roles and Relationships and Provider Autonomy

In the Former Soviet Union, the Ministry of Finance together with the Ministry of Health (MOH) served as both the purchaser and provider of health services. They set priorities, made resource alloca-

[5] While the system mechanism is in place to allow individual facilities to reinvest savings and avoid budget decreases, it cannot address political decisions to decrease the overall health budget.

tion decisions, and also made many of the small, day-to-day operating or management decisions within the hospitals themselves. In both Kazakhstan and Kyrgyzstan, the case-based hospital payment system served as a pivotal component of the health reform agenda, sparking profound changes in the relationship between health purchasers and providers and the approach to health sector resource allocation.

The roles of the health purchaser and provider were separated, or split, with the MOH or Mandatory Health Insurance Fund (MHIF) serving as the health purchaser, focusing more on allocating resources according to health priorities and less on day-to-day management of health providers. The health providers had more autonomy to adapt to the changing financial incentives in the new provider payment systems, allocate resources more efficiently and effectively, and improve facility management. This separation of functions and changing of roles and relationships also increased the transparency of resource allocation decisions through the use of predetermined and publicized payment rates, which were directly connected to services received by the population. Finally, the new hospital payment system also contributed to decentralizing of management (not finance) functions in a previously overly centralized health system.

9.1.3. Consumer Responsiveness

In the Soviet system, the population was not adequately involved in decisions about their health care. They had limited rights, as well as limited responsibilities. Individuals were unable to choose their primary care providers, and their health care provider did not provide them with information about their health status and treatments. Provider payment systems funded the infrastructure of the health sector not the health services received by the population, and as the state provided everything, people did not take responsibility for their own health. A case-based hospital payment system facilitated a shift in mentality and increase in consumer responsiveness, as hospitals were now paid to provide services to individuals rather than maintain infrastructure and buildings. Thus, the hospital revenue depended, at least in part, on the satisfaction and choice of patients or the primary care providers referring them.

9.1.4. Improvement of Health Information Systems

Although much information was collected under the old Soviet system, very little analysis was done and data was used for political reasons rather than to improve decision-making. It was understood

that a case-based hospital payment system would require the development and implementation of an improved health information system, which could be used for health statistics, quality improvement, billing, and internal hospital management.

9.2. The Role of Case-Based Hospital Payment in the Kyrgyzstan Health Reforms

The Kyrgyz Republic (Kyrgyzstan) is a small mountainous country in former Soviet Central Asia, which gained independence from the Soviet Union in August 1991. Kyrgyzstan has a population of just over 5 million people, and with a per capita gross domestic product (GDP) of US$342, it is one of the poorest former Soviet republics. Between 1990 and 1994, per capita GDP fell by nearly 50 percent in Kyrgyzstan (World Bank 2004), and health expenditures also collapsed. By the early 1990s the health care system was in crisis, with deteriorating quality and accessibility of basic health care and worsening health outcomes, including outbreaks of previously controlled infectious diseases, as well as emerging public health threats.

The Kyrgyzstan health reforms are unmatched in their scope and results in the former Soviet Union, with the exception of the Baltic Republics. The large scope and comprehensiveness of health reform, using a broad health systems approach, has extended its impact well beyond the health sector and resulted in sweeping changes in the way the government delivers services to the population. The reforms were initiated in 1994 with the top-down development of the Manas National Health Care Reform Program (1995-2005) and the bottom-up implementation of reforms in the pilot of Issyk-Kul Oblast (region). Donor coordination has always been a strength of the Kyrgyz health reform process, with a core group of donors including WHO, World Bank, USAID, Swiss Development Corporation, and DFID working closely with Kyrgyz partners to integrate activities into a common conceptual framework.

While it is not the purpose of this brief case study to describe the broad content or process of the health reforms, the program encompasses the following elements: (1) formation of a new primary health care (PHC) sector through the creation of Family Group Practices (FGPs); (2) restructuring the hospital sector; (3) new health financing mechanisms and provider payment systems implemented through a single-payer system; (4) specification of a Basic Benefits Package, including a new outpatient drug benefit and formalized population co-payments; (5) new health information systems; (6) strengthening of health management; (7) introduction of family medicine; (8) strengthening of priority

programs, including maternal and child health and infectious diseases; (9) promotion of evidence-based medicine and the introduction of new clinical practice guidelines; (10) improving health facility infrastructure,, health provider accreditation, and facility level quality improvement; (11) promotion of rational drug use; (12) health promotion; and (13) increasing community involvement in the health sector through the formation of new community health action entities (Village Health Councils).

Health reforms have been implemented nationally – in all seven oblasts (regions) and in Bishkek and Osh Cities – and have touched all levels of the health sector providing individual health services. While pilot programs around the world are often not rolled out, the Kyrgyz health reforms quickly and successfully built on and expanded their initial pilot efforts. The recent development of the Manas-Taalimi National Health Reform Program 2005-2010 aims to consolidate the achievements of the Manas Program and addresses interventions in next generation reforms, such as the public health system, medical education, and infectious disease vertical systems, while simultaneously increasing the capacity of the MOH to design, implement, and measure the impact of health reforms.

The role of a new case-based hospital payment system in these reforms was to serve as a major driver or trigger for a step-by-step health reform process. When the newly established MHIF began implementing health insurance in 1997, significant progress had already been made in national health policy development and pilot implementation. Roll-out of health reform model had begun, including formation of new FGPs, free choice of FGP and population enrollment, introduction of family medicine, and development of new provider payment and health information systems. However, it was the MHIF and its implementation of a case-based hospital payment system that really initiated health financing reform, which became the driver of the next and expanded phase of the health reform program. Through extensive policy dialogue, a decision was made that health insurance would not completely cover a defined population with a benefits package completely separate from the population and benefit package covered by state budget funding as in Russia and Kazakhstan. Rather, the payroll tax funding generated by the health insurance system would serve as an additional or supplemental benefit, in effect reducing population co-payments.

Being in the position of providing *incremental* benefits to the insured population allowed the MHIF the freedom to innovate. The objectives of the MHIF were to leverage its small amount of money (about 10 percent of total health funding) to drive broader health reform, increase health delivery system efficiency, and make the health insurance program visible to the population. The mechanism se-

lected to accomplish these objectives was the introduction of new provider payment systems to create competition, provider autonomy, and population choice. The new case-based hospital payment system was innovative in that it only reimbursed hospitals for variable costs directly related to patient care, while the budget still paid for fixed costs. Specifically, hospitals could use the incremental funds from the case-based payment system to purchase drugs, supplies, food, and to fund performance-based staff bonuses. This resulted in positive support for health insurance from the population (especially pensioners), since co-payments for drugs and supplies were reduced, and providers, since salaries were formally supplemented with bonus payments. Competition and patient choice were promoted, as patients selected hospitals in which drugs, supplies, and food were available. Hospitals that attracted more patients in turn generated more funds for drugs, supplies, and food. In addition, providers were granted more autonomy and began to develop their capacity to manage and allocate resources. This implementation strategy established the case-based hospital payment system as a trigger for health reform, and it continued to play that role as the health reforms took root and expanded.

One of the characteristics of the Kyrgyz health reform process was a step-by-step implementation process and a focus on institutionalization, which had political, technical, and operational benefits. Politically, this approach facilitated the building of support for both current and future steps. Technically, this approach allowed a process of experimentation and refinement, which improved and solidified the interventions. Operationally, this approach built capacity through actual implementation experience, which increased the understanding and ownership of the reforms, and also provided the major development asset of time. Early implementation of a case-based hospital payment system for only variable costs was an important element of this step-by-step approach. As the new MHIF was not immediately responsible for the collection of revenue and payment of expenditures for a complete benefit package for a subset of the population, the fund had time to develop its policies, procedures, human resources capacity, and operating systems. Thus, implementation of the case-based hospital system also served as a vehicle for MHIF institutional development.

Time and an implementation-oriented approach also benefited the development of the capacity of health providers. Under the old system, health providers had very little autonomy to allocate resources or to make even the most basic management decisions. The case-based hospital payment system triggered greater hospital autonomy to allocate resources, which combined with the asset of time, led to improved hospital management functions and systems. Health insurance with its new case-based hospital payment system was initiated in thirteen hospitals spread throughout Kyrgyzstan. The initial re-

action of the thirteen hospitals to the greater autonomy to allocate resources granted under the new hospital payment system was reluctance. Accustomed to a high level of central control, the hospitals did not immediately believe that they would have greater autonomy or readily to understand what to do with the autonomy, since their management functions and systems were not well developed.

After about six months of implementation, the perspective of the hospital managers about their new autonomy had completely changed. They ran with the autonomy and rapidly began improving management functions and systems. The health information system used for billing under the case-based hospital payment system was also used to assess the types of cases the hospitals were treating. Accounting, including management and cost accounting, had improved and was starting to be used for financial analysis as well as the routine recording of expenses. Hospitals had a better understanding of the need to match revenues and expenses and were more cognizant of what neighboring hospitals were doing. The hospital managers had considered and improved their procurement processes for supplies and drugs. Very importantly, most of the hospitals had established a Personnel Committee to consider and decide on the procedures for allocation of performance-based staff bonuses.

As the case-based hospital payment system was rolled out and eventually used to pay all of the general hospitals in Kyrgyzstan, this pattern of institutional development remained the same – the MHIF as health purchaser continued to develop its capacity, the case-based hospital payment system granted greater autonomy to hospitals to allocate resources, and the hospitals rapidly began to improve their health management functions and systems. New provider payment systems (including a capitated rate payment system for FGPs) were driving the realignment of roles and relationships in the health sector, development of the MHIF as health purchaser, and substantial and critical organizational behavior change at the health provider level.

Although the first variable cost case-based hospital payment system for additional or supplemental benefits under the health insurance system drove improvements in hospital management, there was not much restructuring of the hospital sector to reduce excess capacity. The payroll tax for health insurance only represented about ten percent of the total health budget, and the Ministry of Finance and MOH were operating the old line item budgets in parallel. The financial incentives contained in these two provider payment systems were contradictory, and given the larger share paid under the line item budgets, the incentives to maintain capacity were stronger, so little restructuring and rationalization of

the hospital sector occurred. This led to the next step in the health reforms, with the case-based hospital payment system again playing a major role.

In 2001, Kyrgyzstan established a single-payer system with both general revenue health budget and health insurance payroll tax funds pooled in the MHIF, which served as the single-payer under the MOH. The system was initially piloted in two oblasts, then rolled-out nationally step-by-step. By 2004 the single-payer system had largely been implemented throughout Kyrgyzstan. Common financial incentives rewarding the rationalization of excess hospital capacity and increasing efficiency enabled dramatic restructuring and rationalization of the hospital sector (see Table 9.1). The results show that one of the major challenges of the health system inherited from the former Soviet Union is being addressed -- excess capacity in the hospital sector is being rationalized with savings reinvested in direct patient care, such as drugs and increases in very low health professional salaries. The technical efficiency of hospitals has increased, as the share of health expenditures allocated to direct patient care expenses increased from 16 to 36 percent between 2001 and 2003. At the same time, an evaluation of the impact of restructuring found no evidence that downsizing created access barriers to care for the poor. The allocative efficiency of the health system also improved, as the share of health care expenditures devoted to primary health care doubled from 15 to 33 percent between 2001 and 2003. A new capitated rate payment system was used to reimburse FGPs, which led to better funding of salaries, medicines, and supplies at the primary level, and thus significantly contributed to the ongoing process of strengthening cost-effective primary health care.

Table 9.1 Hospital Resource Rationalization in Kyrgyzstan 2001-2004

Infrastructure Parameter	2001 (Actual)	2002 (Actual)	2003 (Actual)	2004 (Planned)	Change 2001-2004	% Change 2001-2004
No. of buildings	1,598	921	921	843	755	-47%
Total floor space	804,960	523,019	523,019	477,149	326,711	-40%
No. of total staff	49,371	50,201	51,087	47,639	2,632	-5%
No. of hospital staff	38,615	30,364	28,764	26,243	12,372	-32%
Average salary/month (som)	533	645	754	932	399	+73%
Amount spent on drugs per case (som)	135	157	207	277	142	+105%
No. of treated patients	503,877	465,115	529,206	549,789	45,912	+8%

The reach of the case-based hospital payment system and its role as a trigger of health reform in Kyrgyzstan extended beyond health financing, and beyond even the structure of the health delivery system. The new hospital payment system also contributed to the development of improved service delivery and quality improvement. One example is the establishment of a connection between health insurance program implementation and facility accreditation. A hospital is not permitted to enter and be reimbursed by the health insurance system until it is accredited. This policy benefited the MHIF initially, because it took time to accredit facilities, which provided a window for development and the ability to manage their growth. The policy also benefited the new Medical Accreditation Commission, as the commission was validated, and licensing and accreditation was accepted and in demand. Finally, an unexpected benefit was an increase in the allocation of resources to the health sector, as some local governments invested in improving the condition of their health facilities to ensure that they would be eligible for participation in the health insurance program. The MHIF also implemented a quality assurance system to monitor quality of hospital services. This system is currently being linked to the introduction of new evidence-based clinical practice guidelines. Finally, although PHC practitioner salaries are still low and require further increases, shifting resources from the hospital sector to PHC is enabling the introduction of family medicine and the gradual increase in the scope of services provided in PHC.

The MHIF implementation strategy, including the case-based hospital payment system, created time for the MHIF to establish its institutional identity, build capacity within the organization, and make investments calculated to provide returns through increased efficiency and equity. With the implementation of the single-payer system, the MOH and MHIF put many of the developing pieces of the health reform puzzle together by specifying a Basic Benefit Package for the population, which included both guaranteed (free) benefits for some health services and formal population co-payments for other health services. In addition, the MHIF solidified its status as a leading change agent by evolving into an active and intelligent health purchaser. The MHIF introduced a new outpatient drug benefit, which continued to strengthen and increase utilization of PHC health services and reduce unnecessary hospitalization for conditions that can be managed in an outpatient setting with appropriate and accessible drug therapy.

The case-based hospital payment system in Kyrgyzstan matured along with the reforms. The system started as a simple system of 28 groups based on data available combining department level groups with diagnosis-based groups (see Chapter 4). Currently, the system is completely diagnosis based,

with about 150 groups and a very well-developed health information system, including an automated billing and accounting system that has paid hospitals for about three million discharged cases since its inception. In summary, in Kyrgyzstan implementation of a case-based hospital payment system served as a trigger or one of the core elements of a step-by-step approach to health reform that now encompasses the entire health sector and is rapidly being institutionalized for long-term sustainability.

Figure 9.1 Timeline of Health Reforms in Kyrgyzstan

1992
Government of Kyrgyzstan passes Health Protection Act and Law on Medical Insurance
1994
Memorandum of Understanding signed between WHO/EURO and MOH to undertake the MANAS Health Care Reform Program
Government of Kyrgyzstan requests USAID technical assistance in health care financing reform and plans pilot in Issyk-Kul oblast
Health Financing and Sustainability Project sends a team to develop a health insurance reform demonstration in Issyk-Kul oblast
National Heath Policy developed and approved by government
USAID awards Health Care Financing and Service Delivery Reform Program in Russia, Ukraine, and Central Asia (later renamed ZdravReform Project)
1995-96
Restructuring of primary health care in Issyk-Kul oblast, including development of new family group practices, introduction of family medicine, open enrollment, and development of new provider payment and health information systems
Government approves MANAS Health Care Reform Program
World Bank-funded Health Sector Reform Project begins (1996-2000) in Bishkek city and Chui oblast
1997-99
Introduction of mandatory health insurance; 13 hospitals contracted with Health Insurance Fund and are paid by a new case-based payment system
Health Insurance Fund brought under MOH
Health Insurance Fund contracting and new provider payment systems expand to 66 hospitals and 290 family group practices
Roll-out of family group practice formation and open enrollment to Bishkek city and Chui oblast
Republican, oblast, city and rayon (district) health care budget funds pooled in Issyk-Kul oblast
Roll-out of reforms and formation of first family group practices to South Kyrgyzstan oblast
2000
MANAS health reform team institutionalized into MOH, Health Insurance Fund, and other health sector entities
USAID awards 5-year Central Asia Quality Health Care Project (later renamed the ZdravPlus Project)
2001
Single-payer system established and pilot-tested in Issyk-Kul and Chui oblasts
Development of monitoring and evaluation systems with support from WHO/DFID Health Policy Analysis Project
Co-payment policy introduced in single-payer system pilot sites; evaluated by Swiss Red Cross
Clear positive results in Issyk-Kul and Chui oblasts, including rationalization of beds, buildings, and staff; reinvestment of savings; increases in salaries; reduction in fixed costs; population accepts co-payments and informal payments appear to decline
World Bank-funded Health Sector Reform Project II begins

Source: Adapted from McEuen 2004

9.3. Case-Based Hospital Payment as a Stable Element of Uneven Reforms in Kazakhstan

The Republic of Kazakhstan is a country in former Soviet Central Asia with a vast landmass, the ninth largest country in the world. The population was estimated at 15.7 million in 1997 and at 15 million in 2004, with projections of 17.5 million in 2010. Economic growth has taken off, and with the discovery and extraction of oil reserves in the Caspian Sea, Kazakhstan is poised to move from a low-income to a middle-income country in the very near future. The nominal per capita gross domestic product (GDP) was $1,260 and $2,253 in 2000 and 2003, respectively (World Bank 2004 [77]). Health indicators in Kazakhstan deteriorated during the transition period similar to other former Soviet countries in the region. Life expectancy at birth was estimated to be only 61.3 years in 2003 (World Bank 2004 [77]).

Kazakhstan is characterized by a sophisticated and fluid health policy environment. Over the last seven years, leadership of the MOH has changed often, and the pendulum of health policy has swung widely from progressive reform agendas to repeal of reforms and back again. New hospital payment systems have been part of the health financing policy in Kazakhstan, even during the periods of most stagnant overall health reforms. The role of a case-based hospital payment system has been different in Kazakhstan than in Kyrgyzstan, however. In Kyrgyzstan the hospital payment system served as a major driver or trigger for a step-by-step health reform process. In Kazakhstan, the new case-based hospital payment system served as a constant policy approach in a very fluid and often unstable health policy environment. The equally critical but different roles case-based hospital payment systems have played in each country reflects the core importance and flexibility of hospital payment systems in the overall development of health systems. Hospital payment systems determine the incentives faced by and, therefore, strongly influence the behavior of hospitals, which has a profound effect on the performance of the entire health system.

Health financing reform in Kazakhstan was initiated with the introduction of mandatory health insurance in 1996. Following a pilot test of mandatory health insurance schemes beginning in 1993, Kazakhstan established the legal basis for a national Mandatory Health Insurance Fund (MHIF) in 1995. The insurance system became operational and began financing health care services in mid-1996, and was canceled at the end of 1998. Thus, the existence of Kazakhstan's mandatory health insurance system was brief, lasting less than three years. The MHIF in Kazakhstan was burdened from the start

with inappropriate goals, a flawed design and institutional structure, and an unrealistic implementation strategy. There is also evidence, however, that during its brief existence, Kazakhstan's MHI system was beginning to effect some change in the roles and relationships among the government, providers, and patients in the health care system. Innovations in provider payment systems, contracting with providers, and computerized information systems were driven by the MHIF rather than the Ministry of Health (MOH) between 1996 and 1999. The new case-based hospital payment system implemented by the MHIF was central to many of these innovations.

The health insurance system was intended to provide nearly universal coverage, with a three-percent payroll tax contribution to cover the formally employed, and local government transfers to cover children, pensioners and officially unemployed. The budget transfer to the MHIF to insure the socially protected non-working population was a per capita amount set by the Federal MHIF but subject to modification by local governments. Self-employed or unofficially unemployed individuals were required to pay a per capita premium directly to the MHIF to obtain coverage. The system was hampered from the beginning by a focus on revenue collection to compensate for inadequate transfers from local governments to cover an ambitious set of services for nearly all of the population, and an unclear relationship with the MOH.

The MOH also continued to have responsibility for financing some health services, which contributed to unclear roles and relationships between the MHIF and MOH. The MHIF financed a "basic package" of services, which was in addition to the "guaranteed package" financed by national and local budgets through the Ministry of Health (MOH). The guaranteed and basic packages together covered nearly all health services for all population groups. These packages were poorly defined in terms of types of services, however, allowing opportunistic interpretation by both institutions and by health care providers. The unclear roles and relationships of the MOH and the new MHIF also resulted in inconsistent, contradictory, or duplicative health policies and technical interventions. For example, the payroll tax funding for health insurance was pooled at the oblast level, and the Mandatory Health Insurance Fund (MHIF) was able to start implementing new provider payment systems. The local budget contribution to health funding, however, was transferred to providers according to the former historical input-based budget system. Therefore, health providers received funding from two different purchasers in a way that created contradictory incentives.

From the beginning of the health insurance system in Kazakhstan, however, the MHIF took steps to drive the system away from fixed input-based budgets for health facilities to new provider payment systems based on the number of services provided. A national case-based hospital payment system was rapidly developed and implemented by the MHIF, with the legal basis provided by the Law on Health Protection, as well as the mandate laws and regulatory decrees governing the MHIF.

The first case-based hospital payment system was the simplest model with a region-specific (geographic) payment per case and no case grouping or price differentiation for the type or groups of cases. This system was a reasonable first step in a continuous refinement and improvement process. However, the first case-based hospital payment system in Kazakhstan also included facility-specific coefficients, which differentiated payment to hospitals by their type and administrative level (rural, district, region). These coefficients created payment rates that approached hospital-specific rates. Thus, there were no incentives for restructuring or increased efficiency, but there were incentives to hospitals to admit low-cost cases and under-serve severely ill patients. Retrospective analysis showed only a minimal correlation between cost per case and the administrative level of the hospitals. For example, the regional or higher administrative level hospitals that received a higher payment coefficient had only an average case mix index (case severity). This experience therefore also provided a valuable perspective on the natural political inclination to separate hospital payment rates by administrative level. This lesson learned was taken into account in the next generation of case-based hospital payment systems in Kazakhstan, which did not contain hospital-specific coefficients. Thus, this first case-based hospital payment system and the process of initial refinement started the health purchasing reform process established hospital payment as a core element or block in the foundation of health reform, and initiated a change in the roles and relationships between the health purchaser and providers.

From 1995-1998, Zhezkazgan and Semipalatinsk Oblasts (regions) were the primary pilot oblasts in Kazakhstan. The USAID-funded ZdravReform Project supported a number of interventions in these pilot oblasts, including the development and incremental implementation of case-based hospital payment systems. Both oblasts implemented new hospital payment systems incrementally, with Zhezkazgan Oblast transitioning from the Soviet-era input-based line item budgeting system to a per-diem payment system, then to a case-based system with cases grouped by diagnosis. Semipalatinsk Oblast worked to develop a system with cases grouped by diagnosis, first using a paper system that did not initially change the flow of funds in the health system. The systems developed by Zhezkazgan and Semipalatinsk Oblasts, as well as other experimental sites in Kazakhstan, also varied by other factors,

including which costs were included in the case-based hospital payment system and how surgeries were classified. This dialogue and debate surrounding the different approaches to case-based hospital payment contributed to the overall reform dialogue in Kazakhstan and became a cornerstone of capacity-building and education of policy makers, system managers, and health providers.

Consistent with the naturally fluid environment in Kazakhstan, in 1998 Zhezkazgan and Semipalatinsk Oblasts were merged into Karaganda and East Kazakhstan Oblasts, respectively. Around the same time, the MOH merged into a broader Ministry of Education, Culture, and Health, and the capital of the country moved from Almaty City to Astana City. These major changes in the country's administrative structure translated into uncertainty in health policy directions. In addition, health insurance was cancelled in 1998, for a variety of both political and technical reasons. Politically, the multi-payer system where both the MOH and MHIF purchased health services created unclear roles and relationships, institutional conflict, and fragmented health policy. In addition, the national vertical structure of the MHIF was not accepted by the relatively autonomous oblasts. Technically, the pre-conditions for national health insurance were not met prior to implementation, including health delivery system restructuring, sufficient health provider management capacity, clear benefits packages, and provider payment systems with clear and non-conflicting incentives. Following the cancellation of the health insurance system, a health purchasing center was established in the MOH and Oblast Health Departments, and although several other reform initiatives were stalled or rolled back at that time, the implementation of new provider payment systems, including the case-based hospital payment system, continued and even advanced in some regions, particularly in Karaganda Oblast.

The health reforms were extended from Zhezkazgan to Karaganda Oblast, which became the lead pilot site in Kazakhstan, with the accelerated development and implementation of the case-based hospital payment system a major element of the health reform model. After implementation of the case-based hospital payment system with cases grouped by diagnosis in Karaganda Oblast from 1998-2001, the number of hospital admissions stabilized, inappropriate admissions declined, the average length of stay dropped by about two days as hospitals began to restructure and increase efficiency, and resources began to be shifted to more cost-effective primary health care. The process of extension or roll-out of the new case-based hospital payment system with cases grouped by diagnosis to other oblasts began after these positive results began to emerge and were disseminated to national and regional health policymakers.

In 2001, changes in several overarching Kazakh laws impacted the health sector and made implementation of health financing reform very difficult for several years. The Law on Budget and Law on Self-Governance decentralized health funding to the rayon and city level, which fragmented funding pools and severely reduced equity. In addition, the decentralization of health funding inhibited the implementation of new provider payment systems containing incentives for increased efficiency in the health sector, because funding could not follow patients across administrative boundaries. In addition, the Law on State Procurement (*Goszakaz*) established a tender process for health services that was implemented through negotiations with health facilities on line-item budgets, which returned to funding facility inputs and infrastructure, instead of provider payment systems reimbursing health facilities for health services provided to people with the freedom to choose where they receive services.

This legal framework, which was in place from 2001-2004, hampered the implementation of case-based hospital payment systems. However, some oblasts and cities, including Karaganda City, continued to implement a modified version of the system, thus maintaining the role of a relative constant element in an ever-changing policy environment. For example, in a number of sites, although the case-based payment system could not be used directly to reimburse providers, it was used as a tool to negotiate the volume of cases in hospital budgets under the Law on State Procurement. During this time, great strides were made in refining the case groupings, and broader implementation of the automated hospital database required for the case-based hospital payment system was achieved. An increasing number of oblasts and cities implemented the system, and by 2004 Kazakhstan had approximately seven million hospital cases in the hospital database.

In addition, connections were made between the automated hospital database and other health system interventions, particularly related to quality. For example, a primary health care monitoring system was developed in Karaganda Oblast and then extended to other oblasts. The monitoring system relied on the hospital case database to monitor hospitalizations for primary health care-sensitive conditions, an indicator of primary health care performance. This significant progress in using the health information systems that supported case-based hospital payment to further develop quality assurance systems provided a stronger foundation for future expansion of health purchasing reform and development.

Since 2004, the health policy environment in Kazakhstan has significantly stabilized. An intensive and participatory policy dialogue process including most stakeholders resulted in Presidential approval of the State Health Care Development Program 2005-2010 in September 2004. The State Health Care

Development Program (SHCDP) is considered to be a solid strategy that encompasses nearly all elements of health system development. Many working groups were actively involved in the development of the SHCDP, and roundtables were held to obtain input from various stakeholder groups, including educators and non-government organizations. The corresponding implementation plan approved by the Government of Kazakhstan details activities, assigns responsibilities, and attaches state budget funds to contribute to and institutionalize implementation of the strategy. In Kazakhstan, 2004 also saw the development and approval of a comprehensive legal framework for national implementation of health financing reform. The national framework includes pooling of funds at the oblast level and implementation of the new provider payment systems developed in the pilot oblasts. In addition, Kazakhstan decided not to reintroduce health insurance but rather to double the health budget over three years.

Implementation of the SHCDP and the legal framework for health financing reform should contribute to stabilizing the wide swings of the health policy pendulum and allow Kazakhstan to embark on a less chaotic and more planned step-by-step approach to health policy and health system development and strengthening. Kazakhstan should move forward rapidly with full implementation of a national case-based hospital payment system with cases grouped by diagnosis under the new legal framework, as many of the supporting health information systems have already been developed. The case-based hospital payment system should also serve as a primary resource allocation mechanism for the greatly increased health budget. Many technical issues remain to be addressed, however, in health care financing in Kazakhstan. For example, changing how health funds flow through the treasury system is a challenge, as current funds flow processes are inconsistent with case-based hospital payment system implementation and increased hospital autonomy. The current step-by-step implementation process should facilitate addressing most of these issues and challenges. In summary, it appears that over the next few years the role of the case-based hospital system in the Kazakhstan health reforms will evolve from a constant in an unstable health policy environment to an engine or agent of change in a more stable environment.

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