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ADVISORY SERVICES AGREEMENT**between****MINISTRY OF HEALTH OF THE REPUBLIC OF BULGARIA****and the****INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT****Final Action Plan
for the Implementation of DRGs-
based payments****May 2015**

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List of abbreviations

ACHI	Australian Classification of Health Interventions
APR-DRGs	All-Patient Refined Diagnosis-Related Groups
AR-DRGs	Australian Refined Diagnosis-Related Groups
BMA	Bulgarian Medical Association
CCPs	Clinical Care Pathways
CMI	Case-Mix Index
DHHS	Department of Health and Human Services
DRGs	Diagnosis-Related Groups
EU	European Union
HCFA	Health Care Financing Administration
HHS	Health and Human Services
HMIS	Health Management Information System
ICD	International Classification of Diseases
IR-DGRs	International Refined Diagnosis-Related Groups
IST	Implementation Strategy Team
IT	Information Technology
MOH	Ministry of Health
NCPHA	National Centre of Public Health and Analysis
NHIF	National Health Insurance Fund
NRA	National Revenue Agency
NSSI	National Social Security Institution
OECD	Organization of Economic Cooperation and Development
PACS	Picture Archiving and Communication System
PCs	Personal Computers
PPS	Prospective Payment System
SSH	Specialized Software for Hospital
USAID	U.S. Agency for International Development
WHO	World Health Organization

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Background and presentation of the Report

Bulgaria under the guidance of the Minister of Health is undertaking a major reform of its health system. One input to the reform is a joint study with the World Bank on health financing in Bulgaria (*The World Bank Diagnostic Report*)¹. The report evaluates the strengths and weaknesses of Bulgaria's health financing system in terms of the three health financing functions of revenue raising, risk pooling, and purchasing of services. It assesses each of these financing functions in terms of the health financing goals of improving health outcomes, financial protection, and consumer responsiveness in an efficient, equitable, and sustainable manner.

The assessment of the health financing system documented significant strengths in the system, but also major challenges in terms of the purchasing function and current hospital payment practices. These challenges included unsustainable growth in hospital spending; lack of incentives for efficiency, quality, or cost control, and strong incentives for hospitalization over treatment in less expensive outpatient settings. Fundamental problems with the current hospital payment system using Clinical Care Pathways (CCPs) were highlighted.

The Minister of Health's 'Concept Note Health 2020 Goals' that was approved by the Council of Ministers in February 2015, also raised strong concerns about hospital efficiency, the need to pay for results, and the sustainability of the entire health financing system, for which hospital spending accounts for about one-half. "Introducing a system of payment of hospital activity based on results from diagnosing and treatment activities" was stated as one of the main measures to achieve health reform priority objectives².

Diagnosis-Related Groups (DRGs) are one of the most widely used hospital financing systems globally in OECD, EU and increasingly in emerging market countries. Bulgaria has been studying and developing DRGs since the mid-1990s. While *The World Bank Diagnostic Report* provides a detailed assessment of all of Bulgaria's provider payment systems including their inter-linkages and provides overarching recommendations on payment reforms including DRGs. Therefore, this report does not repeat what is detailed in the Diagnostic Report, but rather it is intended to serve as a practical guide for implementing DRG-based financing in Bulgaria, building upon both the country's substantial past investments and its current expertise. It was written as part of the World Bank's Advisory Services on Health Financing and is based on the premise that a decision to adopt DRGs was seriously considered by the Government of Bulgaria, as reflected in the Government's request to include a draft DRGs Action Plan in the deliverables of the Advisory Services.

¹ Full reference: The World Bank (2015) Advisory Services on Health Financing in Bulgaria. Intermediate report. Draft diagnostic, actuarial costing model and an array of options for reforming the current system.

² [English version] Ministry of Health of the Republic of Bulgaria. Concept Note Health 2020 Goals. Sofia 2015 (page 36)

Purpose of this report

The purpose of this report is to provide information to Bulgarian decision-makers on how Bulgaria can move towards implementing a DRG-based hospital budgeting and payment system. The report was prepared by a team of Bulgarian and international DRG experts who have been involved in the country's DRG assessment and planning since its inception. The report is intended for a wide-ranging audience that includes high-level policy-makers who are weighting the benefits of implementing DRGs, technical staff who may be tasked with implementing the Action Plan, and other key stakeholders who may be less familiar with the use of case-mix as a mechanism to provide payment to hospitals.

The report has a two-fold purpose:

- First, it provides a primer about case-mix systems in general, and DRGs in particular, as well as the technical steps necessary to implement DRGs. It also describes the significant work conducted in Bulgaria to date and the array of technical knowledge and infrastructure that exists in the country.
- Second, it provides a draft Action Plan containing necessary steps with a timeline and budget that, together, outline the technical and political activities necessary to reform the current hospital payment system. Given the Bulgarian context, the suggested approach is to begin movement towards DRG implementation by conducting a rigorous pilot test of using DRGs for payment and budgeting with a small number of hospitals. This is a useful approach as a pilot project allows all stakeholders time to learn, time to make and test policy decisions, and time to evaluate future directions in a short-time frame. Such an approach is also politically palatable. If Bulgaria wanted to move directly to full implementation of DRGs, the information in this report can easily be adapted to support such a step. The Action Plan contains a number of activities that will need to be carried out by different stakeholders and experts. The report describes the roles and responsibilities across different institutions for developing, implementing, and maintaining a DRG-based payment system but purposely does not provide specific recommendations on which institutions should do what since there is no “one right way” for Bulgaria to move forward but rather there are many options and we leave it to Bulgarian decision-makers to determine what would be best in terms of division of labor/tasks across institutions. The Action Plan also builds upon Bulgaria's significant knowledge about, and readiness to implement, DRGs for hospital budgeting and payment — including its developed health management information systems (HMIS) processes. Our expectation is that the Action Plan will serve as the basis of many discussions and revisions will be made to both the tasks included and the timing of both specific tasks as well as the overall timeline. The timeline is intentionally aggressive and may require some modification based on discussions that decision-makers will have.

Information provided in the following chapters

Given its importance, technical complexity, political sensitivity, and the high level of erroneous conventional wisdoms about DRGs, the report includes a significant amount of background information, detailed technical implementation information, and a thorough assessment of the Bulgarian context and readiness to engage in system reform. Because the report is directed at such a varied audience, the content is presented in different chapters, so each type of reader can gain the most useful information in the most convenient manner.

The first part of the report is fairly general; the second half is quite specialized, and is designed to aid technical staff in moving swiftly to begin a DRG pilot project, if the stakeholders determine to do so. Readers with a strong working knowledge of case-mix tools, DRGs, and/or the country's experience with financing systems are encouraged to skip sections and/or chapters that present this information.

The content of the chapters is as follows:

- *Chapter 1* presents background information on various hospital payment methodologies, and describes case-mix payment systems, which are the most common tool. It describes case-mix systems' uses, risks, and benefits, and presents background information on the most widely used case-mix method – the DRGs. This chapter will be useful for those who wish to learn about the overall concept of hospital financing methods, case-mix systems in general, and DRGs in particular. Stakeholders who wish to compare DRGs with the current process in Bulgaria (i.e., CCPs) will also benefit from this information.
- *Chapter 2* provides an overview of the current Bulgarian situation, including the use of CCPs to create hospital contracted budgets and to pay facilities for their services. It is intended to inform decision-makers about pilot testing a DRG-based payment system to improve how health care funds are distributed. This chapter will be useful for those who are less familiar with Bulgaria's history with DRGs and/or its current use of CCPs. The *World Bank Diagnostic Report* presents more detailed information about CCPs, the challenges associated with the use of this tool, and the benefits from the current process.
- *Chapter 3* presents the primary technical steps required to effectively and successfully implement a DRG-based payment system, and describes Bulgaria's readiness and/or experience with each step. It provides detailed information about the technical decisions and computations that must be made to mitigate risks and effectively use DRGs. It also describes the roles and responsibilities across institutions for developing, implementing, and maintaining a DRG-based financing system. This chapter will be useful for those who wish to understand Bulgaria's readiness to implement DRGs and the context for the process described in the Action Plan.
- *Chapter 4* presents the Action Plan and the associated activities to build upon Bulgaria's past work and infrastructure to pilot-test a DRG based payment system. The Action Plan presents a timeline, budget, and activities for implementing the technical steps detailed in Chapter 3. The detailed steps and the timeline provided stem from our understanding of Bulgaria's current level of expertise, the processes achieved to date, and what is needed to move forward with a pilot implementation but ultimately the Action Plan will need to be reviewed and revised by Bulgarian decision-makers. This Chapter also describes existing HMIS processes (i.e., data collection, storage, ownership, and communication) and will be most useful for those who seek a greater understanding about the activities that need to be conducted in order to proceed with a pilot DRG implementation.

Chapter 1 – A Primer on Case Mix and Diagnosis Related Groups

1. This chapter presents brief information on hospital payment methodologies, provides detailed information on the most common method used for paying hospitals (case-based, case-mix), describes the use, risks, and benefits of this tool, and describes the most common case-mix method, DRGs. Technical information is presented in text boxes and footnotes for those who wish to gain a deeper understanding of these concepts.

2. This chapter is useful for those who wish to learn about hospital financing methods, case-mix systems in general, and DRGs in particular. Stakeholders who wish to compare DRGs with the current process (i.e., CCPs) will also benefit from this information. Readers who are already familiar with case-mix tools and DRGs, or who do not need this information, are welcome to skip this chapter.

1.1. Introduction to Hospital Payment Systems

3. Health care purchasers or payors have a variety of different ways they can purchase health care services. From a policy perspective, they want to obtain value for the money they spend. Different tools generate different incentives and disincentives, therefore selection of tools to pay for health care services is important and must be done carefully. For example, historically, many purchasers used *input* tools — such as the number of beds a hospital has or the number and types of equipment available — as the basis for its payment system and/or to create hospital budgets. This method does not create efficiency incentives nor relate what is being “purchased” in terms of hospital services or treated patients, etc.

4. As a result, over time, purchasers of health care services have moved to using *output* tools — such as the number of bed days produced or the number and types of patients discharged. The number and type of patients discharged best describes the mix of cases a hospital treats and is the most widely used tool to pay for health care services provided by hospitals. Measuring outputs is useful as it allows payors to purchase services in a similar manner across hospitals, and incentivizes hospitals to manage their inputs as they receive a fixed amount of money for each “product.” While the debate continues about the optimal output measures, it is widely accepted that these measures create more incentives for efficient hospital behavior and also contribute more management autonomy and flexibility.

Different tools can be used to distribute money in the same way, and the same tool can be used to distribute money in different ways. For example, in the U.S., case-based tools are used to pay hospitals using a transactional payment system, while other countries use the same case-based tool to create hospital budgets.

5. Regardless of the tool used, purchasers will need to have accurate and complete clinical and cost data in order to create an effective and fair payment or budgeting system. The product purchased needs to be measurable, and the costs associated with the activity or unit of measure must be clearly identifiable and known. Otherwise, it is impossible to distribute health care resources efficiently, fairly, or equitably.

1.2. Introduction to Case-Mix Concepts

6. One popular output-based tool that is commonly used to finance hospital services is per-case payment, also commonly referred to as “case-based payment” or “case-mix payment.” This tool is used to create payment systems and/or global budgets for hospitals.

7. A “case” may be defined in a variety of ways: it might be defined as a patient discharged from the hospital or from a specific department. It might be defined as a certain combination of diagnosis and procedures treated over a short timespan from admission to discharge, and include all of the services provided (i.e., labs, tests, devices, etc.). It may be defined as a case that spans a longer period of time, commonly referred to as an “episode of care,” such as a pregnant woman who receives pre- and post-delivery care as well as care related to the actual birth. Case-mix can be used for many purposes (see box), but the most widespread use around the world is to distribute limited health care resources.

Some Common Uses of Case-Mix

- Distribute limited resources equitably;
- Compare hospitals across a wide range of resource and outcome measures;
- Evaluate inpatient mortality rates;
- Conduct management and planning activities;
- Benchmark hospitals, departments, physicians, etc.;
- Conduct utilization review and quality assurance activities, and more.

8. Using case-mix to pay hospitals is viewed as a balanced approach to financing because it aims to share financial risk between the provider and the payor. The purchaser (or payor) must be able to measure the type and volume of patients treated, and assign a monetary value to them in order to allocate resources equitably and efficiently. Case-mix aims to measure the production of health care institutions (i.e., hospitals) by assigning hospital discharges into *clinically meaningful and resource homogeneous groups* based on clinical and cost characteristics, and then assigning a monetary value intended to represent the cost of the average case.

9. The term “case-mix” refers to an interrelated — but distinct — set of patient attributes including:

- *Resource intensity*: the relative volume and types of diagnostic, therapeutic, and bed services used to manage a particular illness.
- *Severity of illness*: the relative levels of loss of function and mortality that may be experienced by patients with a particular disease.
- *Prognoses*: the probable outcome of an illness including the likelihood of improvement or deterioration in the severity of the illness, likelihood of recurrence, and the patient’s probable life span.
- *Treatment difficulty*: the patient-management problems that a particular illness presents to the health care provider; these are associated with illnesses without a clear pattern of symptoms, illnesses requiring sophisticated and technically difficult procedures, and illnesses requiring close monitoring and supervision.
- *Need for intervention*: the consequences (in terms of severity of illness) that would result from a lack of immediate and/or continuing care.

10. Clinically, “case-mix” typically refers to the severity of the patient’s condition and the difficulty associated with providing care to that patient. For example, a hospital with a higher mix of complex

cases, is viewed as seeing patients who are more severe, more complicated in terms of treatment difficulty, at a greater risk of mortality, requiring more interventions and resources, and/or with a worse prognoses.

11. From an administrative or regulatory perspective, “case-mix” refers to the resource-intensity demands that the patient places on the institution; some patients require a higher level of resources, resulting in larger costs to provide them with high-quality, appropriate care. While the two interpretations of case-mix are often closely related, they can vary widely for certain kinds of patients. For example, terminal cancer patients are severely ill and have a poor prognosis, but often require few hospital resources beyond basic nursing care.

12. With respect to hospital payment or budgeting systems, case-mix tools are used to measure the types of patients treated in the hospital setting (versus only counting cases or looking at the volume); analyze the differences in resource intensity of various types of patient care; and to allocate resources equitably and efficiently based on hospital output (versus input).

13. Different case-mix tools exist around the world. Some measure the production of inpatient hospital care (i.e., DRGs), while others measure the production of outpatient care (i.e., Ambulatory Payment Classifications, Ambulatory Visit Groups, etc.), still others can measure Home Health Care, Long-Term Care, Skilled Nursing Facility care, etc.

14. Despite the different types of case-mix systems that exist as well as new ones that are being created, they all typically share the following common characteristics of being:

- Medically and clinically meaningful;
- Involve similar (i.e., homogenous) resources;
- Use routinely available demographic, clinical, and cost data that can be statistically analyzed and validated; and
- Involve a manageable number of groups/categories (i.e., neither too few nor too many) without compromising clinical or resource homogeneity.

1.3. Benefits and Risks of Case-Mix Tools

15. Key benefits of using case-mix as the basis of a hospital payment or budgeting system include:

- *Increasing transparency:* Case-mix systems help distribute funds in an objective and data-driven manner to ensure that hospitals receive funds that are directly linked to the number and types of cases treated rather than based on input measures or subjective criteria such as hospital location or ownership.
- *Increasing efficiency:* Case-mix systems incentivize hospital efficiency by rewarding *outputs* rather than inputs, and rewarding hospitals that provide services the most efficiently (e.g., below the average or median cost). Hospital payments can be made (and/or budgets contracted) at a predictable fixed or national price that reflects cost variations among different inpatient clinical services. Hospitals receive a fixed amount of money for a certain average length of stay by case-mix classification groups; this incentivizes them to be efficient in their care delivery and reduces both patient length of stay and the costs per patient.
- *Recognizing and promoting equity:* Case-mix systems foster equality among hospitals and ensure that providers are treated fairly. Any unique characteristics or circumstances that might increase a

hospital's costs that are outside of the facility's control can be addressed through the use of adjustments (i.e., hospital type, location, teaching vs. non-teaching, etc.).

16. Key risks that come with using case-mix that must be monitored and mitigated include:

- Discharging patients “quicker” and “sicker” from the hospital;
- Providing sub-optimal care (i.e., fewer procedures and/or less care may be provided to generate savings or profits);
- Reporting of fraudulent diagnosis and/or procedure codes resulting in ‘up coding/DRG-creep’ to earn more money;
- Inappropriate transfers to other hospitals;
- Volume increases;
- Cherry picking (also referred to as “cream skimming”) of patients where hospitals may select only certain types of patients and turn away others or encourage them to seek care elsewhere. These risks along with others as well as possible mitigation measures are further discussed in section 1.5.

17. Such risks are valid concerns and must be addressed by countries that use case-mix tools to finance hospital care. Addressing them is done by implementing strong up front contracting rules and processes while also carefully monitoring the data. Clinical and quality measures should be monitored to ensure that hospitals do not try to take advantage of case-mix payments by engaging in inappropriate clinical practices that negatively impact patient care and outcomes.³

1.4. Understanding DRGs

18. DRGs are a form of case-mix tool based on diagnosis and procedures and a specific grouping algorithm that assigns a payment level based on the patient treatment's relative resource-intensity. They are the most well-known and widely used type of case-mix tool used to classify acute care inpatient hospital cases. Patients are assigned into groups that are clinically comparable and have a similar pattern of resource use. (The first step in creating the hospital inpatient groups is by looking at the “relatedness” of the “diagnosis” by body system or medical diagnostic category, hence the name “diagnosis-related groups”). DRGs are developed using demographic and clinical information routinely found in hospital inpatient medical records (see box). The patient

Minimum Basic Data Set for Assigning a DRG to an Inpatient

- Principal diagnosis
- Secondary diagnoses (to account for comorbidities)
- Operating room (OR) and non-OR procedures (to account for complications)
- Age
- Birth weight for newborns
- Sex / gender
- Discharge status (i.e., discharge, transfer, death)

³ These include looking at mortality rates, morbidity rates, infection rates, transfer rates, re-admission rates, days in the intensive care units, etc. During the early years of DRG implementation in the U.S., hospital discharges were carefully monitored in order to identify and prevent negative outcomes. Because hospitals knew they were being monitored, they did not attempt to behave in inappropriate ways; instead, they were incentivized to provide high-quality health care in an efficient manner. They no longer had a financial incentive to buy the most expensive drugs and/or devices, or to keep their patients in the bed longer than needed, so they changed these behaviours. Hospitals made trade-offs to reduce their costs while continuing to provide the proper care to their patients.

classification system provides a way to relate the *type of patients* treated by a hospital (i.e., its case-mix) to the *costs incurred* by that hospital.⁴

19. DRGs were first designed and developed in the late 1960s at Yale University in the United States in order to create an effective framework to monitor service utilization within hospital settings. DRGs were designed to relate a hospital's mix of patients and the resources required to treat those patients to the hospital's overall costs. DRG groups were created to be both clinically meaningful and resource homogenous. A hospital that has a more complex mix of cases is expected to expend more resources and thus incur more costs than a hospital treating a less complex mix of cases. A hospital with the higher mix of cases would thus receive more money than a hospital with a lower mix of cases, assuming both hospitals had a similar case-load or volume.

20. In 1983, the U.S. created a national DRG-based hospital prospective payment system (PPS) for all Medicare patients, which was managed by the U.S. Department of Health and Human Services' (HHS) Health Care Financing Administration (HCFA).⁵ This very basic DRG system was used to pay U.S. hospitals for care provided to Medicare beneficiaries and incentivize the hospitals to become more efficient. In 2007, the U.S. Medicare program replaced the original DRG system with Medicare Severity-adjusted DRGs (MS-DRGs), which was a major refinement to the groupings. At the same time, the U.S. government began to tie inpatient reimbursement to the quality of care provided to patients.

21. Although this initial DRG system was used to address care delivered primarily to the elderly, the use, application, and types of DRG classification systems have grown significantly over the years. 3M Health Information Systems (3M HIS) created some of the first expanded systems, including All-Patient DRGs (AP-DRGs), All-Patient Refined DRGs (APR-DRGs) and International Refined DRGs (IR-DRGs). DRG groups range in size from 500 groups to more than 1000.

22. Internationally, many governments have created more specific DRG systems, such as the Australian Refined Diagnosis Related Groups (AR-DRGs), Nordic countries' Nord-DRGs, Hungarian DRGs, German DRGs, and many more. Much development has occurred over the years to address some of the limitations that exist with DRG systems such as improving the definitions and relative weights of many non-surgical/non-intervention DRG groups. A selected list of countries around the world that have studied and/or implemented the use of some type of DRGs to serve as the basis of their hospital payment or budgeting systems is provided in the chart below.

⁴ Ideally, costs of DRGs are based on the 'efficient costs of production,' not only actual incurred costs. In the absence of detailed studies of hospital production efficiency, this is often done by defining 'efficient' as the mean or median costs of comparable hospitals.

⁵ The U.S. Congress did this by amending the Social Security Act, which governs the U.S. Medicare program. Medicare is a social insurance program for the elderly, disabled, and those with end-stage renal disease that is financed by payroll taxes on the working age population, premiums from program enrollees, and general revenue contributions from the Government.

Selected List of Countries Studying or Using DRGs

- Australia
- Belgium
- Canada
- China
- Costa Rica
- Czech Republic
- Denmark
- England
- Estonia
- Finland
- France
- Georgia
- Germany
- Ghana
- Hungary
- Iceland
- Indonesia
- Ireland
- Italy
- Japan
- Korea
- Latvia
- Lithuania
- Malaysia
- Moldova
- Netherlands
- New Zealand
- Norway
- Portugal
- Romania
- Singapore
- Slovenia
- South Africa
- Spain
- Sweden
- Switzerland
- Taiwan
- Thailand
- Turkey
- United States

1.5. Misconceptions, Concerns, and Questions about Using DRGs as the Basis of a Payment or Budgeting System

23. Despite the expansion of DRGs internationally, many concerns and misconceptions exist. Some concerns stem from a lack of understanding about DRGs and case-mix tools. Others stem from a misunderstanding of how DRG-based payment system's impact on doctors and medical specialists. Table 1, below, addresses the most common concerns and misperceptions. Many of these concerns have also been raised by Bulgarian stakeholders over the years.

Table 1: Common Concerns and Misperceptions about DRGs

Misconception / Concern / Question	DRG Reality
DRGs are a prospective payment tool and cannot be used to create hospital budgets.	DRGs measure the resource-intensity of the types of cases treated; they can be used for a variety of purposes, including as the basis of a case-based payment system and/or to develop contracted hospital budgets.
DRG is a tool to reduce or cut the amount of money available to fund hospitals.	The total amount of money available to fund hospital services is a policy decision. DRGs in and of themselves do not have the power to increase or decrease the funds available. The tool only distributes the available funds in a fair and equitable manner.
DRGs are a tool used to control doctors and how they practice and/or deliver care.	DRGs create efficiency incentives, which can benefit providers, payors, and patients alike, if they are implemented and monitored correctly. The DRG tool has no prescriptive rules or requirements about what care should be delivered or how.
Using DRGs will reduce the quality of care that patients receive because hospitals will discharge patients "quicker and sicker" or not provide the needed services.	DRGs do not automatically cause the quality of care to increase or decrease. Rather, they are used to create incentives to provide the appropriate care, as efficiently as possible, in the best setting. DRGs can also help highlight differences in care delivery through benchmarking. The best way to mitigate any inappropriate behavior on the part of physicians or

	hospitals (i.e., delivering lower-quality care) is to ensure that auditing and monitoring exists to provide oversight over these activities and their outcomes.
The health care system needs to be better financed before the country can implement DRGs as the basis of a payment or budgeting system.	As noted above, the amount of finances available in the system is a separate political decision, and does not stem from the DRG process itself. DRGs help distribute the available funds but do not create or limit the money available in the health system.
Implementation of DRGs depends on having a large amount of high-quality data to group patients / cases into DRGs.	Implementing DRGs does require clinical data from the country to be available, and different countries have begun with different amounts of data. For example, six months of clinical data can be enough to begin a pilot implementation.
Implementation of DRGs depends on having complete and accurate cost data in order to use DRGs as a method of payment or budgeting tool.	Accurate and complete cost data is important but again data improve over time as they are used as the basis of the financing system. Most countries either begin with whatever limited data they have or borrow the relative case cost information from other similar countries.
Moving to DRGs will cause large shifts and have a negative impact on hospitals.	It is possible that large shifts could occur when moving from the current financing system to a new one, but these shifts can and should be moderated by carefully phasing-in DRGs so that large short-term redistributions of funding do not occur.
Using DRGs would mean that doctors no longer have the ability to negotiate their prices.	It is true that under DRGs, most countries do not allow the relative weights (which drive DRG prices) to be negotiated as they are calculated based on objective cost data. Nonetheless, discussions and negotiations can still take place on the base (or national) price.
Implementing DRGs means there will be an increase in spending (expenses), which will drain the system.	DRGs and other case-mix tools do not automatically increase or decrease spending levels; the tool simply divides up the available funds in an objective and fair manner.
DRGs will create incentives to increase hospital cases and volume.	Yes it is possible that DRGs create the incentive to increase cases, but this can be addressed by the use of volume caps or a spending cap set by the payor. Additionally, monitoring volume can help with this to ensure that hospitals are not admitting patients inappropriately, or admitting patients that could be treated in the outpatient setting, or selecting only certain kinds of patients while turning others away or fragmenting patient care in an attempt to increase volume.
Hospitals will report diagnosis and procedures in a way to maximize their money/payments	Yes it is possible that hospitals may try to do this and it is commonly referred to as “DRG-creep.” There are two types of DRG-creep. The first is that hospitals’ coding naturally improves because money is tied to their coding. The second is that hospitals may try to cheat or game the system by reporting incorrect diagnosis and procedures to obtain more money. This must be carefully monitored by auditing and monitoring hospital case-mix indices.

Chapter 2 – The Bulgarian Context: CCPs and DRGs

24. The purpose of this chapter is to provide an understanding of the current Bulgarian situation, including the tool currently being used to create hospital contracted budgets and to pay hospitals throughout the year, and an assessment of how well it functions compared to other case-based tools. This background is provided to inform decisions about whether the country would benefit from pilot-testing the use of DRGs for hospital payment. Such a shift to the use of DRGs might remedy some of the challenges presented by CCPs and improve the efficiency, equity, quality and consistency of health care delivery.

25. This chapter will be useful for those who are not familiar with Bulgaria's use of CCPs today and/or Bulgaria's history with DRGs. Those who are already familiar with this history, or do not need this background can skip this chapter. For those who seek more detailed information about CCPs, the challenges associated with the use of this tool, and the benefits from the current process, are invited to review this information in the *World Bank Diagnostic Report*.

2.1. Use of CCPs to Create Hospital Contracted Budgets

26. Since the transition, Bulgaria has implemented major health system reforms, most notably through the introduction of a mandatory health insurance system in which the National Health Insurance Fund (NHIF) acts as the main public purchaser of health care services. As part of these reforms, the NHIF's method for hospital contracting was changed to case payments in 2001 (based on CCPs) and global hospital budgets in order to promote efficiency and quality of care. (Previously, the central government used a norms-based resource allocation methodology and line-item budgets to set contracts.)

27. CCPs were originally intended as clinical guidelines. The current CCP system is a combination of diagnosis and procedure requirements, administrative requirements, staffing and equipment requirements, clinical guidelines/protocols, documentation and patient education requirements, and a series of contracting rules. Each CCP algorithm, which is defined in the National Framework Contract, describes components necessary to provide services in a safe and appropriate manner (i.e., eligible diagnosis; minimum number of hospital medical staff, non-medical personnel, and/or equipment; etc.). Discharges are assigned a CCP based on information about the patient's diagnosis and the procedure(s) delivered to the patient. Providers are contracted to provide specific CCPs, and reimbursed for them by the NHIF at a price negotiated by the Bulgarian Medical Association (BMA) and the NHIF.

28. The CCPs are used as a global budgeting tool to help prepare the national budget for the provision of inpatient care. This budget is comprised of regional budgets that are determined based on historical data about the number of reported cases, by CCP, provided by each hospital in the region. (In 2015, for example, budgets are 90-95% of the previous year's allocation.)

29. CCPs are also used as a payment tool. The final payment to hospitals is based on the actual number of cases treated, by CCP (i.e., based on submitted claims). Hospitals that do not treat the projected number of cases receive less than the budgeted amount. Hospitals that treat more than the projected number of cases may receive payment for the extra cases, which is usually based on a political decision, but they may see a penalty or reduced budgets in the next year.

30. Some benefits for CCPs include:
- Both hospitals and physicians are familiar with CCP requirements and the overall contracting process.
 - Hospitals have the necessary infrastructure in place to submit CCP required information and understand how the NHIF audits claims for CCP information.
 - CCPs provide a common understanding of a patient's general treatment path and the clinical care the patient should receive.
 - CCPs also include information about personnel, staff, equipment, and other capacity that the hospital must have in place in order to provide services. These requirements to the extent they are intended to ensure patient safety and quality are useful particularly in the absence of other guidelines or regulations such as requirements or conditions hospitals must meet in order to contract with the NHIF or mandatory Hospital Accreditation.
31. CCPs are an effective tool for their intended original use, which is to describe the type of clinical care/services patients should receive; they can be considered a type of output-based financing tool, since CCPs aim to measure hospital production. But, because CCPs were not designed to pay hospitals, we do not believe they are the, most appropriate tool for distributing limited health care funds in a fair and equitable manner.
32. In fact, over the years, CCPs have created challenges in the Bulgarian health care marketplace, since they do not promote efficiency and are likely to result in increased costs stemming from the provision of unnecessary services and longer lengths of stay. Additionally, CCP prices are negotiated rather than being based on objective cost data and since the relative weights of CCPs are not based on statistical resource costing algorithms, the weights do not likely reflect resource cost differences accurately among cases. And, because CCPs are generated by the presence of certain conditions and the provision of certain tests and procedures, providers have little incentive to capture complete medical information about the patient's health and health care needs. Thus, a complete and accurate picture of morbidity is likely unavailable to health care institutions, payors, and planners.
33. In summary, as a tool, CCPs are best-suited to describe clinical care. They can also continue to be useful to describe necessary hospital conditions/standards for contracting, but should not continue to be used to pay hospitals as the use of CCPs for payment has inevitably created inequalities in the health system; incentivized inefficiency at the hospital level; resulted in unnecessary lengths of stay and admissions; and resulted in the provision of a large range of unnecessary services. Instead, a different tool — such as DRGs — is being considered by Bulgarian decision-makers as an option for improving the equity and efficiency of their hospital payment system, which we support.

2.2. Bulgaria's History with Case-Mix and DRGs

34. Bulgaria's long history with case-mix and DRGs is summarized below. It is useful to understand this history to guide potential future activities to pilot the implementation of DRGs for a new payment or budgeting system. Annex 1 provides more detailed information on this history of activities from the 1990s to the present for interested readers. Studies about using DRGs in Bulgaria have been on-going since the mid-1990s, and multiple projects have been conducted to-date. In the mid- to late-1990s, the U.S. Department of Health and Human Services and the U.S. Agency for International Development

(USAID) awarded a technical assistance project to Solon Consulting and 3M HIS designed to introduce case-mix in selected Eastern European countries, including Bulgaria.

35. During this project, the country created a simple clinical data collection software tool, which was used by selected hospitals to begin gathering basic data. Hospital staff received training so they could consistently capture and report patient registration and clinical information. Additional software systems have been created and refined over the years; for example, a software allowing for automated top-down or step down cost accounting process and patient level costing for inpatient cases.

36. In the early 2000s, technical experts and officials at MOH and NHIF pilot-tested DRGs for payment purposes; among other outcomes, the project evaluated various grouper options and contracting models. After careful consideration, the Australian classification, procedure coding, grouper, and coding standards were selected.

37. In 2010, the MOH began work to obtain a licensing agreement from the Australian government for the grouper software. The Council of Ministers approved the guidelines, terms, and timeframe for implementing a new DRG-based hospital financing model. The MOH and NHIF were authorized to prepare a draft agreement as a basis for negotiations with the Australian government to purchase a classification system. The agreement was signed in 2011, confirming Bulgaria's right to use the ARDRG classification system (version 6) until 2016.

38. Currently, data are readily available throughout the country. Bulgarian experts have collected and analyzed clinical and cost data, and used them to create country-specific relative weights. Data from over a million inpatient cases have been grouped into DRGs; by 2008, approximately 92% of all inpatient clinical data was being collected and grouped into DRGs using Version 4.5 of the Australian Grouper (ARDRG).

39. A special department was created in the National Centre of Public Health and Analysis (NCPHA), and staffed by experts who have worked on previous projects for the introduction of DRGs in Bulgaria. Technical experts have also prepared initial budget simulations of the impact of a DRG-based payment and budgeting system. A wide variety of trainings have occurred on technical DRG components, including coding, costing, and hospital management.

40. In short, there are a number of experts in Bulgaria who have significant technical knowledge about how to use DRGs to pay hospitals, and, over the past 20 years, much of the necessary background and planning work and data analysis has been conducted to facilitate a pilot implementation of a DRG-based payment system.

2.3. Moving from CCPs to DRGs

41. Conceptually, Bulgaria moved from input- to output-based financing years ago; nonetheless, problems remain. Despite this, and the aforementioned changes to the Bulgarian system — including hospital autonomization and the adoption of contracting between the NHIF and providers — improved efficiencies have not been fully realized in the health sector, as detailed in *The World Bank Diagnostic Report*.

42. One reason is that, as a tool, CCPs are being used for budgeting and payment. The unnecessary clinical stipulations and administrative requirements (unrelated to patient quality of care and safety) that are embedded in the CCPs, CCP price negotiations, and the lack of spending cap enforcement have created distortions and inefficiencies in the health system. As a result, the benefits of a true, output-based case-based financing system are not being experienced. In order to create the appropriate incentives to consolidate services, increase efficiency in the use of hospital resources, and reduce hospital over-capacity, Bulgaria intends to move away from using CCP as the basis for its hospital payment system and considers using DRGs, the approach increasingly used in OECD, EU, and emerging market country health systems.

43. In order to proceed, the report recommends to undertake a pilot DRG-based payment system implementation project to explore whether and to what extent a DRG-based tool can generate efficiency incentives, improve quality of patient care, and reduce unnecessary hospitalizations. The country could continue using CCPs for their intended purpose: to define clinical pathways and guidelines and to outline hospital conditions of participation to ensure patient safety and quality, while moving towards using DRGs as the basis of its hospital payment system. Implementing a DRG-based payment system can facilitate an equitable distribution of limited resources, greater transparency, and efficiency incentives that are not in place today.

44. Whatever tool is used as the basis of a hospital payment system must be implemented carefully and accompanied by a consistently enforced auditing and monitoring function, processes largely absent today. It should be noted that all case-based payment systems – in fact all payment systems - have inherent limitations and risks, and must be carefully monitored to ensure that patients have effective access to care, that providers are reporting accurately, and that payments or budgets are computed appropriately.

Chapter 3 - Implementing a DRG-Based Financing System

45. This chapter presents specific information that details the primary technical steps required to effectively implement a DRG-based financing system (either pilot implementation or full-scale national roll-out). This chapter also provides detailed information about the technical decisions and computations that must be understood before DRGs can be used as a basis to pay hospitals. It also describes the roles and responsibilities across institutions for developing, implementing, and maintaining a DRG-based financing system.

46. In addition, this chapter includes an assessment of Bulgaria's situation with respect to each step. Bulgaria has a long history of studying DRGs, technical experts, and much of the infrastructure necessary to begin a pilot implementation of a DRG-based payment is in place. The HMIS readiness for DRG implementation is assessed and is presented in detail in Annex 2. Readers who do not need to understand each technical step's specific details can review the Bulgaria-specific information under each technical step to understand where the country is with respect to the readiness of the step described.

3.1. Background of Necessary Requirements

47. Consideration to implement a DRG payment or budgeting system involves addressing the eight steps listed below. Each is described in general, along with an assessment of Bulgaria's readiness. The latter is important for both technical staff and Bulgarian Stakeholders to be aware of, as it drives the preparation of the DRG Action Plan and budget provided in the next Chapter.

48. The following steps are required to move forward with a DRG-based payment or budgeting system (each is described in detail below):

1. Create a standardized method for coding patients' clinical morbidity;
2. Develop a hospital data-reporting system based on patient level data (the same minimum basic clinical data set data reported by all hospitals, for each discharged patient, using the same format);
3. Implement a classification system and grouper software that assigns patients into DRGs;
4. Design a costing methodology and collect hospital cost data for use in creating relative weights and hospital case-mix indices (both of these allow analysis of the intensity differences among treated cases and hospitals);
5. Obtain expenditure data/available budget data to develop a national base price (or reference price) that represents the average cost of a case;
6. Select a set of adjustments that may be required to cover costs that are outside the hospital's control and simulate the impact of using one or more adjustments;
7. Select and discuss transition options to mitigate large payment redistributions among hospitals from the current method of budgeting hospitals to the new method based on DRGs so that a smooth and careful migration can occur;
8. Create a quality monitoring board and/or auditing body to monitor coding, costing, and the overall implementation of the new financing system.

49. Countries in the beginning stages of looking at implementing DRGs may take longer to complete some of the steps above (i.e., introducing a coding system, collecting data, etc.). Countries that already have a coding system in place and a history of clinical data collection may be able to move more quickly towards implementation.

50. While most of these steps are primarily technical in nature, they have political aspects to them, for which decision-making and stakeholder input is critical. Simulating the impact of various policy options will be important to help inform decision makers on the impact of their selected/desired policy choices and on the implications of timing and/or funding that may be required. Fortunately such capacity is available to assess the impacts of alternative policy choices.

3.2. Steps for Implementing Case-Mix Systems

Step 1: Create a standardized method for coding patients' clinical morbidity

51. A standardized method for coding the patient's clinical morbidity requires the selection and use of a diagnosis and procedure coding system. Examples of coding systems include the World Health Organization's (WHO) International Classification of Diseases (ICD) version 9 (ICD-9) or version 10 (ICD-10), or a locally adapted version, such as the U.S. clinical modification (ICD-9-CM) or the Australian modification (ICD-10-AM). For diagnosis coding, most countries use a version of the ICD-10. There is greater variability in the systems used for procedure coding. For example, some countries use the U.S. modification to the ICD-9 procedure coding system (ICD-9-CM), while others use the Australian Classification of Health Interventions (ACHI). Still others use a homegrown procedure coding system. Regardless of the system used, it is important that hospitals are trained and understand how to record complete and accurate diagnosis and procedure information.

52. Countries that seek to change their coding systems while they are also considering the move to a DRG-based payment system will benefit from adopting a coding system that is already used to classify or group cases into DRGs. Doing so mitigates the need to map from one coding system to another over time, enables the use of a simpler system, and, in some cases, results in more accurate DRG assignments.

53. The "minimum basic data set" of key demographic and clinical data elements that must be collected — along with diagnosis and procedure codes — includes: age, gender, admission date, discharge data, discharge status, and any other information needed to assign patients into DRG groups. It is important however for implementers to discuss and agree upon specific data-sharing processes and determine ownership of the data that is collected and analyzed at the central level.

The Bulgarian context

Bulgaria currently uses ICD-10 to code diagnosis, and ICD-9-CM to code procedures. A shift to using ACHI was intended to begin on January 1, 2015, but has not yet been implemented, although certain aspects of "going live" have been completed (for example, translating and publishing ACHI codes). Additionally, relevant legislation is enacted calling for the use of ACHI but, until it is used, mapping tables from ICD-9-CM to ACHI can be used for the purposes of assigning DRGs.

Bulgarian hospitals have a long history of coding diagnosis and procedures; a cursory review of hospital data reveals that many hospitals report more than just a primary diagnosis code. These facilities often report one or more secondary diagnoses to capture co-morbidities and complications as well as one or more procedures to describe the clinical care given. In addition to the coded data, Bulgarian hospitals already collect all of the other necessary information included in the minimum basic data set for being able to assign DRGs to cases.

This is very useful for the purposes of creating a DRG-based financing system. Doctors and medical professionals involved in coding will need training in ACHI once it starts being used, however. Additionally, all information systems and software will need to be updated to reflect the use of ACHI.

All of the country's hospitals have the necessary IT infrastructures and have implemented various types of HMIS, including the free "Specialized Software for Hospitals," allowing for the collection and transmission of the minimum basic data set for DRGs.

In terms of data existence, ownership, and sharing, there is a large amount of inpatient clinical data at the NHIF and the NCPHA. At present, each organization considers this information as its own and does not share it with the other. This makes it difficult to use all of the available data dynamically to calculate all of the parameters, conducting statistical analyzes, and running simulations. This information-sharing barrier should be overcome and formal data-sharing mechanisms established between the NHIF, NCPHA and MOH so that all available clinical and cost data can be used. Alternatively, if this is not possible, then hospitals would need to engage in duplicate reporting activities so that all of the necessary data is available at the institution responsible for preparing DRG simulations and calculations.

Step 2. Develop a hospital data-reporting system based on patient-level data

54. Data reporting from hospitals to the central level must occur either manually or electronically. Twenty years ago, when DRGs started to be more widely used around the world, clinical data reporting largely occurred on a manual basis, with statisticians, nurses, and administrative staff abstracting the minimum basic data set manually from patient charts and entering the information into an Excel file that was transmitted to the central level. Today, data recording and collection primarily occur through the use of electronic tools. Data are also transmitted more real-time through electronic means to the central authority.

55. The lack of timely, accurate, and complete data is typically the most significant problem that hampers case-mix development projects. Adequate data are not always readily available, particularly if a country does not have a history of capturing clinical data and submitting it to a central authority.

56. In addition, case-mix implementation projects can come to a halt when decision-makers expect 100% accuracy and completeness of data before a project can move forward (i.e., they let the perfect become the enemy of the good). While each country should strive to correct its data limitations, expert experience indicates that data only improve after use, when hospitals know that their data are being used to determine payment (rather than just being collected for study). For this reason, incomplete or even imperfect clinical and/or cost data do not have to be barriers to moving forward with DRG-based financing implementation.

The Bulgarian context

From an information systems perspective, processes are already in place to submit information from the hospitals to the NHIF on a daily basis using predefined XML formats (which contain all data elements needed for DRG assignment and much more). All hospitals are able to produce and transmit this data using existing software solutions from different vendors or software provided free-of-charge by the NCPHA. NHIF has software that handles the daily reports of the hospitals, imports data into a central database, performs various claim level audits and data validations, and calculates the reimbursable amount.

In addition, approximately 200 hospitals voluntarily report their inpatient clinical data and their expenditure or cost data at the hospital, department, and patient level to the NCPHA for use in case-mix analysis. (The country has benefitted from the development of software that has been provided, for free, for hospitals to use to report clinical data.) If the government decides on expanding DRGs beyond the pilot-testing described in this report, then it will need to require all hospitals to report clinical and expenditure/cost data to a central entity (such as the NCPHA) to ensure that complete data are available for analysis and modeling. Processes are being developed to establish operational feedback for hospitals to help them clear any coding mistakes and avoid them in the future.

Step 3. Implement a classification system and grouper that assigns patients to DRGs

57. The classification system is the basis on which the patient's clinical information (specifically, diagnoses, procedures, and other basic demographic and clinical data) is used to assign patients into case-mix groups — in this case, into DRGs. Although the terms “classification” and “grouping” are used interchangeably, a “grouper” is actually the software that has the classification system's logic embedded within it; the grouper software assigns inpatient cases into DRG groups based on the clinical data and the minimum basic data set.

58. This is the opposite of how CCPs work. With CCPs, there is no process of classification or grouping because hospitals code only the exact diagnosis and medical procedures needed to assign the CCP. In other words, hospitals pre-select the CCP (and often preselect CCPs with higher reimbursement rates/prices) and then provide the treatment and medical procedures noted in the requirements under the CCP. This is not the case with DRGs, since patients are classified into a DRG group based on software logic that considers the combination of diagnoses and medical procedures reported as having been performed (a physician cannot assign the DRG).

59. The difference between DRGs and CCPs is important, because it underscores that DRGs were developed using statistical methods to evaluate both clinical *and* resource homogeneity; CCPs were created more subjectively based on discussions with and recommendations from specialists about which diagnosis and procedures belong to different CCPs with little to no statistical analysis conducted of the clinical or cost data.

60. A classification system and grouper are pre-requisites to the implementation of a DRG-based financing system. The ability to receive coded data about diagnosis and procedures from hospitals, and

use software to assign (i.e., “group”) these data into DRG groups is essential for developing a fair and objective payment system that relies on objective underlying clinical and cost data.

61. There are many available groupers, most of which are fairly similar and based on the original concepts used by the U.S. Medicare’s DRGs. Some groupers are more advanced than others, and include severity and other variables that impact resource consumption. A key question is whether a country should create its own grouper, buy a grouper, borrow grouper logic from another country, or adapt an existing grouper for its own use.

62. There is no one correct answer and each country must evaluate its existing situation, the political and practical needs, and the funds available before determining whether to embark on the process of creating a “country-specific grouper.”

63. Countries that are implementing case-mix payment systems should evaluate the strengths and weaknesses of different groupers. One consideration is whether the software uses the diagnosis and procedure coding systems being used by the country. This is critical, since the combination of various diagnoses and procedures creates the DRG groups. If the underlying diagnosis and procedure information being collected in the country does not match that of the grouper software, mapping tables must be used to align the two. This is not an insurmountable problem, but creates an extra step that could result in more time and resources being required. This step may also create some noise in the final DRG assignments.

64. Another consideration in selecting the grouper is where the country is in the process of implementing a DRG-based payment system. During the study and pilot-testing phase, most countries either borrow a grouper or obtain a low-cost research license. If the country decides not to proceed with implementation, this saves the costs of buying a system or building a country-specific tool.

65. Whether or not it is necessary to create a country-specific grouper is a widely debated subject among experts. The best way for a country to resolve this question for itself is to conduct analyses to determine whether a borrowed grouping system can be effectively implemented, or whether major gaps exist in classifying the patients. If the latter situation exists, then a country-specific grouper may be necessary.

66. Most countries find that making minor refinements to existing groupers is sufficient, since DRG groupings represent diagnoses and diseases that typically apply globally. Hence, many countries elect to borrow a classification system and DRG grouper from another country and modify for their own use. Very few countries have spent the significant time, effort, and money to develop their own DRG grouper software. (In fact, experts believe that the primary reason countries create their country-specific own groupers is to meet political needs, including obtaining clinical buy-in and ownership of the system, rather than to address specific technical needs.) Regardless of the system used, the ultimate goal is to ensure that the DRG groups used as the basis for financing appropriately classify patients into clinically meaningful and resource-homogenous groups.

The Bulgarian context

Bulgaria has negotiated a license with the Australian government to use the Australian classification system

This Project is implemented with the financial support of Operational Programme “Technical Assistance” co-financed by the European Union through the European Regional Development Fund

All the data elements needed to assign patients into DRG groups are being collected by hospitals through various information systems.

and has a license to use the grouper software through June 2016. The Australian Classification of Health Interventions (ACHI) has been translated and adapted for use in the Bulgarian context.

From a technical informatics perspective, existing processes can easily be adapted to assign DRGs to cases (instead of CCPs) and to compute a DRG-based reimbursement for the case (instead of assigning a CCP price). Of course the quality and completeness of coding will improve in time if DRGs are used, but what is available today is sufficient to begin.

Step 4. Design a costing methodology and hospital cost data to create relative weights and hospital case-mix indices

67. It is important to implement a standardized costing methodology in order to develop patient level cost information. Some countries only use a step-down or top-down costing approach to derive patient level costs. In very simple terms, this method estimates patient-level costs by allocating departmental-level costs down to the patient-level using various metrics. Many countries have begun DRG pilot implementation efforts with only aggregate data available to estimate patient-level costs and then, over time, adopted other techniques.

68. Other countries have begun by using both top-down and bottom-up costing methods; this allows an allocation of administrative and ancillary department expenditures to the patient-level (i.e., top down) while also accounting for specific, direct, patient-level costs (i.e., bottom-up costing). Bottom-up costing is more time-consuming and expensive, but can generate a more accurate and complete picture of cost to treat each patient.

69. Having more accurate patient level data allows for the development of more accurate country-specific relative weights, which is critical in computing hospital case-mix indices (discussed below), and other key elements of a DRG-based payment system. Relative weights and case-mix indices both allow an analysis of the relative resource-intensity differences involved in treating various types of cases (i.e., cost of a normal delivery vs. a cesarean section). These concepts and their formulas are defined below.

Country-specific relative weights

70. A relative weight is a measure of the expected cost of a given type of case (i.e., DRG), relative to the cost of the *overall* average case. Hence, relative weights express the “costliness” of one DRG relative to an average case. They function in the payment model as a multiplier of the base price (or reference price) to generate the final DRG price. Because of their critical nature, it is important to have an accurate set of relative weights; if this is not available, then other financing system policies should be used to mitigate any potential large financial impacts.

$$\text{Relative Weight of DRG "X"} = \frac{\text{Average cost of "DRG X"}}{\text{Overall average cost of a case}}$$

71. For each DRG, a relative weight is calculated that reflects a ratio of the required resources to treat a patient with that DRG compared to the resources required to treat the “average” case. Relative weights are set at the national level. The relative values do not vary among hospitals: a single value for each DRG is calculated and used for all hospitals. Calculating an accurate set of relative weights is very important and requires establishing a “normal” distribution of length of stay and/or cost by DRG. This allows identification of the cases that are inside or within the norm (i.e., inlier cases) and those outside of the norm (i.e. outlier cases). A further technical step is required for the proper computation of the relative weights which involves converting cases with very high or low lengths of stay or cost, as described in the footnote⁶.

Example:

A DRG with a relative weight of 1.0 reflects the average case, whereas a DRG with a relative weight of 5.0 reflects a case that requires five times the resources compared to the average, to treat the patient. Therefore, the payment or budget a hospital receives for that case should be five times greater than the payment or budget they receive for the average case. Similarly, a DRG with a relative weight of less than 1.0 is expected to require less than the average amount of resources to treat the patient and hence the money a hospital receives will be less than that given for the average case.

72. Once relative weights are calculated, they must be reviewed to ensure that they make sense from a clinical and resource use perspective. For example, an adjustment may be required to relative weights that were created based on a small number of cases. These DRGs’ relative weights require a clinical review by doctors from different specialties.

73. Additionally, if the relative weight of a medical DRG (i.e. normal delivery) is higher than the relative weight of a surgical DRG (i.e., C-section), review and adjustment will be required. This review process is critical, especially in the early years of a system being introduced, since the cost data are likely to be less robust. The review process can also involve comparing country-specific relative weights to those computed in other countries.

Case-mix index

74. As described above, relative weights allow a comparison of the resource intensity of one DRG compared to another. The case-mix index (CMI) is a similar concept; it is a measure of one hospital’s overall output of cases (volume and type of cases) compared to the average for all hospitals. Like relative weights, the CMI is a unit-less number that allows a comparison of the differences in resource-intensity to treat patients across hospitals. A hospital with a CMI of 1.0 represents patient of average intensity.

⁶ Relative weights are calculated using only inlier cases, therefore mathematical calculations are used to convert “outlier” cases into “inliers” so that a true picture of the total number of patients treated and costs, on average, can be generated. This is important, since DRG financing reflects payment for the average case and there are large differences in the standard deviations among cases (e.g., surgical DRGs tend to have lower standard deviations than medical cases). Converting outliers into inliers requires creating equivalent cases from actual cases. This allows an accounting of the resources required to treat non-standard (or outlier) cases, compared to the resources required to treat standard (or inlier) cases. The conversion of outlier cases into equivalent cases allows for the standardization of all cases on the basis of resource consumption. Standard and outlier case definitions are based on data analysis and discussion with statisticians, clinicians, and economists. Ultimately, using equivalent cases rather than a straight count of case volume is a better way to calculate each hospital’s contracted budget.

75. A hospital with a CMI greater than 1.0 would be described as treating patients who require more resources, compared to the average hospital, assuming that accurate coding practices exist. If two hospitals have similar contracted budgets, but very different case-mix indices, one

The CMI formula is:

$$CMI = \frac{\sum (relative\ weight * number\ of\ equivalent\ cases)}{Sum\ total\ of\ equivalent\ cases\ at\ the\ hospital}$$

should ask why to understand whether the budgets are appropriate or not. If both hospitals have a similar average cost per patient and share similar hospital characteristics (i.e., type of hospital, location, etc.), then it might be said that the hospital with the higher CMI is more efficient as it is able to treat more resource intensive patients for the same average cost as hospital treating less resource intensive patients per its lower case-mix index. On the other hand, if the hospitals do not share similar characteristics, then the fact that both have the same contracted budget may be reasonable if the higher budget for the hospital with the lower CMS reflects additional money to cover costs that are outside of the hospital's control (i.e., the lower CMI hospital is located in a rural area).

76. The CMI, hospital characteristics, cost structures, historical budgets, and future contracted budgets must all be examined thoughtfully in order to have meaningful discussions about efficiency and future hospital financing policies.

The Bulgarian context

Bulgaria has a long history of using both top-down and bottom-up costing to generate patient level cost information. Top-down costing is used to allocate non-medical (administrative, ancillary and support) departments costs to medical departments. In addition, bottom-up patient-level costs that are currently captured include (but are not limited to): medications, medical devices, supplies/consumables, implants, lab and imaging tests, operation procedures, invasive and other diagnostic procedures, etc. Both top-down and bottom-up costs are used to generate the final cost for each treated patient in most Bulgarian hospitals.

Bulgaria is unique in that it has focused on capturing both types of costs since the beginning of DRG costing work in the country, in the 1990s. Therefore, existing Bulgarian cost data can (and should) be used to create the first round of Bulgaria-specific relative weights. The weights must be reviewed carefully and can be compared to those of other similar countries to determine if any anomalies exist and/or if refinements are required.

As discussed above, the data that are currently available are sufficient for a use in a pilot DRG-financing project; in fact, Bulgaria has much more complete data than most other countries had when they began with DRG-based financing. Using these data to establish a national average price is discussed in the following section.

If Bulgaria decides to implement a full-scale DRG-based financing system, technical experts should conduct a detailed review of the current costing methodology and make any necessary revisions so that even more accurate and robust cost data can be collected in the future.

Step 5. Obtain and use financial data to develop a reference price

77. Once the CMI and volume of each hospital patients are computed, they need to be translated this into a financial equivalent. To develop contracted hospital budgets, for example, one must define a price so that one can multiply the CMI of a hospital by the volume by the price (called “reference or base price”).

78. The reference price represents the cost of the “average” hospital case. This value can be computed at different levels (i.e., the hospital, peer group of similar hospitals, or national level) by dividing the total money available or the total money spent in a previous year to treat patients by the product of the equivalent cases and the case-mix index. When this is calculated for each hospital, we can have a sense of how the average cost per patient varies by hospital and in comparison to the national average. This information can inform decision-makers how to move from the existing payment and budgeting system which may reflect historical inefficiencies and inequities to a new one based on DRGs. The expectation under DRGs is that ultimately a single national reference price would be used rather than hospital prices since all hospitals should be able to provide the same clinical care (or “produce the same DRGs” in terms of resource consumption) for the same average cost and hence receive the same average payment.

$$\text{Reference or Base Price} = \frac{\text{Target expenditure or available budget}}{\text{Sum of equivalent cases across all DRGs} \times \text{CMI (1.0 at national level if the relative weights are normalized)}}$$

79. Simulating the financial impact of using one reference price or another is necessary to evaluate what types of payment or budget redistributions would occur by moving from the existing to a new financing system. This in turn helps determine whether the impact needs to be moderated by the use of adjustments or transition options, which are further described below.

80. Countries can elect to begin with the hospital’s own reference price, which allows for what is often called “shadow-budgeting” during the first year of DRG implementation before migrating to a national reference

$$\text{Hospital “A” Base or Reference Price} = \frac{\text{Target expenditures for Hospital “A”}}{\text{Sum total of equivalent cases} \times \text{CMI}}$$

price. This allows hospitals to receive their same budget in the first year of DRGs as they did in the previous year and is useful in countries where there is not a long history of coding, costing, data collection, etc. Shadow budgeting allows hospitals and policy-makers time to learn the principles of case-based payment and to develop policies under the new financing mechanism. Other countries begin by using a portion of the hospital’s own price and a portion of the national price to set the overall reference price with the goal of migrating to 100% use of the national price. Beginning in this manner balances the need to move ahead with a new payment system while respecting the fact that hospitals need time to learn and adapt to a new system while also giving decision-makers time to refine and implement adjustments and policy decisions.

81. The latter process can occur by gradually using an increasing percentage of the national price and a decreasing percentage of the hospital’s price — until a single national price is in effect. (This is described in more detail in the “transition options” section below.) The speed of migration from hospital-specific prices to a single national price depends on factors such as: goals for the health system,

availability of clinical data, accuracy and confidence in the relative weights and their underlying cost data, technical capacity, hospital readiness, and the political desire to move more or less rapidly.

82. Once the reference price is computed, new hospital-contracted budgets can be calculated simply by multiplying the selected reference price (i.e., hospital-specific, national, or a mixture of the two), the CMI, and the number of equivalent cases.

83. A final and important consideration for setting the reference price is whether any money will be carved out and set aside to fund necessary adjustments such as outliers, unexpected increases in volume, etc. Doing so lowers the base price, but gives payors money to fund other policies. If money is *not* carved out, then the payor will have to identify and allocate new funds to cover these policies. Working with technical experts to run simulations on various parameters and analyzing the resulting impact is critical to guide decision-making and to mitigate any large payment or budget redistributions which if allowed to occur, can place the entire system implementation at risk

The Bulgarian context

Each country's starting point to decide how to migrate to DRG-based financing fundamentally starts with a comparison of how the existing system to the new one. Bulgaria uses CCP-based financing in which each CCP is assigned a price, and that same price is paid to all hospitals. Hence, it has a culture of using a single national base or reference price.

For this reason, the migration path for Bulgaria from CCP to DRG-based financing would likely focus on how the product prices are set (CCP vs. DRG), rather than whether hospital-specific prices or a single national price should be used in the new system.

For Bulgaria, the major change in the hospital payment system would be the shift to DRG prices based on relative weights, with relative weights and payments being based on hospital cost data. Relative weights multiplied by the national price create a DRG price list. This is conceptually equivalent to the existing CCP price list, but underlying processes and data used to generate the DRG price list are very different from the way that the CCP price list is generated. The change from negotiated CCP prices to empirically driven DRG prices is likely to create large shifts in newly contracted budgets for some Bulgarian hospitals.

Step 6. Generate a set of adjustments to cover costs that are outside the hospital's control

84. The implicit principle in using DRGs as the basis of a payment system is that hospitals receive funds based on the type and volume of patients treated rather than on the number of beds or other structures (i.e., staff, equipment etc.), processes (i.e., number of hospitalization days), or variables that are considered inputs or intermediate outputs. If DRG prices are not set appropriately, however, or if other aspects of the financing system are inappropriately accounted for (which affect the true cost differences across hospitals), adverse or perverse incentives could result and negatively impact system implementation and, more importantly, the provision and quality of patient care.

Types of adjustments

85. One way that decision-makers can ensure the payment system is equitable is through the utilization of “adjustments,” a set of policies and/or transition mechanisms, which simultaneously create incentives for hospitals to improve efficiency and quality of patient care, while enabling a smooth implementation of the new financing system with minimal risk to both the provider and the payors.

86. As discussed above, adjustments may be warranted in order to account for variations in hospital costs for aspects of care that are truly outside of the hospital’s control. Any adjustment that is implemented must be supported both conceptually and empirically; the additional costs considered for adjustment must be outside the control of hospital management and the adjustment factor must make a significant and systematic difference with respect to inpatient costs per discharge.

87. Countries can begin with the assumption that *no* adjustments are needed and then use data and regression analyses to determine what adjustments, if any, are needed to cover real cost variations that may exist. Initially, most countries begin with only a few adjustments in order to keep their implementation simple. Many countries make adjustments for inflation, specialty hospitals, and outliers because these are typically beyond a hospital’s control. Other standard adjustments include: local area labor costs, urban/rural location, teaching status, and having a disproportionate share of certain types of patients (i.e., low-income patients).

88. Once adjustments have been selected, there are different ways to introduce them. A common method is to simply pay for the actual costs by making a separate, direct payment. A second option is to use a multiplier (or factor or coefficient) to adjust the base price used. A third option is to address certain costs (such as outliers), by using specific formulas. A fourth option is to provide case- or DRG-level adjustments by using hospital peer group averages or individual hospital base prices, rather than a national base price as mentioned in the previous section to mitigate impact from the old system to a new system of financing.

89. Risk mitigation occurs by using adjustments and transition options. For this reason, it is critical for technical experts to run simulations in order to understand the impact of various adjustments on the new system, and to select which adjustments to use. This ensures hospitals that require protection against costs outside of their control receive those protections in a pre-determined way as implementation of the new payment or budgeting system occurs.

90. The following are the most common types of adjustments:

- Inflation
- Geographic location
- Local wages
- Direct and indirect health professions education
- Specialty hospitals
- Outliers

91. Annex 3 describes these adjustments in detail for those who wish to understand the concepts more fully.

The Bulgarian context

Experts in Bulgaria have a great deal of experience and ability in thinking about policy options to address outliers. Over the last few years, they have prepared a number of outlier calculations and can share this with work decision-makers.

Step 7. Developing methods to implement adjustments and/or transition options and simulating them to allow for a smooth and careful migration to a new financing system

92. Adopting a DRG-based financing system will inevitably alter the resources that are available to specific hospitals. For this reason, changing a country's financing method to a DRG-based system must be done slowly and methodically in order to monitor and mitigate risks appropriately. Otherwise, large and destabilizing shifts can occur as a result of the existing biases, care delivery patterns, constraints, and incentives that differ from the new method. Providers, payors, and decision-makers all need time to adapt to a new method of financing with minimal financial risk. A gradual transition enables stakeholders to fully understand new concepts including new coding systems, the importance of documentation, electronic clinical data reporting, cost data collection and reporting, and simulation modeling. For this reason, the methods used to implement adjustments and the pace of transition depends on many factors, including political considerations, existing hospital readiness, and the accuracy of clinical and cost data reporting.

93. Regardless of which of the methods described are used, technical experts must assess the impacts of using various adjustments and transition policy options on the new system, and select which option to use. The two most widely used transition options are *blending different base prices* over time to arrive to the national base price, and *using risk corridors* to mitigate losses and gains, or a combination of the two. These methods are described below.

Blending Different Base Prices

94. The concept of blending utilizes two base prices in varying percentages so that, in the initial years, historical funding is preserved and only a small part of the contracted budget comes from the new financing method. This option mitigates the large financial impacts that can occur when moving to a new financing system. Key considerations in timing the shift to using 100 percent of the national price include the country's current system and how different it is from the new one, the level of impact hospitals would be expected to face each year, the quality and accuracy of the underlying clinical and cost data, and the pace of change desired by decision-makers.

95. The most widely used strategy is to blend the hospital's own base price with a national price so that in the early years of a DRG implementation, the majority of hospitals' contracted budgets/payments are based on their own historical experience, and a smaller percentage of their contracted budgets/payments are based on the national experience.

$$\text{Hospital Budget Formula} = \text{Base Price} * \text{Hospital CMI} * \text{Number of Equivalent Cases}$$

96. For example, if decision-makers want to migrate to a new financing system fairly rapidly, then they might expect hospitals to adapt over a period of three years from their own base price to the

national average. In this case, hospital budgets are calculated using the hospital's own average cost or base price, and this value will differ from the national-level base price (it could be higher or lower).

97. The Table 2 here shows how blending can occur over three to four years where a portion of the hospital's budget/payments are based on its own base price and a portion of it is set using the national price. If the government wanted to migrate in three years, then in the first year of system implementation, it would compute the hospital's overall budget based on 33% of the national price and 66% on the hospital's own price and migrate over three years to the hospital's budget being based on 100% of the national price. A four-year migration as shown in Table 2 allows for the first year of system implementation to be 100% budget neutral with the hospital's contracted budget being kept essentially the same as the previous year in recognition that hospitals need time to adapt.

Table 2. Blending Prices Over 3 to 4 Years

	2016	2017	2018	2019
National Base Price %	0%	34%	66%	100%
Hospital Base Price %	100%	66%	34%	0%

Risk Corridors

98. Under a risk corridor, limits are placed on the amount of money that hospitals can gain or lose in any one year. Risk corridors are a useful transition tool because contracted budgets/payments are often based on historical information, and newly coded and/or costed data could vary significantly from what is reported under the new financing system. If what is contracted varies from the hospital's actual experience, a risk corridor provides the hospital with additional money and also limits the payor's exposure to paying out more than is expected.

99. Using risk corridors is also helpful if the first year of the new financing system is based 100% on a hospital's own base (i.e., the four-year blending/transition policy described) as this still allows for some gains and losses under the new system and can help hospitals more quickly learn and adapt to the new system.

100. A risk corridor states that:

- Hospitals cannot gain more than "X"% over the previous year's contracted budget/payments;
- Hospitals cannot lose more than "Y"% over the previous year's contracted budget/payments.

101. Both "X" and "Y" need to be defined based on budget simulations and through discussions with decision-makers. For example, typical ranges include, +/- 3% or +/- 5%. It is important to note that "X" and "Y" may also be dependent on whether a blending strategy is also utilized. Using risk corridors creates incentives for hospitals to code accurately and completely, to perform efficiently under the new system, and protects both hospitals and payors from experiencing large shifts during the early years of a new financing system implementation.

102. Using a risk corridor also requires data analyses and modeling and is also dependent on the funds the government has available to put towards use of this transition mechanism. Similar to the discussion about allocating funds for adjustments, decision-makers must either hold funds back from the overall amount of money available for contracting to fund the risk corridor, or allocate additional funds to cover this.

The Bulgarian context

As noted above, it is likely that a DRG-based pilot payment system implementation in Bulgaria would begin with use of a single national price, since there is already a culture of using a national price. The major change for Bulgaria at this time has to do with the type of case-based tool used and, specifically, shifting from using CCP prices to DRG prices that are based on empirically derived relative weights that measure resource-intensity differences better than CCPs do.

This will result in a redistribution of resources, which means some hospitals will receive larger total payments/budgets, and some will see lower funding levels. Stakeholders will need to make decisions on whether and what adjustments to utilize and what types of transition mechanisms are necessary to adopt to support migration to a new financing system, to promote efficiency objectives, and to create better alignment of incentives across care settings (i.e., hospital care vs. ambulatory care for one-day stay cases vs. outpatient care, etc.). Using adjustments is a good strategy to mitigate risks during the first few years of a new financing system implementation.

Step 8. Create a quality monitoring board and/or auditing body to monitor coding and costing data and other aspects of the new financing system

103. Most countries grapple with the question of whether efficiency incentives created by using a DRG-based payment or budgeting system go too far in incentivizing hospitals to cut costs beyond what might be “reasonable” (essentially reducing existing waste and inefficiency but *without* reducing the quality of care provided to patients).

104. Some of the questions raised by DRG critics about DRG cost-cutting incentives (see box) are important to understand and address. These questions are common with any case-based payment or contracting system. They are, in fact, relevant for Bulgaria today with its use of CCPs. In order for DRGs to be beneficially applied in a health care reform effort, it is critical to monitor and evaluate the system as it is actually implemented on the ground. An on-going process will assess success in reaching the goals of the health care reform process. Such monitoring and evaluation efforts are critical to ensure that risks are mitigated and the payment and budgeting systems work as intended.

Key Monitoring & Evaluation Questions:

- *Are hospitals eliminating unnecessary and/or marginally beneficial services, or are they also cutting needed services?*
- *Do DRG incentives undermine patients’ access to care and satisfaction?*
- *Are lengths of stay and/or services reduced to the extent that they could harm patients?*
- *Is the quality of health care compromised in a DRG based payment or budgeting system, thereby resulting in higher mortality rates, hospital readmission rates, and outpatient service use?*

105. Implementing a sustainable payment system that is fair to both the payer and the provider requires strong contracting rules and an auditing and monitoring component along with a commitment

to link payment to high-quality health care, favorable patient outcomes, to evaluate hospital activity, and to prevent the system from being cheated or “gamed.”

106. Under DRG-based financing, hospitals know they are receiving money for the patient with an average length of stay and average costs for the DRG rather than the actual length of stay or the actual cost of the case. The system of averages creates both positive and negative incentives. Positive incentives include increasing efficiency and reducing waste, while maintaining or improving the quality of patient care. Negative incentives or risks include trying to maximize profits by treating patients with too few services or procedures, or transferring them to another hospital, or discharging patients inappropriately early (i.e., “quicker and sicker”), etc. This must be carefully monitored.

107. It is clear that a DRG payment or budgeting system creates incentives for hospitals to operate more efficiently in their treatment of inpatients; their selection of drugs, devices, equipment, and capital investments; and in their determination of the most appropriate care setting (e.g., inpatient, day-surgery, outpatient, etc.) where patients receive care. Behavioral changes that occur by hospital managers and physicians ultimately enable limited health care funds to be allocated and used appropriately, without compromising patient’s access to care or quality of care.

108. In addition, clear penalties for fraudulent behavior must be communicated to providers up-front to reinforce that inappropriate care delivery (i.e., discharging patients before they are well, inappropriately coding patient care and/or conditions), will not be tolerated and that consequences such as being forced to pay back funds, dropped from NHIF participation, and, legal action could be taken against provider as needed. Key data elements to monitor include but are not limited to: lengths of stay, mortality rates, morbidity rates, re-admission rates, reporting incorrect diagnosis and/or procedure codes to generate higher-paying DRGs, higher-than-expected transfer rates, unexpected volume increases, higher-than-expected outlier cases, and in general, incorrect or potentially fraudulent data. Assessing these elements helps to ensure that the DRG-based financing system is being implemented in a way that mitigates risk, and is working as expected.

109. In addition, aligning incentives across care settings and payment mechanisms used for different care settings is critical and must be carefully considered. For example, providing much higher payment to hospitals for procedures that are only one-day stays could create the perverse incentive of hospitals admitting patients who might otherwise be treated in an outpatient specialist clinic. Waiting times to receive certain specialized tests and services is another example; hospitals should not be incentivized to admit patients who could otherwise be treated in the outpatient setting. These and other similar issues must be addressed over time in order to see the best results of implementing a DRG-based payment or any hospital payment system

The Bulgarian context

An Auditing and Quality Monitoring function must accompany any DRG implementation in Bulgaria. Our understanding is that there is an auditing and monitoring department within the NHIF that could be tasked to conduct the types of activities described above. This department’s capacity and knowledge must be assessed.

Nevertheless, what is key for decision-makers to know at this time is that a strong auditing

and monitoring function must accompany a DRG pilot or full-scale implementation. Without such an entity to carry out the necessary functions, the overall implementation of DRGs would be at risk. If sufficient capacity does not exist within the NHIF, it may be possible to strengthen it, or decision-makers may determine a new entity is required which could be a part of the Ministry of Health, or the NCPHA, or a separate organization altogether.

It is critical that this entity, regardless of where it is housed, engage in the types of data monitoring activities described above. This entity should also provide hospitals with feedback reports so they are aware that their data, reporting, outcomes, and other indicators are being monitored. Moreover, penalties must be implemented for negative patterns and/or behaviors — otherwise hospitals will continue to game the system and quality of care could be compromised.

It should be noted again that the risks described above are not unique to DRGs, but exist with most payment/budgeting systems, including Bulgaria's CCP system today. The key to eliminating such risks is auditing, monitoring, transparency, and holding providers accountable.

3.3. Bulgaria's Readiness and Key Next Steps to Implement DRGs-Based Financing

110. Implementing DRGs as the basis of a payment or budgeting system requires two key elements to be in place: technical readiness and political will. "Technical readiness" means that there must be sufficient knowledge and capacity to accurately create, analyze, and implement a DRG-based payment or budgeting system. Further, an implementation approach must be decided. Generally speaking, there are two broad options: (1) to begin implementation slowly with all hospitals included; or (2) to begin with a small number of hospitals so that policies can be "piloted" and refined before broader implementation occurs. The report proposes that Bulgaria proceeds with DRGs by doing a pilot implementation with a small number of hospitals in order to select policy options, to determine how best to use DRGs and CCPs together, and to build consensus and momentum in the country before proceeding with broader implementation. Note however, that it is possible to move forward with full DRG implementation involving all hospitals given the high level of technical capacity in the country.

111. The previous section described the necessary technical steps and activities that must be in place to implement a DRG based payment or budgeting system. It also described the current Bulgarian context for each step. As a result of Bulgaria's long history of studying DRGs, much technical expertise has been developed in the country, and Bulgaria can leverage this experience to begin a pilot DRG-based payment or budgeting system implementation. Existing knowledge and expertise can also be supplemented by using outside experts, by consulting the literature, and working with Ministries of Health and Health Insurance Funds in neighboring countries.

112. Additionally, the country already has in place certain infrastructure components that are essential to a DRG system. Hospitals already have the health information systems technology to record diagnosis and procedure codes, to submit data to a central authority in an electronic format, and to capture cost data using a simple costing software. The HMIS and information technology (IT) capacity exist to inform and guide a pilot DRG implementation project. Of course, this infrastructure and capacity should be refined, central-level technical capacity expanded, and hardware and software upgrades

implemented, as outlined in the action plan that is described in the next chapter. More details about this can be found in Annex 2.

113. The second element, political will, is arguably the single most vital component in the successful implementation of a DRG-based payment system. This element often takes more effort and time to cultivate than technical readiness. For this reason, the success or failure of DRGs system implementation projects is usually dependent on political will and marketing the reform.

Hospitals have IT infrastructure and systems that exceed the minimum functionality required to implement a pilot DRG-based payment system. The necessary system adaptation that must occur to pilot test DRGs is minimal, compared to the system's current capabilities.

114. In Bulgaria, technical capacity exists and the Government's health reform program advocates improvements in hospital efficiency. However, there are many misconceptions about what DRGs are, their impacts and the country's readiness to implement. It might be that these misconceptions are being tactically used as arguments against a reform which would change the status quo and bring greater transparency and objectivity to hospital payments than the current CCP method. Bulgaria has the technical capacity, data, and infrastructure in place — in fact, other countries have successfully implemented a DRG-based system with far less technical readiness. Since 2010, although a number of political decisions have been made to support the use of DRGs, the system has not yet been implemented as a method for paying hospitals.

Chapter 4 - Action Plan and Budget to Implement a Pilot DRG Payment or Budgeting System

115. This Chapter outlines the primary Action Steps and associated activities to pilot-test a DRG system for budgeting or paying hospitals in Bulgaria. For those seeking a deeper understanding of the Action Steps and budget, Annex 4 provides additional detail. It lists specific activities under each Action Step and an estimated time frame for completing the work. The detailed steps stem from Bulgaria's level of expertise, milestones already been achieved, and outline what is still needed in order to move forward with a pilot implementation program. Budget figures are given in U.S. Dollars and inclusive of both a low and high estimate in order to provide a sense of the cost range associated with specific activities, depending on what decisions are taken.

4.1. Rationale for a Nine-Month Action Plan Timeline for Implementation

116. Should the Government decide to move ahead with a pilot implementation, the suggested nine-month timeframe could be deemed overly expeditious. This choice however, made in consultation with experts, is deliberate and reflects the technical readiness to proceed. In other words, the international and local technical experts on the team agree that this pilot test can occur in the short nine-month timeframe but the flexibility exists to expand this timeline to a longer period of time if determined by Bulgarian stakeholders. The final timeframe will depend upon the actual technical capacity available, the desire and speed to implement reforms, the budget available, resolution of any information systems issues, etc. and the Government's actions to manage the reform.

117. The Action Plan and Budget must be used as a "living" document that will require additions and/or adjustments as decision makers and technical experts sit together to plan their way forward with a pilot implementation. While the plan has been tailored to the specific Bulgarian context (i.e., taking into account the past technical work, current knowledge, and available data), we fully expect decision-makers to review and revise it to meet their needs, timeframes, and overall health system goals.

118. For example, decision makers may determine that a new costing system is not necessary; this activity would be removed from the Action Plan, along with the associated budgetary estimate. Review of the Action Plan must be a collaborative one that includes Bulgarian decision-makers and Bulgarian technical experts. International (and independent) technical experts could also usefully contribute to the discussion. The Plan can then be revised to meet the identified goals on an appropriate timeframe and within the parameters of Bulgaria's political and economic environments.

4.2. Main DRG Action Plan Implementation Steps and Estimated Costs

119. The implementation plan contains the following main tasks, each supported by activities that are detailed in Annex 4. The main tasks described are tailored to what is needed in Bulgaria at this time and therefore do not conform to the general steps outlined in Chapter 3 for DRG. The budget estimates are intended to serve as a starting point for decision-makers and technical staff to work through and adapt based on the specific decisions that are made with respect to DRG implementation. The costs of

implementing each of the 8 components are listed here and the total costs for implementing all 8 components ranges from \$372,500 - \$699,000.

Main tasks	Range of funding needed estimates (US\$)	
	Low	High
1 Infrastructure and institutional capacity development and activities to support rapid implementation	110,500	192,000
2 Create hospital processes and conduct trainings	70,000	105,000
3 Implement a coding and classification system	35,000	60,000
4 Engage in clinical data collection and analysis	42,500	110,000
5 Assess and analyze grouping system and data processing	29,500	52,000
6 Conduct costing to develop relative weights	45,000	80,000
7 Develop a contracting system and migrating to DRG based contracting	30,000	70,000
8 Create an auditing and monitoring authority	10,000	30,000
Total Budget Estimate	372,500	699,000

Each of the Main Tasks is broken out below. Readers can either go through this detail or refer to the full Action Plan in Annex 4.

Main Task 1: Developing Infrastructure and Institutional Capacity to Support Rapid Implementation

120. Institutional ownership, technical capacity, and knowledge are critical components that must be developed in order to support Bulgaria's transition from CCP-based to DRG-based payments. Having institutional awareness and technical knowledge on how to implement a DRG-based payment or budgeting system in the content of broader health system goals is critical, as using DRGs to structure inpatient hospital payments will impact other care settings, as well.

121. The goal of any capacity-building work is to create the necessary capacity and knowledge on all key DRG technical aspects of implementing, expanding, and maintaining a case-mix based financing system (i.e., coding, costing, data collection, grouping, data analysis, etc.). It is necessary to improve the capacity of local stakeholders, staff, and institutions — especially around the more highly technical payment policy issues described in previous chapters (i.e., updating the relative weights, simulating various adjustment options, etc.). Existing knowledge on these topics exists among local technical experts especially at the NCPHA and should be leveraged.

122. As a first step towards pilot DRG implementation, senior decision-makers at the MOH, the NHIF, the BMA, the Ministry of Finance, and other key stakeholders must be fully briefed on the major technical concepts related to implementing a pilot DRG-based payment or budgeting system and the necessary decisions that must be made in the short-term in order to begin preparatory activities for a pilot implementation with the selected pilot hospitals.

123. These stakeholders must clearly articulate the political decision and commitment to conduct the pilot-test using the DRGs tool to finance hospital care. Stakeholders must gain a more balanced understanding of the strengths and weaknesses of CCPs and DRGs and should understand that CCPs and DRGs can co-exist in a new, more effective system. It will be important to create champions and manage the opponents.

124. Specifically, stakeholders must clearly understand that:
- The manner in which CCPs are used for hospital financing is flawed;
 - DRGs can be implemented as an output-based financing system with appropriate efficiency incentives;
 - Open-ended budgets will not be allowed; in other words, hospitals will have to live within the means of their contracted budget unless there are extenuating circumstances;
 - Annual updates will be made using data and will be made transparent to all stakeholders;
 - The impact of DRGs will be closely audited and monitored;
 - Any fraud or abuse detected will be addressed with penalties.
125. Another key step is the creation of an Implementation Strategy Team (IST) comprised of decision makers, stakeholders, and technical experts. The IST should meet regularly (ideally weekly) to address specific topics with the expectation that policy issues will be discussed and decided upon. The IST should be responsible for overseeing the necessary technical and policy actions described in the Action Plan in Annex 4. For example, they should be in charge of ensuring that the Parliamentary Health Commission or Council of Ministers re-releases and/or re-signs the document calling for DRG implementation, which was originally signed in 2010.
126. Additionally, defining institutional roles and responsibilities and ensuring the designated institutions have the appropriate, trained staff needed to carry out the necessary activities is essential to pilot test a DRG-based payment or budgeting system. Specifically, designating one or more institutions and/or departments within existing institutions to be responsible for developing, simulating, implementing, and maintaining all technical aspects of introducing DRGs *is necessary* for successful and sustainable long-term implementation. From a technical perspective, existing capacity within the NCPHA Case-Mix Office can be leveraged for the pilot implementation.
127. Development and refinement of all technical and policy-related activities must occur in a meaningful and consistent manner. A clear delineation of roles and responsibilities by “institution,” will ultimately be necessary to ensure a successful and sustainable implementation of a DRG-based payment or budgeting system especially if expanded to more hospitals beyond the pilot which is what we expect.
128. These decisions include determining what institutions (i.e., MOH, NHIF, etc.) are in charge of maintaining and updating the classification system, the coding system and rules; the on-going development of the grouper software; and the development of annual pricing updates are critical and must be addressed. There is no single correct way to assign roles and responsibilities — and the process for doing so varies greatly by country — but these decisions must be made in order for system to succeed. One common approach is to have the payment authority take ownership, as it ultimately bears responsibility for the fund allocation and payments.
129. The MOH should issue official statements to hospitals about the pilot DRG financing implementation, and stress the importance of attending diagnosis and procedure coding training sessions held by the NCPHA. In addition, the MOH should release an Order requiring all hospitals to submit their clinical data to the NCPHA. Specifications on the required data elements should be discussed with the NCPHA, as they can provide a detailed list of the data element. Pilot hospitals should feel the impetus to report data and view their voluntary involvement in the pilot financing as something that is both highly regarded and valued with respect to national policy-making. Finally, the MOH should work closely with the NCPHA to evaluate the infrastructure needs required.

Main Task 2: Creating Hospital Processes and Conducting Trainings

130. Expanding the existing technical capacity that exists in Bulgaria requires investment of both time and resources so that staff and institutions are better equipped with all necessary infrastructure and knowledge. Without this type of capacity building, long-term success and sustainability of the process will be jeopardized.

131. Hospital must be selected for the pilot implementation. Selection criteria should include geographic location, size, type of hospital (i.e., public, private, regional, municipal, university, etc.), submission of clinical and cost data, and any other parameters Bulgarian decision-makers deem important.

132. It is recommended that Bulgaria begin with a small group of pilot hospitals so that policies can be tested and refined. A group of 20-40 hospitals to be included since this is a small enough group to be manageable in the short implementation time frame provided but large enough to provide meaningful results. If decision makers would like to include more hospitals in the pilot, that likely fine as long as all of the included hospitals are able to receive training on coding, costing, data quality, data submission, and an overview of DRG fundamentals before their financing is changed from CCPs to DRGs. Involving them in adjustment and transition policy discussions may also be useful as they are part of the team testing DRGs and should be included.

Main Task 3: Implementing a Coding and Classification System

133. Bulgaria has already conducted a significant amount of work to implement a coding and classification system. Additional details related to this work can be found in Annexes 1 and 2.

134. The translation and adaption the Australian Classification of Health Interventions (ACHI) has been completed. In addition, the necessary legislative base exists for the implementation of ACHI as an official coding system for medical procedures in Bulgaria. ACHI was officially introduced with Ordinance of Minister of Health first published in GG No 75, 9, in September 2014. Afterwards it was changed with GG No 106, 23, in Dec 2014. This second ordinance indicates use to begin as of March 31, 2015. Text in the Ordinance specifies that the NHIF is obliged to update all of its documentation and its information systems by the end of 2015.

135. To date, the following activities have been completed:

- Translating the classification system (including the main diagnostic categories and diagnostic-related groups, as well as coding standards);
- Regrouping all data with version 6.0 of the Grouper;
- Conducting a detailed analysis of the relative weights;
- Calculating relative weights by using Bulgarian data and comparing them with foreign relative weights of countries using a similar coding system;
- Mapping the medical procedures from ICD-9 CM to ACHI;
- Mapping the medical diagnoses from ICD-10 to ICD-10 AM;
- Translating and publishing updates of ICD-10 (2004-2014).

136. Currently, the greatest need with respect to implementing the coding and classification system is to ensure that all hospitals are trained to report complete and accurate diagnoses and procedures in a manner required by DRGs. (See above, training.)

137. ICD-10 diagnosis coding and ACHI procedure coding training materials must be created for use in the facility trainings, along with in-person and e-learning materials. These materials will be used to “train the trainer” so that staff can conduct regional coding trainings for pilot hospitals (and, subsequently, all other hospitals).

Main Task 4: Engaging in Clinical Data Collection and Analysis

138. Before data collection and analysis can occur, the central and local level clinical data collection software must be refined, if needed. Clinical data can then be collected on a monthly basis from hospitals participating in the pilot project (and, subsequently, all other hospitals). These data must be reviewed for accuracy and completeness, and feedback provided to hospitals on errors, average number of codes reported, top diagnosis and procedures etc.

139. In addition, the following basic data collection and software maintenance functions will need to be addressed annually:

- Improve, update and maintain the data reporting application;
- Improve, update and maintain the data submission module/application;
- Maintain the central database;
- Maintain the grouper software;
- Develop and maintain web portals, such as the hospital management reporting portal;
- Conduct data analysis activities.

Main Task 5: Assessing and Analyzing Grouping Systems and Data Processing

140. Bulgaria already has an agreement in place with the Australian government to use Australian DRGs. Thus in this regard, there is likely not much work that will need to occur until the license comes up for renewal in June 2016. Maintaining the existing grouper software and continuing to group hospital clinical data will be the main activities that need to occur on a regularly basis. Grouped data will need to be analyzed and management reports provided to participating hospitals (i.e., top 10 DRGs, average length of stay by DRG, etc.)

141. If Bulgaria expands the pilot project to full DRG-based financing implementation for all hospitals, then it may be desirable to develop a Bulgarian grouper, but this is not a necessary activity in the short-term.

Main Task 6: Conducting Costing to Develop Relative Weights

142. Initial activities include determining whether the existing expenditure data collection process needs to be reviewed and/or refined, and whether a costing study is needed to support the creation of Bulgarian DRG relative weights. (The current data may suffice.) This involves identifying the costs that are being collected and streamlining their capture across all hospitals, and then developing and implementing costing standards.

143. Hospital staff may require training to ensure the accuracy of the cost data collection process. Data are to be collected and analyzed on a monthly basis, and hospitals provided with feedback. When six months of data have been collected, the first set of relative weights can be generated, and compared to previously calculated relative weights in Bulgaria and those from weights obtained from countries that resemble Bulgaria. Using different weight sets, hospital case mix indices should be computed and analyzed, and the relative weights adjusted using both quantitative data and qualitative clinical input from physician experts who may be able to provide more information about the costs of certain clinical services and procedures, especially newer ones that may not be evidenced in the collected data.

Main Task 7: Developing a Contracting System and Migrating to DRG-Based Contracting

144. The BMA, National Consultants, and the NHIF should work closely to refine all of the CCPs to create a smaller number of CCPs (i.e., approximately 30-40) organized along body systems (i.e., Cardiology, Respiratory Diseases, Nervous System, etc.) that would be truly useful as clinical guidelines. This work should involve a review of clinical guidelines, pathways, and protocols used around the world.

145. A review of external guidelines will help the National Consultants and the NHIF create a more robust set of revised CCPs that should provide physicians with more meaningful clinical and quality information, and also allow the NHIF to ensure that minimum contracting standards are in place, while allowing the removal of restrictive administrative requirements.

146. This work should occur in tandem with the movement to a pilot-DRG based payment or budgeting system. It is possible that for a few years, both systems would be used as a method for determining hospital budgets but over time the idea would be to migrate away from CCP-based financing and towards DRG based financing.

147. The primary activities under this DRG Task are related to understanding adjustments and transition policies and simulating them. It is likely that many different parameters will need to be simulated, but before technical staff can simulate, they will need decision-makers to select specific policy options of interest for analysis.

148. Additionally, a review and revision of the existing National Framework Contracting process will likely need to occur in order to allow for DRG-based budgeting and payment to occur for the pilot hospitals as well as all hospitals over time if that decision is taken.

149. To achieve the goal of efficiency, decision-makers will need to establish fair payment/budgeting policies which includes allowing for specific adjustments, outliers, and an appropriate transition time frame so that hospitals have time to begin harnessing the efficiency incentives inherent in a DRG-based payment system as they slowly migrate away from the current CCP mechanism. Two such incentives include reducing the patient's length of stay and migrating cases from the higher-cost hospital setting to a lower-cost day stay or outpatient setting. Hospitals focused on efficiency will begin making changes naturally since they will receive a fixed amount of money based on the average case for a particular DRG for an average length of stay. To the extent possible, they will provide care in a manner to reduce the number of days in the hospital and also may try to treat the patient on ambulatory basis (i.e., cataract surgery, patients with hypertension, etc.).

150. Decision-makers can directly incentivize hospitals to make such changes by offering a financial benefit for certain behaviors it would like to see adopted. For example, if the payment for a specific inpatient DRG was set at the same rate as the payment to treat the patient as a day case or an outpatient case, hospitals would be strongly incentivized to treat the case in a day-surgery or outpatient setting as the cost would be lower but the same payment level would be realized. This should only be done after careful analyses have been done on short-stay DRGs (i.e., those with 0-, 1-, or 2-day lengths of stay) and a clinical review by physicians on certain types of patients seen in hospital today that should not need to over time, assuming other care settings are available. Options for aligning incentives between inpatient hospital care and one-day stays as well as outpatient cases should be analyzed and simulated, and options communicated to hospitals once they are selected to be a part of the new DRG-based payment or budgeting system.

151. Promoting complete and accurate coding and data reporting and encouraging the provision of high-quality care in the right setting is also critical and can be facilitated by communicating the penalties for fraudulent reporting as well as poor quality of care (see below under auditing and monitoring).

152. In addition, hospitals should have the autonomy to hire and fire staff and to use funds saved by providing high-quality, efficient care, in a manner they believe is appropriate (i.e., investing in equipment, making repairs, etc.). If existing laws do not support hospital directors being able to use “profits/surplus” in a manner to benefit the hospital, there will be little incentive to increase efficiency or to provide care in the most appropriate clinical settings.

Main Task 8: Auditing and Monitoring

153. There is an auditing and monitoring department within the NHIF. Decision-makers must determine if this is the department that will handle auditing and monitoring activities related to DRG implementation and if so, then the capacity of this department will likely need to be strengthened. If a separate auditing and monitoring body is created, then staff determinations will be important; will staff be redeployed from other departments/institutions or will new people need to be hired?

154. Regardless, training must be provided on how to review information and data from a DRG coding and documentation perspective. In addition, existing auditing software and/or data edits will need to be updated so they edit claims based on DRG data issues and parameters rather than CCP requirements.

155. Case-mix (and, hence, DRG) is only a tool — its efficiency depends upon implementing it in a way that creates the right incentives to promote and increase efficiency, transparency, objective resource allocation, and reduction of waste and corruption in the health sector. This can only occur if appropriate laws and regulations, are created, implemented, and upheld. There must be accountability in the system, which means engaging in auditing and monitoring activities, and enforcing penalties (i.e., fines) for identified fraud and abuse. There must also be a commitment to honoring budget ceilings, otherwise hospitals have no incentive to be efficient.

156. Existing laws and regulations that create negative or competing incentives from those created by using DRGs for financing, must be addressed; otherwise, the potential benefits of a DRG-based financing system will not be realized. Auditing and monitoring mechanisms let providers know that their actions are being watched. All parties need to know their data will be reviewed to identify patterns of

inappropriate lengths of stay, re-admissions, or otherwise incorrect or fraudulent cases (i.e., reporting incorrect diagnosis or procedures simply to generate higher paying DRGs).

157. Technical experts in Bulgaria already have knowledge on using statistical methods to examine things such as inappropriate length of stay cases and readmission rates by trending patterns by hospital, by peer groups of hospitals etc. This can be done to see if certain hospitals systematically have outliers, for example or have high readmission rates (high must be defined using statistical methods). A re-admissions policy may also need to be implemented in order to mitigate risk on the side of the purchaser overpaying for care by simply not allowing additional payments for hospitals who readmit a patient with the same diagnosis within 15 or within 30 days. These are just a few examples of the types of issues that need to be discussed, analyzed, monitored, and communicated to hospitals.

158. Auditing and monitoring inpatient clinical data is critical to ensure that the incentives created by the DRG payment mechanism are being harnessed appropriately, are not placing patients at risk, and do not create unintended impact on the outpatient or day care settings.

4.3. Caveats about Budget Estimate

159. The Action Plan and budget provided in Annex 4 describe the activities believed necessary to complete over a nine-month period to begin pilot testing a DRG-based payment system in approximately 40 hospitals and to work with those hospitals during the first year of the implementation.

160. It should be noted that no funds have been budgeted for some of the described activities; this occurs when it is believed that existing staff can either complete the work within their current job descriptions, or be redeployed to new activities at no additional cost. Additionally, for some activities, both a “low” and a “high” budget estimate are provided. This range indicates that the activity can be completed in different ways, each of which carries a lower or higher cost based on specific implementation decisions.

161. For example, if existing space is used for meetings or for trainings (i.e., conference rooms at the MOH, the NHIF, or the NCPHA), there will be no space rental costs and the only expenses will be minimal costs for refreshments. If these activities are held in rented space, there would be a higher cost for them. Even so, the cost could be higher or lower depending on exactly how and where the activity takes place.

162. Some activities show only a small range in the costs. For example, training costs are fairly well-known, so there is less variation in these estimates. (Training costs were estimated by local experts based on their knowledge of costs and their expectation of a certain number of attendees.)

The Excel version of the Action Plan and Budget contains notes about these issues, so readers can gather more detail, if desired. If the assumptions are incorrect, Bulgarian decision-makers and technical experts can update and/or correct the figures provided.

163. The budget estimate does not cover expansion of a DRG-based system to all Bulgarian hospitals. If such an expansion is undertaken, a specific Action Plan with dedicated activities and budget would need to be prepared based on the lessons learned and information gathered during the piloting phase. The budget for a full roll-out is likely to contain additional costs related to activities such as considering

the development of a Bulgarian grouper, or buying a new costing system. The Action Plan's budget does not include these items, since they are not needed during a pilot-test.

164. In conclusion, the budget amounts provided in the Action Plan are initial estimates of what local and Bulgarian experts believe are needed to begin a DRG-pilot implementation with approximately 40 Bulgarian hospitals. These estimates should serve as a starting point for discussion among Bulgarian decision-makers and technical experts and should be adapted based on actual decisions taken. They should not be viewed as an impediment to implementing a DRG-based pilot payment system.

4.4. Summary

165. There is no single right answer on how to develop, pilot-test, and implement a DRG-based payment system, nor is there a single answer as to where the case-mix functions should be housed. It is critical, however, to have capacity, knowledge, clearly defined institutional roles and responsibilities, and political commitment. What is clear is that technical capacity and knowledge, and the existing staff and HMIS/IT infrastructure, can be leveraged to begin a DRG pilot implementation. Investment and upgrades will be needed over time, but neither staff nor systems are an impediment to Bulgaria being able to begin with DRGs.

166. To date, a significant amount of work has been conducted to study, and prepare for, DRG implementation; the heavy lifting, in terms of technical work, has been conducted. Successfully completed activities include building hospital and national IT and HMIS infrastructures; developing crucial software and providing training on its use; and collecting necessary data in a national repository.

167. The activities outlined in the Action Plan are intended to ensure that the pilot test to migrate from CCP-based contracted budgets and hospital payments to DRG-based ones will foster organizational and functional changes at the hospital and central levels. They will also create and align incentives across care settings, and develop additional capacity among stakeholders. They are designed to ensure that this effort will be successful and that the outcomes can be used to evaluate whether a broader, national roll-out is of interest.

168. By using the DRG and CCP tools as they were originally intended, Bulgaria can accomplish a fair, transparent, and data-driven allocation of its limited resources — and ensure that clinical protocols and contracting standards remain in place to ensure patient safety and quality of care.

169. While nine months is a rapid timeframe, the experts consulted believe that this plan is feasible, since Bulgaria has a large amount of existing data and strong infrastructure. Given the country's advanced state of technical readiness, it is preferable to generate momentum quickly, and concentrate the preparation activities, in order to begin a pilot implementation. This is the assumption under which the activities plan was prepared, but can be easily revised if a longer timeframe is needed.

170. Clearly the Government as part of its Health Reform Plan must decide on what are the best policies to improve hospital efficiency and improve the sustainability of the health system. If the steps in the action plan are carried out in a timely manner, Bulgaria will be well-positioned to begin a pilot DRG implementation in short-order and expand it out over time. It should be noted, however, that the pilot introduction of a DRG-based financing system will not solve the country's broader health system issues. It will have the intended benefits of creating incentives for hospitals to consolidate health care

services, reduce unnecessary lengths of stay, decrease unnecessary admissions, reduce care fragmentation, and begin to migrate patients to other, more appropriate care settings.

Annex 1. Bulgaria's History in Studying Case-Mix and DRGs

171. This Annex provides a summary timeline of past case-mix and DRG related efforts in order to ground future work. The information was provided in oral history from experts who were involved with the first pilot projects that began in the mid-1990s. The timeline may contain some factual errors, which is a risk when working from memory and oral history.

1990s

- In late 1993, Robert Fetter, one of the developers of the U.S. DRGs, was invited to Bulgaria. He first familiarized experts from Bulgarian health institutions with the fundamentals of a case-mix approach and DRG-based system.
- In 1994 - 1995, a technical assistance project to introduce case-mix in Eastern Europe was awarded to Solon Consulting and 3M HIS by the U.S. Department of Health and Human Services (DHHS) and the U.S. Agency for International Development (USAID).
- 1996-1999: Bulgaria was one of four countries that received technical assistance through the technical assistance project. In Bulgaria, the project sought to provide the MOH and NHIF with education and information about DRGs. During this project, a simple clinical data collection software tool was created and installed in 11 hospitals so they could begin collecting minimum, basic data to be used to group inpatient cases into DRGs. Five computers and a server were placed in a Municipal hospital and approximately 15 computers distributed to hospitals in the region. The ICD9-CM diagnostic and procedure coding system was translated into Bulgarian, and training and certification on ICD9-CM coding was conducted. In addition, the definition of the minimum data set and forms to be used to gather the data were completed, and training conducted so hospitals could consistently capture and report patient registration and clinical information. Accounting and expenditure data were also collected using Excel; an Economist on the project team used these data to model step-down costing and compute relative weights using Bulgarian data. (We believe this was the first set of relative weights created in Bulgaria.) The project included other activities, but the main focus was to provide education and training on DRGs, their use, and the major technical steps required to implement such a system.

A case-mix office was also created as a separate entity in the MoH involving the experts engaged in the technical assistance project. Because no budget was approved for this entity, the team was moved to the NHIF to organize its work.

2000s

- 2000: Another simple piece of software was created to automate the step-down cost accounting process and extend costing for inpatient cases. A total of 21 hospitals participated in the pilot project.
- 2001: In the beginning of the year, the NHIF needed to decide how to begin reimbursing hospital care. All of the data since 1996 (from more than 500,000 cases) were recollected and grouped and some analyses were done. An Australian consultant (Dr. Don Hindle from the Medical Faculty of the University of New South Wales) was invited to Bulgaria to present Clinical Care Paths (CCPs). With strong support of the Minister of Health and the NHIF, CCPs were selected

for use in organizing hospital reimbursement. While CCPs were not developed for this use, misconceptions existed about DRGs suitability for contracting purposes, which influenced a preference for CCPs. There may also have been a misperception that DRGs require more data collection about admission and discharge information, as well as the capacity to code and report cases, neither of which was well-developed in Bulgaria at that time. The first 30 CCPs were created by the NHIF, based on a list of diagnoses and procedures that came from a small list of DRG groups.

- 2000 – 2001: The political situation changed dramatically in 2001. The majority of the staff with experience in DRGs (both at the MOH and the NHIF) were replaced. At this time, much of the DRG work came to a halt, including studying new reimbursement concepts. Nonetheless, the NHIF continued with creating more CCPs.
- 2001 – 2003: Coding training was planned and delivered to doctors, coders, and economists. A cost accounting project also was in place during this time, but a project to collect electronic data from hospitals was not completed. Data collection was at a standstill.
- 2003 – 2005: The Bulgarian and Australian governments signed an agreement to obtain a research license. At the same time, a Bearing Point project was occurring in Bulgaria, through which the primary author of this report, Ms. Jugna Shah, was working with technical experts and officials at the MOH and the NHIF to pilot-test DRGs for financing. This project focused on the following activities:
 - Work with the Head of the NHIF to expand technical capacity within the case-mix office;
 - Prepare grouper software selection criteria and evaluate various grouper options;
 - Discuss policy decisions, DRG implementation options, and contracting models with the MOH Deputy Minister and the head of the NHIF (presentation on DRG contracting available on request);
 - Draft a discussion guide on determining institutional roles and responsibilities;
 - Prepare an implementation timeline with required political and technical decisions
- 2003 – 2004: The existing ICD-9 and ICD-9-CM diagnoses coding system was changed to ICD-10 WHO. Clinical and expenditure data collection began again involving approximately 40 hospitals; 3M worked with Bulgarian counterparts to group approximately 1 million cases in both the 3M International Refined Grouper and the Australian Grouper. A meeting occurred between Bulgarian counterparts and an Australian grouper software company to discuss the terms for obtaining a grouper software license. After a careful evaluation and cost-benefit analysis of various groupers, Bulgarian experts selected the Australian classification, procedure coding, grouper, and coding standards.

MOH conducted a tender for the provision of the Specialized Software for Hospitals (SSH); the system was required to contain clinical and expenditure data collection software for hospitals, interface for data collection activities with the NHIF, and DRG grouping interface and analyses.

- 2005: the MOH purchased servers, network switches, and Personal Computers (PCs) for 154 hospitals.
- 2006: Clinical and expenditure data collection software were installed in Bulgarian hospitals and

training provided to approximately 1200 people. Clinical and expenditure data collection began using the “Specialized Software for Hospital” (SSH) system.

- 2007: Gamma Consult created data validation software for the NHIF’s use. A free version of this software (without the validation checks) was provided to the hospitals. Approximately 156 hospitals collected data in 2007 and an additional 92 hospitals were given the software. They had been expected to close, and so were not included in the original software rollout, but they did not close and subsequently began reporting data. By March, clinical and expenditure data were being reported by all hospitals that had received the software. Private hospitals were also given the opportunity to participate.
- 2008: By the end of the year, approximately 92% of all inpatient clinical data was being collected and it was grouped into DRGs using Version 4.5 of the Australian Grouper.

From 2008 until 2010, the NHIF assigned the BULL SIVECO consortium to develop an integrated information system for NHIF. During this process, it was decided that the “Specialized Software for Hospitals” would be the sub-system where the reports of the medical institutions for hospital care would be filed, and that this sub-system would be integrated with the NHIF’s large information system. In parallel, an interface was developed to import Excel files containing the Clinical Pathways reports.

- 2009: The contract between Gamma Consult and the NHIF, which had begun in 2005, was completed. The primary author of this report, Ms. Jugna Shah, was invited to speak at the V National Conference “ICT In Healthcare: The Challenge of the 21st Century” in Sofia, Bulgaria on October 15, 2009. (This presentation, entitled, “Using Case-Mix Financing Methods to Restructure Hospital Payments and Measure Hospital Production: DRGs vs. CCPs,” is available on request.) Gamma Consult agreed to update the software if NHIF made certain changes to hospital requirements. NHIF received ownership of the software from the MOH but did not do much with it.

The software was made available free-of-charge to over 320 medical institutions; at this time, the NHIF central database covered over 95% of the hospitalizations in the country.

- 2010: The Ministry of Health began working on obtaining approval to implement DRGs and also to obtain a licensing agreement from the Australian government for grouper software. The Bulgarian Council of Ministers approved the guidelines, terms, and timeframe for implementing a new hospital financing model, using DRGs (available on request) and authorized the Minister of Health and the Governor of the NHIF to prepare a draft agreement as a basis for negotiations with the Australian government for the purchase of a classification system.
- 2011: The NHIF did not make much progress with exploring DRGs as a financing tool, but did ask hospitals to continue reporting clinical and expenditure data using the software provided. Gamma Consult continued to provide minimal updates to the software on a *pro bono* basis. The data continued to be grouped into DRGs, but the quality of the data was not examined and there were no efforts to improve data collection.

The Minister of Health signed a License Agreement between Australia and the Bulgarian MOH

confirming the right to use the classification system ARDRG version 6 until June 2016 (effective on February 1, 2012). This agreement was ratified through an act adopted by the 41st National Assembly on December 14, 2011, SG No.102 of 2011.

Problems arose between the new NHIF management team and the NHIF case-mix department. The new NHIF director wanted to merge the case-mix department into the Information Technology Department, and indicated that they did not want to pay for the grouper software (which was provided *pro bono* in the first place). During this time, the grouper software was transferred back to the MOH, which transferred the Specialized Software for Hospitals (SSH) software to the NCPHA.

As a first step for implementing DRGs in Bulgaria, a special department was created in the National Centre of Public Health and Analysis (NCPHA) staffed by experts who have worked on previous projects for the introduction of DRGs in Bulgaria. The department was responsible for collecting, grouping, and analyzing the data. The department was also asked to prepare a DRG implementation and activities plan, which it did based on previous implementation plans. A leading Bulgarian DRG technical expert was appointed as the Director of the NCPHA, which houses the case-mix department. The Director and the Minister of Health negotiated with the Australian government to finalize negotiations for the specialized DRG grouping software; this was obtained using financing from a World Bank DRG Project, and provided to the NCPHA by order of the Minister of Health. The classification department focused on maintaining the data collection process.

To develop an effective case-mix office, additional staff were needed to conduct analysis, prepare relative weights, simulate budgets, analyze trends and patterns, etc. The Director of the NCPHA lacked sufficient time to work on case-mix and DRG-related activities, and hired another DRG expert to run the case-mix department (this individual had been the Deputy Minister in 2005 and had a large working knowledge of DRGs). Many of the DRG processes were initiated again, including preparing an infrastructure plan and revised work plan (available on request).

- 2012: The Minister of Health was replaced and the Director of the NCPHA departed; the newly hired DRG expert remained in charge of the case-mix department and continued with data collection, grouping, and analysis activities. A Committee was formed to monitor the introduction of DRGs, which includes representatives from the Ministry of Health, Ministry of Finance, NHIF, and NCPHA.

In April, the classification system and grouper software was provided to the NCPHA by the MOH. Unfortunately, this transfer removed the hospitals' obligation to report their data, since the data provision requirement was part of the hospitals' contract with the NHIF. While many hospitals have stopped reporting data, and the volume of data is declining, fortunately, over 200 hospitals still continue to report.

- 2013: The NCPHA grouped 2012 data and prepared several analyses on the use of DRGs; this was published in the *Bulgarian Journal of Public Health*. The papers addressed DRGs and CCPs, their performance differences, key issues, and possible next steps for Bulgaria to implement DRG-based financing.

The XML format for reporting medical institutions' daily activities for hospital care was launched in February. It contained all of the details from form No. 7 of NHIF – Direction for hospitalization. Medical institutions generate the XML files and upload them in the NHIF portal. The introduction of this XML format is now available in the HOSP database and can be used to group cases into DRGs.

- 2014 - 2015: During 1st quarter, the head of the case-mix department was asked to leave the NCPHA. Despite this change some work continued on data collection and grouping. Additionally, the NCPHA case-mix team translated the Australian procedure coding system in preparation for its implementation in 2014 (hospitals had been reporting their data using Excel), but the implementation date was postponed to 2015. A new World Bank project was signed in 2014, which includes a focus on studying the use of DRGs. The primary author of this report, Ms. Jugna Shah, was asked to join the World Bank team to study the possibility of implementing DRGs in Bulgaria for hospital financing.
- In 2015, the former head of the case-mix department was asked to return and work on implementing a DRG-based financing system. The result of the collaborative work between the World Bank team and Bulgaria counterparts is showcased in this report.

Annex 2. Current status of HMIS systems and IT infrastructure from the point of view of DRG implementation

172. This Annex provides an overview of the current status of hospital management information systems, and the NCPHA, NHIF, and MOH information systems with respect to DRG implementation.

1. First steps in the preparation of Bulgarian hospitals and NHIF for the implementation of DRG from an IT perspective

173. A standardized method for coding the patient's clinical morbidity uses a preselected diagnosis and procedure coding system. Hospital reporting of these data to the central / national level in electronic form is a prerequisite for developing, implementing, and maintaining a DRG-based financing system. These data include diagnosis and procedure codes, as well as the "minimum basic data set" of key demographic and clinical data elements: age, gender, admission date, discharge data, discharge status, and any other information needed to assign patients into DRG groups.

174. It is also important to implement a standardized costing methodology and system for use in reporting cost data from hospitals to the central / national level via electronic form. This information is used to create country-specific relative weights that are then used to compute hospital budgets and other key elements in the DRG-based payment system.

175. Cost data can be provided at the hospital / department level, and then allocated by DRGs; this process is called "top-down costing." Alternatively, department-level costs can be stepped-down to the patient-level and combined with directly captured patient-level costs; this type of costing is called "bottom-up costing."

176. Two Bulgarian pilot studies of DRGs were conducted: the first in 11 hospitals between 1996 and 1998, the second in 40 hospitals from 2003 to 2004. In addition, three DRG classification systems were evaluated (HICFA 12.0, AR DRG 4.7, and 3M International Refined DRG's). Based on this work, the Bulgarian MOH decided to implement Information Technology (IT) infrastructure and software that created the capacity to electronically report clinical and cost data, and to implement DRGs.

177. In 2005, the MOH purchased servers, network switches, and Personal Computers (PCs) for 154 hospitals. In 2006, the MOH assigned the development of the "Specialized Software for Hospital" (SSH) system to be used for hospitals' electronic reporting and to support the introduction of DRG.

178. During 2006–2007, the system was developed and implemented in 246 medical institutions providing hospital care (with a total workforce exceeding 1,500) and the NHIF. The system includes two sub-systems — hospital and central — that are described below.

179. (1) The hospital sub-system is made available to the medical institutions for free and includes two modules, the "in-patient registration and clinical pathways" module and the "costing and financial analyses" module.

(1.1.) "In-patient registration and clinical pathways" module automates the activities involved in collecting clinical data by allowing registration of data for:

- admission of inpatient to hospital;
- inpatient transfers between hospital departments;
- inpatient discharge;
- all data for outpatients and exams;
- coding of referral, admission, and discharge diagnoses; diagnoses for comorbidities and complications; and medical procedures (surgical and diagnostic) according to ICD-10 WHO and ICD-9-CM.

180. The module also allows input of data in predefined formats from the Hospital Information System of the medical institution (if any). It fully conforms to the legislation and reporting requirements of the MOH, NHIF, and the NCPHA and is subject to update according to changes in legislation and regulations.

(1.2) The “Costing and Financial analyses” module has several features, including processes to:

- automate the operations for collection of cost allocation data;
- allow for data input or import of expenditure data by department in predefined formats from hospital accounting and human resources software;
- allow for data input or import of expenditure data at the patient/case level from pharmacy and store management, laboratory, and imaging software at the patient (inpatient case) or department level;
- implement step-down accounting to allocate administrative and ancillary department costs over hospital departments providing medical services;
- automate the process of calculation of actual cost of all hospital products by services, by patient (inpatient cases), by DRG, and by Clinical Pathway;
- perform financial analyses of hospital products including revenue versus expenditures by services, by patient (inpatient cases), by DRG and Clinical pathway, by department, and for the entire hospital;
- allow for *ad-hoc* reporting.

(2) The second module, the central sub-system module, includes three modules and functions: a “Web and E-mail interfaces” module; an “Interface to DRG Grouper” module; and an “Analytic software” module.

(2.1) The “Web and E-mail interfaces” module:

- implements interfaces for access to the data consolidation of aggregated medical and economic information;
- automates the processes of data exchange between NHIF and hospital health care providers in accordance with their contractual relations;
- uses secure data exchange protocol (SSL, HTTPS);
- uses secure authentication, identification and encryption of the exchanged data by X.509 certificates according to the implemented in NHIF PKI.

(2.2) The “Interface to DRG Grouper” module:

- checks the completeness and formal validity of input data;
- automatically processes the received clinical data to prepare it for grouping according to the input format for DRG Grouper software;

- passes the processed clinical data to the DRG Grouper software;
- processes the file with results from the DRG grouping and imports them in the database.

(2.3) The “Analytic software” module:

- supports standard data input from all hospitals in the country;
- performs data checks for clinical validity, quality, redundancy, relevance, and consistency;
- performs hospital claims validation:
 - checks patient data against national population registers;
 - checks insurance status of the patient at the moment of provision of services against the national database;
 - formal validation of clinical data against CCP minimum requirements;
 - validation of reported data against business rules for readmission by CCPs;
 - crosschecks of inpatient data between hospitals and other data reported by other care providers;
 - validation of other business rules related to medical devices covered and in relation with procedures coded, limitations of number of episodes of care or devices, etc. – over 500 various checks of clinical data;
- generates response files for hospitals containing results from data validation and optionally from DRG Grouping via WEB interface for import at hospital database;
- produces various analyses based on clinical data reported by hospitals;
- produces analyses for CCP costing on the national level, by type of hospital, etc.;
- calculates country-specific relative weights, average lengths of stay, low and high trim points for stay and cost by DRG;
- calculates hospital case-mix indices;
- calculates base rate on hospital level and national (regional) level;
- contains various reports to support data collection, DRG grouping of clinical data, grouping results control, reimbursement amounts calculation under CCP etc.

2. Current status of hospitals’ IT infrastructure and HMIS systems, and their capacity to implement DRGs

181. Since 2000, there has been an increasing initiative by hospitals to implement information systems. This process has been particularly intensive since 2006, as a result of the implementation of the “Specialized Software for Hospitals.”

182. At present, all hospitals in the country have built a basic IT infrastructure and implemented HMIS by different providers; several still use the “Specialized Software for Hospitals” that is provided free-of-charge. All implemented systems cover the basic functional capabilities of this specialized software.

183. The number of hospital workplaces where HMIS have been implemented varies from several workplaces in very small hospitals to several hundred workplaces in the big university and regional hospitals and large private hospitals. Currently, about 12,500 HMIS workplaces are in use (including those using specialized software) in about 350 hospital hospitals; this is an average of over 30 workplaces per medical institution.

184. To operate these systems, all hospitals have built and maintain, at a minimum, the following IT infrastructure:

- local area network;
- a server for the database and organized data archive;
- workstations and printers;
- Internet connectivity for verification of the patients' Social Security status from the NRA web site services and daily exchange of data with the NHIF;
- personal ID document readers and internet connectivity; after April 1, 2015, they will perform online registration in the NHIF database for all patient admissions and discharges, using the personal ID document within four hours of the event;
- IT staff or an agreement with an external IT company to provide IT infrastructure maintenance and operation services.

185. The scope of HMIS that has been implemented by different medical institutions varies widely, including, at a minimum, the following:

- accounting software;
- warehouse and pharmacy reporting software (sometimes part of the accounting software);
- human resource and payroll software;
- clinical data encoding and reporting software with no less capacity than that of the Specialized Hospital Software;
- hospital products and services costing software with no less capacity than the Specialized Hospital Software.

186. In the majority of hospitals (about two-thirds), many other HMIS components have been introduced, including:

- electronic ordering of medicines and consumables, reporting of costs for medicines and medical products at the inpatient level;
- laboratory information systems maintaining laboratory analyzer interface, electronic ordering of laboratory tests, and bar coding of specimens;
- electronic ordering of image examinations, storage of diagnostic images in PACS with possible access by hospital departments, and even elements of DICOM Workflow;
- patients' hospital nutrition, diet, and electronic orders;
- contract management and reporting to the additional voluntary health insurances funds;
- calculation and invoicing of additional services used by the patients;
- coverage and preparation of the majority of a patient's the medical data in the system and filing it into an electronic medical record of the patient.

187. The following functions have been recently implemented and are used on a daily basis by some hospitals:

- providing patients with on-line (WEB) access to laboratory results, image examination results, checks, and discharge letters.
- real-time control of patient's treatment costs in relation to the expected revenues from different sources (NHIF, CCP), payments by the patient, payments from additional health insurances, etc. The balance of the expected revenues relative to costs is being monitored with every medicine provided by the hospital pharmacy, each laboratory or imaging test, examination or consulting provided, etc.

- electronic medication prescriptions, control of maximum doses, drug interactions, medicines administration control, and use of mobile devices at the patient's bed.

188. The hospitals have built the capacity and conduct daily reporting of all operations, medicines and medical products, electronically in the form of an electronically signed XML within the next working day, with all data being ICD encoded and not subject to amendment, except in extraordinary circumstances.

189. A conclusion can be drawn from the above overview that the hospitals have IT infrastructure and systems that greatly exceed the minimum functionality required to introduce DRG reporting and payment. The adaptation of the systems that must be performed in the course of DRG introduction is small, compared to the system's current capabilities.

3. Status of the NHIF's IT systems with respect to the exchange of data with hospitals and capacity for introducing DRGs

190. Until 2007, the NHIF collected and processed the hospitals' reports on paper and using Excel files that contained minimum medical data. The Excel files were imported and processed using a software program called "HOSP" that the NHIF developed with the help of external experts. This database does not contain all of the information needed in order to group cases into DRGs.

191. From September 2007 to December 2011, the "Specialized Software for Hospitals" system was implemented and operated at the NHIF; all medical institutions that are contractual partners with the NHIF were obliged to provide medical data and data on costs incurred for medical treatment at the inpatient level, on a monthly basis. As of 2009, the software was made available free-of-charge to over 320 medical institutions; at this time, the NHIF central database covered over 95% of the hospitalizations in the country.

192. In parallel to the data collection from hospitals by the Specialized Hospital Software, the NHIF preserved the clinical pathways reporting in Excel and the reports processing model in the HOSP software product. After the expiration of the "Specialized Software for Hospitals" warranty period, in March 2009, the NHIF neither invested in nor contracted further maintenance and development activities. It did, however, continue using the software until December 2011.

193. From 2008 to 2010, the NHIF assigned the BULL SIVCO consortium to develop an integrated information system for NHIF (the contract was for more than BGN 15 million). In the course of the system implementation, it was decided that the "Specialized Software for Hospitals" would be the sub-system wherein the reports of the medical institutions for hospital care would be filed, and that this sub-system would be integrated with the NHIF's large information system. In parallel, an interface was developed to import Excel files containing the Clinical Pathways reports.

194. In December 2011, NHIF terminated the operation of the "Specialized Software from Hospitals" and the system was moved to the NCPHA. Following this, the NHIF made an assignment to develop a mechanism for daily reporting of the work done by the contractual partners of the National Health Insurance Fund (NHIF) (the contract was for BGN 1.27 million), and continued the development of the HOSP software as a system for processing Clinical Pathway reports.

195. The XML format for reporting the activity of the medical institutions for hospital care was published in December 2012, and launched in February 2013. It contained all of the details from form No. 7 of NHIF – Direction for hospitalization. The medical institutions generate the XML files with their hospital systems and upload them in the NHIF portal, signing them with a qualified electronic signature. The introduction of this XML format is now available in the HOSP database and can be used to group cases into DRGs. The XML reports are processed by the HOSP software; the results, including identified problems, are returned to the medical institutions via the NHIF portal in the form of a text file.

196. Since May 2013, the hospital medical institutions have been reporting daily in XML format, with reports including all patients discharged the previous day, their diagnoses, treatments, medicines and medical products covered by the NHIF. There is the possibility to also include the patient's discharge letter.

The medical institutions' report to the NHIF usually do not include all of the patients admitted to, and discharged from, the medical institution; instead, they include only those patients who have Social Security and whose care is subject to payment by the NHIF.

197. Below are input fields (i.e., data) of AR DRG 6.0 Grouper used to group an inpatient; the asterisked fields (*) are compulsory fields, while those marked with a hash (#) are conditional:

MRN - Medical Record Number.

Admission Date # - This field is only required if age and/or length of stay are to be calculated from dates.

Separation Date # - This field is only required if Admission Date is entered and length of stay is to be calculated from dates.

Separation Mode * - This is a compulsory field and the output cannot be viewed if this field is left blank.

Date of Birth # - This field is only required if Admission Date is entered and age is to be calculated from dates.

Age in Years # - This field is required if age is not calculated from dates and age is greater than 1 year.

Age in Days # - This field is required if age is not calculated from dates and age is less than 1 year.

Admission Weight # – This field is required if age is less than 1 year and should be entered if supplied in the medical record.

Sex * – This is a compulsory field (valid entries are: M, F or U).

Acute LOS # – This field is only required if length of stay cannot be calculated from dates.

Non-acute LOS – This is an optional field but should be entered if supplied in the medical record. This will help identify LOS outside the acute setting.

Leave Days – This is an optional field but should be entered if supplied in the medical record. This will help better define the acute LOS by identifying the time the patient spends out of the acute setting.

Same Day Flag – This is calculated using dates or Acute LOS. May be overwritten if required. Valid entries are 1 (Same Day) or 0 (Not Same Day).

MHLS * – This field captures the mental health status and is optional but should be entered if supplied in the medical record. The default for this field is 9 which means 'not applicable.'

Diagnoses Codes – The Principal Diagnosis (PDx) is required. All other diagnosis fields are optional, but if any Dx's occur in the medical record, they are necessary for correct grouping.

Procedure Codes - All procedure fields are optional, but are necessary for correct grouping if supplied in the medical record.

198. Based on the list above, and knowing the content of the XML file for the hospital daily report, we can conclude that all the data needed for DRG Grouping of inpatients are transferred and available in the NHIF via existing systems of hospitals and NHIF.

199. There are a few issues to resolve prior to implementation of a DRG system, but these could be done easily. These include:

- (1) Procedures and diagnoses in hospital systems and XML files are coded by ICD-9- and ICD-10 WHO ver. 2004, but AR DRG Grouper 6.0 uses ICD-10-AM 7.0 and ACHI 7.0. This issue can be resolved by using mapping tables that have already been created by NCPHA. Once ICD-9-CM procedure coding is replaced with ACHI 7.0 (Bulgarian translation), the procedure codes will be native; meaning, there will no longer be a need to use mapping tables.
- (2) Some of the CCPs impose certain diagnosis and procedure coding requirements that might be unusual for DRGs. This can be handled by special processing of diagnosis lists when exporting codes to the DRG grouper and by fixing unusual coding rules in CCPs during the annual CCP updating process.

200. Since the operation of “Specialized Software for Hospitals” was discontinued in December 2011, the NHIF does not collect cost data at the department- and patient- (inpatient) level anymore, nor does it require hospitals to report these data on a regular basis even for CCPs reimbursement price calculation. Many hospitals continue to report this information on a voluntary basis to the NCPHA.

4. State of the NCPHA’s IT systems with respect to data exchange with hospitals and capacity for the introduction of DRGs

201. The “Specialized Software for Hospitals” system was transferred from the NHIF to the NCPHA in December 2011. Since then, many fixes and updates of the system have been made in order to keep it operational, ensure that it is aligned with changes in the business model and reporting requirements of NHIF and the National Social Security Institution (NSSI), and preserve its functions for collecting and processing medical and cost data for the purposes of DRG. No investments have been made for its further development, however.

Below is the list of major fixes and updates made since December 2011:

- Migrating and installing databases from NHIF to NCPHA;
- Development from scratch of a new version of the “Web and E-mail interfaces” module that uses a qualified professional digital signature;
- Licensing an MS SQL Server 2012 Standard and upgrade of the central part to this version of SQL server;
- Setting up the AR DRG 6.0 Grouper and integrating it by developing a new version of the “Interface to DRG Grouper” module and implementing a mapper developed by NCPHA between ICD-9-CM and ACHI 7.0 and ICD-10 to ICD-10 AM;
- Regrouping all data since 2006 with version 6.0 of the AR DRG Grouper and updating the interface;
- Calculating relative weights using Bulgarian data and comparing them with the relative weights of countries using a similar classification system;
- Updating the “Specialized Software for Hospitals” to address legislative changes throughout the years.

202. Exchange of data between medical institutions and the NCPHA occurs monthly using the encrypted XML files. The NCPHA continues to collect both clinical data and cost data from hospitals. Although all hospitals have the ability to provide clinical information and information on costs incurred, only about 200 of them provide such information to NCPHA. The NCPHA's IT infrastructure was also upgraded in 2012 by buying new servers, storages, and PCs with a budget of about BGN 500 thousand.

5. State of the MOH IT systems with respect to the introduction of DRGs

203. At present, the MOH does not support databases and systems relevant to DRG software, other than those in NCPHA.

6. Suggested activities for implementation of DRGs, from an IT perspective

204. Based on an analysis of prior initiatives and the current status of IT systems in hospitals, NCPHA, and NHIF related to DRG implementation, we can conclude following with respect to a potential pilot test:

- There are enough hospitals that have IT infrastructure and HMIS systems that can produce and report clinical and cost data at the patient (inpatient) level to proceed with a pilot test;
- The NCHPHA's IT system and the "Specialized Software for Hospitals" system are functioning and can easily serve the process of pilot testing DRGs, with minimal upgrades and maintenance services;
- It is reasonable (and could be very helpful) in the pilot implementation to overcome formal barriers and provide access for NCPHA to inpatient clinical data that has been available to the NHIF since 2013, for the purposes of DRG Grouping. These data could aid the pilot implementation by facilitating a precise simulation based on DRGs for all of the hospitals in the country.

205. Following are suggested improvements, from an IT perspective, to assist the pilot implementation of DRGs:

- Training and continuity:
 - Plan, define and publish a date after which ACHI 7.0 will replace ICD-9-CM, and prepare a new version of data collection software and a central system that will work with the new procedure coding system after the planned date;
 - Prepare an e-Learning environment for distant training and testing to guarantee stable results over time:
 - Using e-Learning environment to prepare and publish training courses and test preparation materials for ICD-10-AM diagnosis and ACHI 7.0 procedure coding systems, based on which, a constant training process can be run;
 - prepare and run refreshment courses on diagnoses and procedure coding subject;
 - prepare and run training courses available for hospital staff on DRG topics;
 - prepare and run training courses for costing;
 - Organize a web forum for news, publications, questions and answers related to changes in coding and costing requirements.

- Clinical data collection, coding and classification:
 - Develop and provide Pilot hospitals with a new version of data collection software or/and new interface/export logic to make data submission to a central location simple;
 - Define and develop in a central part of the data collection software analytical reports related to quality of coding by hospital, coder, CCP, DRG, etc. for the provision of feedback to hospitals;
 - Define and develop analytical reports in a central part of the data collection software related to DRG grouping results, by hospital and coder, representative of each DRG, relationship between DRG and CCP to support this analysis of grouped data;
 - Develop management reports in a central part of the data collection software that can be provided to hospitals with grouping results/ hospital feedback reports (i.e., Top 10 DRGs, average length of stay by DRG, etc.) and an upgrade of the central software to produce these reports;
 - Develop interface with NHIF for provision of clinical data from hospital reports for DRG grouping;
 - Upgrade of a central part of the data collection software, the software with functionality for analysis of the homogeneity/distribution of cases grouped under the same DRG and evaluation of the need to define new groups;
 - Develop a Bulgarian grouper, only if a national roll-out is decided after the pilot implementation occurs;
 - Develop a WEB page for manual grouping and a WEB service for batch grouping available to hospitals;
 - Maintain regular updates of data collection software and/or new interface/export logic to keep it in conformance to legislation changes.

- Cost data collection and analysis
 - Upgrade and maintain in a central data collection software functionalities to support abovementioned functionalities and provision of second level support services for data collection and processing (including costing software in hospitals):
 - Improve functionality of relative weights based on cost data collected;
 - Allow import of relative weights borrowed from other countries;
 - Functionality to compute and analyze case-mix indices using different weight sets and weight set mixes;
 - Maintain regular updates of costing software to keep it in conformity to legislation changes.

- Contracting System Development - Migrating to DRG Based Contracting
 - Upgrade of a central part of the software with functionality for calculation of hospital budgets with options for simulations based on different choices for base price blending, outliers, adjustments, etc. including calculation of adjustments to payments within risk corridors during testing of the system in the pilot hospitals.
 - Maintain regular updates of developed functionalities in conformity to legislation changes.

- Auditing and Monitoring

- Upgrade the central system throughout time with functionality to audit clinical and cost data collected, linking DRG data to quality metrics/performance indicators, define and calculate penalties/non-payment for poor and fraudulent data and develop feedback/reports for hospitals;
 - Maintain regular updates of developed functionalities in conformity to legislation changes.
- Help Desk and support services for the period of the Pilot implementation

206. For a potential national roll-out, the current data exchange process in NHIF can serve the DRG implementation on national level without the need for big changes. Some changes will be needed depending on the status of the NHIF information system at the time of DRG implementation, including:

- DRG grouping of reported cases must be done, which is relatively simple to implement;
- There might be a reason for hospitals to receive information back for DRG assignments after DRG grouping in NHIF as well as errors that have occurred via a structured (XML) response file;
- All budgets and reimbursement amounts currently calculated based on CCPs need to be changed to DRGs;
- All claim validation and fraud detection logic has to change to DRGs.

207. In summary, all instruments developed in the pilot DRG implementation process would be applicable to a national roll-out if such a decision is taken. As with the pilot test, the national roll-out will not require any significant improvement of the existing IT infrastructure, although some refinements and investment will be needed.

Annex 3. Description of the Types of Adjustments That Can Be Made to Hospital Budgets to Account for Costs Outside of Their Control under a DRG-Based Payment System

208. Case-mix classification systems are inherently comparative; since averages are used to compute budget amounts, hospitals are explicitly compared to each other. Yet, hospitals vary considerably across dimensions that include their role in health care delivery; rural vs. urban location; differential wage rates; and use of technology in various combinations for treatment or maintenance of technological capacity. These factors affect hospital costs and complicate efforts to make direct comparisons between hospitals. Directly adjusting contracted budgets to compensate hospitals for valuable activities that are outside of the hospital's direct control is one way to ensure equity in the budget allocation and financing processes.

209. It is reasonable to provide adjustments to hospital budgets to account for legitimate patient care expenses that are beyond their reasonable control. Appropriate outlier payment policies enable the incentives that are inherent in a DRG-based financing system to exist. It is a politically important policy to use especially in the early days of system implementation, as it helps control the limitations inherent in any DRG-based financing system — such as the use of imperfect cost data to develop relative weights — and facilitates acceptance by providers. For both pilot testing and broader implementation, decision-makers must carefully study the use of adjustments to identify what adjustments and payment parameters are necessary and appropriate to use to create an equitable financing system that promotes the incentive to provide the “right amount of care in the “right care setting.”

210. The following are the most common types of adjustments:

- Inflation
- Geographic location
- Local wages
- Direct and indirect health professions education
- Specialty hospitals
- Outliers

Each type of adjustments is described in detail below.

Inflation

211. Inflation is a factor that is truly outside of the individual hospital's control. Hospitals are likely to expect that the base or reference price will be adjusted for inflation on an annual basis to account for the rising nature of the cost of living, which is outside of their control. Using an adjustment factor for inflation is the simplest example of an adjustment to the base price, and one that is typically warranted to be made annually or as needed.

Geographic Location

212. Location is beyond the hospital's control in the sense that it is necessary to have hospitals located all across a country to provide citizens with access to care. Location is likely to influence inpatient costs and thus may warrant an adjustment.

213. For example, rural hospitals need to maintain certain stand-by capabilities, which are costly but may not be fully utilized, while urban hospitals may incur higher property and wage costs.

214. It is reasonable to examine the impact of geographic location using statistical analyses and simulation models to determine whether an adjustment is needed. To conduct such an analysis, hospitals can be divided into “urban” and “rural” groups by designating hospitals located in an area with a population density greater than some specified number as “urban” and those in an area with a population lower than a specific number as “rural.” Other possible criteria for grouping by location are the size of the community or other metrics already being used by the country to delineate geographic location.

215. After hospitals are divided into groups, financial impact can be computed using a simulation model beginning with the assumption that no geographic adjustment would be provided. If the results show certain types of hospitals being disproportionately impacted then this or one of the other adjustments may be warranted.

Local Wages

216. In the United States, the Medicare program recognizes that labor costs vary across areas and provides a direct adjustment by using different wage indices. U.S. labor costs have a particularly significant impact on a hospital's viability — but this may not be the case in other countries. To the extent that inputs costs vary in different areas, it is appropriate to consider the provision of an adjustment to account for wage variations and other costs that impact treatment costs.

217. The need for this adjustment can be met through an adjustment for a correlated variable, such as urban/rural location as described above. Again, statistical analyses and simulation models are required to examine whether hospital budgets are systematically influenced by local wage rates.

Direct & Indirect Health Profession Education

218. Another potential adjustment is for hospitals that provide a significant amount of teaching for health professionals such as physicians, nurse practitioners, certified nurse-midwives, physician assistants, etc. These institutions may be official teaching hospitals, or may simply be facilities with large expenses associated with both direct and indirect graduate medical education.

219. Hospitals that provide training typically incur both direct and indirect costs. Direct educational costs include salaries for residents and other trainees, teaching salaries, and potentially a portion of overhead directly attributable to the education function. Direct education costs are usually excluded from hospital budget/expenditure calculations and are typically passed through (i.e., paid as they are incurred or on a formula basis), subject to payment limits. Indirect education costs include the additional patient care costs (e.g., additional tests ordered by intern and residents for teaching purposes).

220. If teaching hospitals' case-mix is, in fact, affected by their teaching status, a separate payment outside of the financing system reflecting only the direct costs would be insufficient to compensate for the overall type of care being provided in these facilities. In these cases, the DRG rates may also need to be adjusted to account for the indirect costs. For example, a certain percentage may be added-on to rates for hospitals that are designated as teaching facilities. Another option is to create a separate base price for the teaching hospitals peer group, and use that rather than the national reference price to calculate their contracted budgets. If these facilities are funded through another source, such as the Ministry of Education, then this type of adjustment may be unnecessary.

Specialty Hospitals

221. Case-mix financing systems work best for hospitals that treat a wide range of patients, since payment is based on a concept of averages. It is inherent in the concept of DRG financing and other case-mix systems that hospitals will lose money on some cases and make money on others. They lose money when they are inefficient or if certain patients present complications that result in longer-than-average lengths of stay; they make money when they are efficient or patients are treated in a shorter-than-average length-of-stay.

222. This concept does not work well, however, for hospitals that treat very specific cases that group into just a few DRGs, such as Pediatric, Maternity, Emergency/Trauma, Cancer, Cardiology hospitals. Without an adjustment to the base price to cover certain structural and/or equipment costs associated with specialty care, these facilities are likely to be underfinanced through no fault of their own. For these facilities, the "law of averages" concept inherent in DRG-based financing systems may not work.

223. Decision-makers should examine data from these facilities to assess whether they are being systematically penalized under a DRG-based financing system. This information will help determine whether an adjustment is appropriate.

Outliers

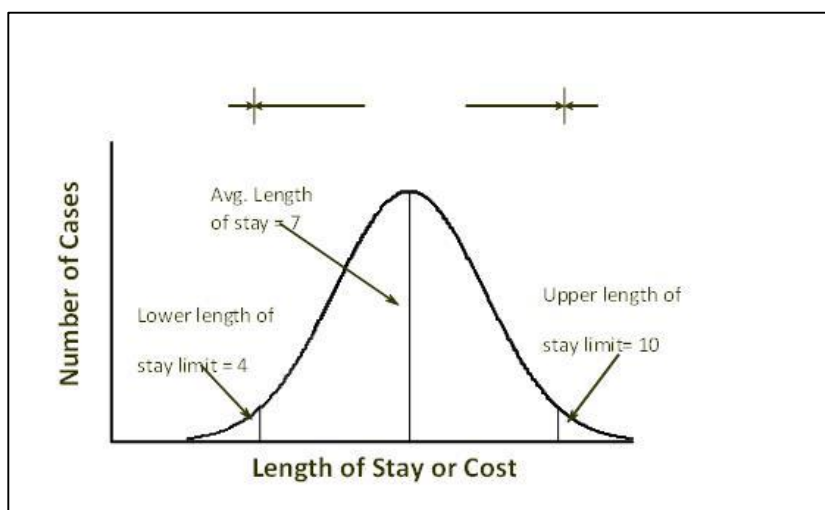
224. Since case-mix classification systems are based on average treatment costs, hospitals and payors must be protected against cases that are abnormal with respect to the amount of resources required for treatment. Abnormal or non-standard cases are called "outliers," and generally fall into two categories: length of stay outliers (very short- or very long-stay cases) and cost outliers (cases with abnormally high costs).

225. Most countries use an outlier adjustment to create a different mechanism to pay for cases that meet outlier criteria. Determining what the best formula for identifying outliers and paying for them is complex and again requires data analysis and simulation modeling so that an appropriate payment formula can be created to pay for very short or very long stay hospitalizations or for very costly cases.

226. Under a DRG-based system *without* an outlier adjustment, hospitals receive a single price for the DRG regardless of the length of stay. For example, if the average length of stay for a certain DRG is seven days, and the patient is discharged or transferred on the second day, the hospital would receive the full DRG payment (if there is no short-stay outlier policy). Similarly, if the patient was kept in the hospital for twenty days, the hospital would still receive the same DRG payment (again, if there is no outlier policy).

227. Such a system creates an incentive for hospitals to treat certain types of patients as one-day stays if they think they can benefit from hospitalizing the patient for a short period of time (i.e., 1-2 days), and receiving the full DRG payment for the average stay. In this scenario, the payer would overpay for the case; with the longer stay case, the hospital would face additional costs that are reasonable but that go uncovered. Both of these outcomes are inappropriate and unfair. Conversely, with an outlier adjustment, hospitals would be paid more appropriately for the care provided and would not be penalized for caring for patients who require a much longer hospital stay due to complications, comorbidities, or other factors outside the hospital's control.

228. To create a fair and equitable financing mechanism that incentivizes hospitals to provide the right amount of care in the right setting, countries implementing a DRG-based financing system typically implement an outlier payment policy. A common approach for doing so is to set certain limits around the average length of stay for each DRG. These limits help determine when a case is considered to be a "short-stay case" (discharged before a pre-defined lower length of stay limit) or a "long-stay case" (discharged after a pre-defined upper length of stay limit). Both are *length of stay outliers*: they are outside the normal distribution of a bell curve from a statistical point of view (see figure, below). Cost can also be used to set limits: cases discharged before a pre-defined lower cost level is reached, or after a pre-defined upper cost level is reached.



229. As the above diagram shows, either cost or length of stay can be used to describe cases that fall outside the norm. In the early years of DRG-based system implementation, countries typically use length of stay outliers rather than cost outliers, until there is more confidence in the cost data. Once cost data are refined and reflective of hospital activities, cost outliers can be simulated and considered for use instead of data on length of stay.

230. In order to arrive at the normal distribution illustrated in the diagram above, mathematical formulas must be used to "trim out" (or remove) data above or below a certain standard deviation from the mean. These cases are either fully removed from the data set or brought back to the limits of what is considered within the curve limits. In this manner, actual cases are converted into what are called "equivalent cases." For example, 4 actual short-stay cases may get converted into 2.6 equivalent cases in terms of resource consumption, while 4 long-stay cases may become 12 equivalent cases.

231. The decisions about the appropriate statistical parameters to use, and how to treat the data that have been trimmed, require policy discussions and are critical steps that create the baseline for calculating the future base price. This is because the number of actual or equivalent cases affects the denominator in the base price calculation, and sets up the DRGs' parameters for what are considered as short- and long-stay cases.

232. Data analysis will help determine whether to finance these cases differently from those that fall within the bell curve's normal distribution.⁷ Implementing an outlier adjustment means that hospitals are paid less than the actual base price for cases that do not reach the lower limit of the average length of stay bell curve, and paid more for cases that exceed the higher limit.

⁷ To generate a bell curve for each DRG, an average length of stay distribution chart should be created using statistical methods to set the DRG's lower and upper limits. Cases that fall outside of the bell curve should be reviewed. On the lower length of stay side, cases must be examined to see if they should have been provided as a one-day stay or in an outpatient/ambulatory environment. Patterns can be studied by case type and by hospital to identify incentives that systematically result in some DRGs and/or hospitals having very short lengths of stay while others have very high stays. For cases that consistently exceed the upper limit, decision-makers must determine whether that is due to inefficient hospital practices, lack of incentives, competing incentives (such as under-the-table payments), or poor quality of care being provided.

Annex 4. Detailed Action Steps and Associated Cost Estimates

Specific Tasks/Activities	Specific Institution	TWG	Cost estimates (US\$)		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Year One: Pilot			
			Low	High											Q1	Q2	Q3
Infrastructure and Institutional Capacity Development and Activities to Support Rapid Implementation																	
			110,500	192,000													
Schedule a full-day meeting with key officials and stakeholders to begin discussing the pilot DRG implementation and to take certain policy decisions		x	500	2,000													
Obtain a governmental decision to begin with a Pilot DRG Financing System implementation and revision of CCPs	x	x															
Request the Parliamentary Health Commission or Council of Ministers to re-release/resign the document calling for DRGs - the 2010 document that was used as the basis for then getting the Australian Grouper	x	x															
Determine what other laws, regulations, or Ministerial Orders are needed to support the DRG pilot financing implementation work (coding, costing, data collection, etc.)	x	x															
Define institutional roles and responsibilities (i.e., who will be responsible for what... in terms of institutions such as MOH, NCDC, Unified Fund, and functions such as coding, costing, etc.); where will the case-mix office/dept. be located?	x	x															
Evaluate and identify staffing needs at the National Center for Public Health and Analysis if this is the group that is determined to work on case-mix and related issues; <i>estimate provided here is only for the pilot implementation.</i>	x	x	50,000	100,000													
Select approximately 40 hospitals to begin the pilot implementation	x	x															
Provide DRG training to those who will be involved in the pilot DRG implementation at the stakeholder and decision-maker level (coding, costing, data collection, grouping, analysis, policy decision, and a review/discussion of the new contracted budgets etc.)		x	25,000	35,000													

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Specific Tasks/Activities	Specific Institution	TWG	Cost estimates (US\$)		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Year One: Pilot			
			Low	High										Q1	Q2	Q3	Q4
MOH to issues an ordinance requiring ALL hospitals to collect and report the minimum basic data set of clinical data (diagnoses, procedures, etc.) electronically if they are not already doing so and to also report their expenditure/cost data	x	x															
Review/revise the central and local level clinical patient data collection software modules (revise hospital department definitions if needed like ICU, critical care etc.)		x	10,000	20,000													
Review/revise the central and local level cost patient data collection software modules		x															
Host a DRG pilot implementation roll-out conference with all stakeholders and hospitals to discuss the final contracting and DRG payments process	x	x	25,000	35,000													
Hospital Processes/Trainings			70,000	105,000													
Train hospitals in coding and data collection under DRGs (regional level training; if individual hospital, then cost could be higher)		x	10,000	15,000													
Train hospitals on the collection and reporting of expenditure/cost data (regional level training; if individual hospital, then cost could be higher)		x	10,000	15,000													
Provide hospitals with data collection software or an interface/export logic to make data submission to central location simple		x	15,000	20,000													
Conduct hospital site visits if needed to ensure their understanding in coding principles for DRGs, data collection, etc.		x	10,000	20,000													
Provide full DRG training to pilot hospitals on coding, costing, data collection, grouping, analysis, policy decision, and a review/discussion of the new contracted budgets etc. - <i>this may not be needed if separate trainings are held and/or if the above roll-out conference is held</i>		x	25,000	35,000													
Provide ongoing support to hospitals		x															
Coding/Classification System			35,000	60,000													
Prepare ICD-10 diagnosis and ACHI procedure coding		x	10,000	20,000													

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			Low	High										Q1	Q2	Q3	Q4
training materials																	
Prepare live and e-learning materials		x	15,000	20,000													
Provide "train the trainers" central level coding training		x	10,000	20,000													
Clinical Data Collection and Analysis			42,500	110,000													
Refine the central/local level clinical data collection software if needed		x	7,500	10,000													
Collect clinical data monthly and review it for completeness and coding accuracy		x	35,000	100,000													
Provide coding feedback to hospitals (i.e., of errors, top diagnosis, procedures etc.)																	
Manage and maintain the clinical database																	
Grouping System, Data Processing, and Analysis			29,500	52,000													
Determine whether any other licensing work needs to occur with the AN-DRG grouper license		x	2,000	2,000													
Maintain existing grouper software		x															
Develop and maintain WEB interface (page) for individual case grouping and / or WEB Service for batch grouping as extension of current DRG grouper interface and provide access to pilot hospitals			5,000	10,000													
Continue grouping of hospital clinical data (monthly basis)		x															
Analyze grouped data		x	5,000	10,000													
Upgrade of central part of the software with functionality for analysis of the homogeneity/distribution of cases grouped under same DRG and evaluation of the need to define new groups		x	7,500	15,000													
Create management reports that can be provided to hospitals with grouping results/ hospital feedback reports (i.e., Top 10 DRGs, average length of stay by DRG, etc.) and upgrade of central software to produce these reports		x	10,000	15,000													
Costing to Develop Relative Weights			45,000	80,000													
Determine whether a review of the existing expenditure data collection process needs to be done and if it needs to be refined		x															

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Identify costing experts at the MOH or other institutions		x															
Revise/develop/maintain costing standards		x	10,000	10,000													
Upgrade and maintain in central software functionalities to support above mentioned functionalities and provision of second level support services for data collection and processing (including costing software in hospitals)		x	35,000	70,000													
Collect and analyze cost data (monthly); work with hospitals to make corrections		x															
Use 6 months of cost and clinical data to generate first set of weights		x															
Compare these calculated weights with previously calculated weights		x															
Borrow relative weights from a few countries who are deemed to have similar characteristics/hospital structures etc. so weights can be compared to country specific calculated weights		x															
Compute and analyze case-mix indices (using different weight sets)		x															
Adjust/refine weights using objective methods/data/criteria if necessary		x															
Contracting System Development- Migrating to DRG Based Contracting			30,000	70,000													
Determine what services are being included/excluded under DRGs (i.e., ICU, implants, drugs, etc.)																	
Discuss care delivery issues across different care settings	x	x															
Refine CCPs so they are more reflective of care paths and as tools for examining quality and setting some parameters around contracting	x	x															
Select payment policies of interest to study and analyze		x	15,000	45,000													
Begin simulations and policy modeling with clinical and cost data		x															
Review options for base price/reference price and what it will will/wont' include (i.e., physician costs, capital, etc.); hospital specific vs. national etc.		x															

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			Low	High										Q1	Q2	Q3	Q4
Obtain data (numerator and denominator) to compute a base price		x															
Simulate different blending options of base prices to achieve objectives		x															
Determine if outliers will be used; prepare formulas and simulate		x															
Determine if adjustments are necessary for fair and appropriate budgets to hospitals		x															
Develop contracted budgets and compare CCP based budgets to DRG based budgets	x	x															
Simulate transition options to move from the current financing system to the pilot DRG-based financing system	x	x															
Refine simulations and the contracting model	x	x															
Refine the National Framework Contracting Process/Rules to allow pilot hospitals to be contracted on the basis of DRGs	x	x															
Align incentives across care settings (in terms of delivery and payment)		x															
Upgrade of central part of the software with functionality for calculation of hospital budgets with options for simulations based on different choices for base price blending, outliers, adjustments etc. including calculation of adjustments to payments within risk corridors during testing of the system in the pilot hospitals		x	15,000	25,000													
Auditing and Monitoring			10,000	30,000													
Increase capacity of the auditing/monitoring body at the NHIF; if new entity is needed, then there would be a need for more funds	x	x															
Develop a monitoring framework if needed and refine current auditing rules and regulations if needed	x	x															
Develop capacity and provide training on how to audit/monitor for DRGs	x	x															
Audit clinical and cost data collected using certain filters/criteria etc.	x	x															
Identify what sort of penalties/non-payment will occur for	x	x															

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			Low	High										Q1	Q2	Q3	Q4
poor vs. fraudulent data																	
Continue monitoring of clinical and cost data		x															
Determine what level of feedback/reports will be provided to hospitals and how often they will be audited and how (randomly, targeted, etc.)	x	x															
Upgrade central system during the time with functionality to support above mentioned audit and monitoring activities and automate them (i.e., creating edits, filters, editing logic)		x	10,000	30,000													
Total Budget Estimate			372,500	699,000													

Note: Specific institution denotes MOH, Parliament or the Implementation Strategy Team of Stakeholders