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Technical process of setting the price per unit of payment

From a societal perspective, the price is the amount that must be paid to elicit from providers the supply of health care services that the society wishes to have and is willing to pay for. In determining the tools and processes for price setting, several common objectives can guide the process (Waters and Hussey, 2004). These include ensuring that:

- Prices accurately reflect the actual costs of delivering a given service.
- Health care providers are reimbursed fairly.
- The pricing structure supports broader health system goals, i.e., coverage, quality, financial protection, and health outcomes.

When setting prices at an appropriate level, elements that should be factored in include the unit costs of providing services, economies of scale and scope, high entry and capital costs, and marginal benefits of quality. To estimate unit costs, purchasers use different costing methodologies to structure the information collection systems and verification.

5.1 Costing methods

Price levels that are too low or too high create incentives for over- or under-utilization. This gives an incentive for purchasers to estimate prices that reflect the actual costs of the given service across a set of providers. There are different kinds of costing such as activity-based costing, average costing, standard costing, economic methods, and others. The methodology chosen is based on the context and information needs. For example, cost accounting methods use accounting principles to classify and measure all costs incurred in carrying out an activity. For provider payment purposes, decisions usually require total or average cost information – and thus cost accounting methods are typically applied (Cashin, 2015).

The cost accounting approach follows a process (Cashin, 2015). The total resources used by a cost centre are identified and measured. The cost of resources used directly by all cost centres are calculated and the costs are assigned to each individual cost centre. The cost of resources used indirectly by all cost centres is generated, and a share is allocated to each cost centre based on the centre's estimated use of resources. From this information, average unit costs are generated based on units of service (i.e., discharged patients, bed-days, or outpatient visits).

Two kinds of cost accounting methods are used most frequently to inform provider payment rate setting: gross costing and micro-costing. The choice depends on the level of accuracy needed, scope of the exercise, and cost objects (i.e., patient, service, hospital department, or unit from which costs are sought).

Price levels that are too low or too high create incentives for over- or under-utilization.

Gross costing first calculates the total costs of the service at the organizational, provider, or departmental level, then disaggregates the total costs to the cost centres (departments or units to which costs are assigned), depending on the richness of the available data and the homogeneity of the services provided. This method is also called the average costing approach or departmental costing, and it represents a top-down approach resulting in average costs per category.

In micro-costing, all relevant components are defined at the most detailed level. This approach records resource utilization at the level of the patient or individual service, and aggregates patient or service utilization data to identify the types of resources used and measure their utilization to calculate the costs of specific services. Micro-costing results in patient specific costs. It can be either retrospective (through collection of existing data from medical records) or prospective (through medical record review or specific studies such as direct observation).

Micro-costing exercises face methodological challenges, given that it is not possible to develop detailed costing for each service or patient. Aggregating cost estimates for individual services typically leads to heavily inflated total cost estimates that almost always exceed available resources and prove difficult in matching funding flows with service priorities. The top-down approach (gross costing) uses the total facility cost, disaggregates the expenditures to cost centres (departments or units to which costs are assigned), and divides the department by the number of patients to generate the cost per patient visit or discharge. Top-down exercises are retrospective given that they rely on data from existing financial accounts documenting aggregate resource use. Either top-down or micro-costing can be used for different base for payments. The common thread across both is the allocation of costs to cost centres. Accuracy relies on the correct allocation of direct costs (medicines and supplies) and indirect costs (administrative and support activities) (Özaltın and Cashin, 2014).

Activity-Based Costing or Funding (ABC or ABF) is an approach used to calculate the unit costs of health services in the USA; subsequently it was applied in other countries (Waters and Hussey, 2004; Özaltın and Cashin, 2014). Instead of allocating indirect costs in proportion to the volume of units or to direct costs, ABC assigns indirect costs based on the main activities within an organization. It seeks to define the principal activities of the individuals who work within the organization, and then traces costs first to these activities and then from the activities to products and services. Allocation of personnel time among the activities is used for indirect costs. This method aims to develop more accurate measures of indirect costs, by attributing support costs based on the actual consumption measured by time allocation. Where data on personnel time are absent, another approach is to apply top-down costing to allocate costs derived from line-item budgets across inpatient departments.

Figure 16
Process of data collection for hospital costs

Setting	Scope	Grouping	Costs excluded	Source of information	Frequency of revision	Share of revenue controlled under fee schedule
Australia	Inpatient care, sub-acute, emergency and outpatient services	Expenditures are grouped across five services: admitted acute, emergency, non-admitted, sub-acute and non-acute. The National Efficient Price is based on the average cost of an admission. Case mix is adjusted by the National Weighted Activity Unit.	Federal programs paid directly (i.e., highly specialised medicines, blood supply)	All public hospitals participate. A separate system of data collection is undertaken from 91 (out of 630) private hospitals on a voluntary basis	Every 1-2 years	70
England	Acute inpatient and outpatient care excluding psychiatric services, emergency care and rehabilitation	>2800 Healthcare Resource Groups costed for treatments with similar cost implications for a given condition from admissions to discharge. Average cost per HRG is generated. Costs for outpatient appointments and procedures collected on the same basis.	Education and research	All 232 National Health Service providers in England (80 NHS trusts and 152 NHS foundation trusts)	Annually	47
France	Acute inpatient and outpatient care excluding psychiatric services, emergency care, rehabilitation	2,680 GHM (Groupe Homogène de Malades) are generated, with four levels of case severity applied to most groups, using information on length of stay (LOS), secondary diagnoses and age.	Education, research and expensive medicines	135 hospitals (voluntary participation)	Annually	83
Germany	Medical treatment, nursing care, pharmaceuticals and therapeutic devices, board and accommodation, and excluding intensive and emergency care	1,292 DRGs and 205 add-on payments are generated based on patient diagnoses, procedures, length of stay, ventilation hours, age, gender, birthweight, medical unit and type of discharge. Each DRG can be split into up to five subcategories depending on patient severity. Cost weights are generated to reflect the average expenditures of a sample of hospitals.	Nursing costs, education, research, expensive medicines, capital costs and interest, allowance for bad debts, taxes, charges and insurance	Approximately 300 hospitals (voluntary participation)	Annually	90
Japan	Inpatient and outpatient services, pharmaceutical and medical devices	The global revision rate (global budget for expenditures) is established, prices for pharmaceuticals and devices revised, and service fees revised. Physician and hospital services are classified into 14 categories. Instead of detailed cost studies, the focus is on revenues and expenditures of clinical departments to decide which departments should be expanded or reduced.	Normal delivery, preventive services such as health screening, education and research	Revenues and expenditures are collected from Health Economic Survey of facilities. Volume is collected from the National Claims Database	Every 2 years for service fees, annually for pharmaceuticals	90

Setting	Scope	Grouping	Costs excluded	Source of information	Frequency of revision	Share of revenue controlled under fee schedule
Republic of Korea	Inpatient and outpatient services	Bottom-up approach with micro-costing is conducted. Diagnosis related groupings are applied to 6 disease categories.	Education and research	Participating providers	Annual	90
Thailand (UCS)	All operating costs for inpatient and outpatient services, including staffing, medicines, diagnostics, and capital depreciation costs	Cost centre approach is used, in which simultaneous equation modeling is applied to allocate indirect costs from transient cost centres to absorbing cost centres (outpatient, patients), generating a unit cost per admission.	Public health programs administered directly by national government, education and research	Initially 20 and now 900 public hospitals	Periodically	74
USA (Medicare)	Inpatient and outpatient services	Medicare severity diagnosis related groups are generated for patients with similar clinical problems. Each has a relative weight that reflects the expected cost of inpatient treatment for the group.	Education and research	Participating providers	Annually	40

Sources: case studies (see annexes). Note: DRG: Diagnosis related group; NHS: National Health Service; UCS: Universal Coverage Scheme in Thailand. Information for Thailand covers hospitals and other settings.

5.2 Process of collecting information

The process of data collection for hospital activity and costs varies widely across settings in terms of the scope of the exercise, grouping of clinical conditions, definition of costs for inclusion and exclusion, and sample size and frequency of data collection (Figure 16).

In Australia, substantial investments have been made in clinical costing systems that monitor hospital activity. The National Hospital Cost Data Collection is conducted by the national regulatory authority (IHPA) through the states and territories. This is the main data collection mechanism used to develop the National Efficient Price (NEP). It is an annual and voluntary collection of public hospital data that undergoes validation, quality assurance checks, and reporting to allow benchmarking. For Round 21 (2016-2017), cost data were submitted from 451 hospitals (65% of total hospitals) across all jurisdictions. The NEP is revised annually and based on cost and activity data from three years prior (as an example, the 2019-2020 pricing model is based on 2016-2017 data).

In England, all NHS providers are required to report their costs annually to NHS Improvement, based on a set of mandatory costing standards. Funding for hospital-based care follows the patient, with the aim of enabling competition for patients based on quality rather than price. Costs are submitted for more than 2800 Healthcare Resource Groups, which forms the reference cost collection. In 2009, a voluntary patient-level information and costing system (PLICS) was piloted, which determines the cost of each medical case informed by the actual medical records and services provided (micro-costing approach). The 2018/19 cost collection from acute providers will be based solely on PLICS, and these data will be used to determine prices in the future.

In France, a national cost study for the public sector was introduced in 1995, with 35 public hospitals participating on a voluntary basis. Until 2006, the French hospital cost database covered only public hospitals (40 hospitals representing 3% of total public hospitals). Since 2006, cost information has been collected annually from a sample of voluntarily participating private hospitals. In 2018, the cost study covered 135 hospitals, of which 52 are private-for-profit. The cost study includes acute inpatient and outpatient care and excludes psychiatric services, emergency care, and rehabilitation. Costs are calculated at the level of the patient episode. They are allocated primarily based on the length of stay (for inpatients) and a relative cost index that reflects the cost of the treatment process (for technical cost centres such as laboratories or imaging). The costs for public hospitals cover all expenditures linked to the stay (including medical personnel, and all the tests and procedures provided and overheads). Those for the private sector exclude medical fees to doctors (who are paid on a FFS basis) and the cost of biological and imaging tests, which are billed separately.

The guiding principle for the provision of health care services in Germany is transparency and efficiency. Costing is based on individual patient episodes and on actual resource utilization. Some 1,292 DRGs and 205 add-on payments are generated based on patient diagnosis, procedures, length of stay, and other key factors. Each DRG can be split into up to five subcategories depending on patient severity.

In Japan, a fee schedule establishes the payment rates for every covered service. First, the global revision rate is established. Subsequently a line-by-line revision of the fee schedule is undertaken, based on the global budget constraint and changes in volume and prices. The fee schedule groups physician and hospital service items into one of 14 categories. The 2018 version lists about 4,000 items and conditions of billing, and separate manuals are prepared for the Diagnosis and Procedure Combination, the Japanese version of the DRG. Data are used from the Health Economic Survey of Healthcare Facilities, and information available from the National Claims Database that compiles all provider claims. Revisions are undertaken every two years for service fees and annually for pharmaceuticals.

In the Republic of Korea, the bottom-up approach cost accounting model is used based on information submitted from providers about the provision of insured services. Providers participate voluntarily, only a small number of hospitals participate, and the sample changes each year. This results in controversy over the representativeness of cost data. Adjustments are made for different levels of providers to account for differences in input costs, including add-on payments of 15% for physician clinics, 20% for hospitals, 25% for general hospitals, and 30% for tertiary hospitals. Other adjustments are made to provide incentives to reduce the length of stay for LTC. Sophisticated monitoring and review systems are in place.

In Thailand, under the Universal Coverage Scheme, a cost centre approach is applied, in which simultaneous equation modeling is used to allocate direct costs to absorbing cost centres.

In Thailand, under the Universal Coverage Scheme, a cost centre approach is applied, in which simultaneous equation modeling is used to allocate indirect costs to absorbing cost centres (i.e., patients), generating a unit cost per admission. Data collection efforts started with 20 public hospitals and now includes 900 hospitals; data are collected about all operating costs for outpatient and inpatient services. The cost per outpatient visit equal to expenditure is divided by total outputs, where the numerator is the total annual operating expenditure and the denominator is the total annual outpatient visits plus total hospital admissions, weighted by a factor of 16 for districts and 19 for provincial hospitals. The weight is generated from conventional costing studies, which are adjusted from time to time.

In the USA, prices are established for DRGs for the Medicare program primarily based on data about charges from individual cost centres and costs obtained from participating accredited providers (approximately 88% of hospitals and 40% of all health care providers). The acute inpatient prospective payment system pays per discharge rates based on two national base for payment rates covering operating and capital expenses, adjusted for patient condition and treatment strategy. From these data, the cost per charge unit can be generated for cost- and charge-based weights. The final cost depends on the cost and the hospital's ratio of cost to charges. The DRG weights are recalibrated annually, without affecting overall payments, based on standardized costs for all cases in each grouping. Wage adjustments are based on market conditions among other factors.

Under the Maryland all-payer model, an annual global budget is established and agreed upon with each hospital, adjusted for hospital cost inflation, changes in demographics and market share, rising costs of new outpatient drugs and other factors. The model guarantees a fixed revenue annually regardless of the services provided, given that the hospital agrees on service commitments to the community. Rates are then set for services billed so that total payments for expected utilization match the global budget. This provides hospitals with the incentive not to exceed their budget.

5.3
From cost submission to price setting for hospital services

Australia established a national system of activity-based funding for funding hospitals in the public sector to determine a national efficient price by collecting information on each patient episode from all public hospitals. Activity is measured by DRG weights, and the costing of each DRG is based on cost data for a representative number of patient episodes. The cost of each patient episode is calculated from actual data about the treatment process. A reference cost is first derived by rebasing average cost to exclude changes in case mix between years. Then, an annual indexation rate is used to inflate the reference cost over three years based on an annual scaling factor modeled using the prior five years of cost data. Prices are also adjusted for variations in the cost of delivering health services including to remote regions, among other factors.

In England, there is a three-year lag between hospitals submitting cost data and these data being converted into prices. The average cost is estimated for each healthcare resource group (HRG), by admission type across all hospitals. Several adjustments are made that impact on the actual amounts received by a provider. A market forces factor is used to compensate for unavoidable cost differences in providing health care driven by geographical variations in the costs of land, labour and buildings. The delay between the collection of cost data and price calculation results in changes in wages, prices and other inputs over which providers have limited control; as such, an inflationary adjustment (cost uplift) is made to each healthcare resource group. This inflationary adjustment is offset by a deflating efficiency requirement. For 2018-2019, for example, the average inflationary adjustment was 2.1%, and the deflating efficiency requirement is -2%. In addition, top-up payments are made to providers offering highly specialized services, which are not adequately reimbursed through the HRG design. For prices traditionally calculated on average reference costs, there are a number of "best practice tariffs" that are structured and priced to encourage fast adoption of best practice.

In France, the hospital technical agency updates the reference prices annually based on information from the hospital cost database, and controls and supervises the cost accounts of all hospitals participating voluntarily. There is always a time lag of two years between the year of the data and the year of the application of prices in hospitals. For example, hospital costs data from 2013, 2014, and 2015 were averaged over the same three years to calculate reference costs in 2016, to set prices for hospital services in 2017. Prices are set at the national level based on average reference costs by case-mix patient groups (GHM) calculated separately for public and private hospitals. Therefore, there are two different sets of tariffs: one for public (including private non-profit) hospitals and one for private

for-profit hospitals. The tariffs for public hospitals cover all the costs linked to a stay (including medical personnel), whereas those for the private sector do not cover doctors' fees or biological and imaging tests, which are billed separately.

In Germany, the regulatory authority calculates cost weights by DRG annually. They reflect the average expenditures of a sample of 300 hospitals, which participate on a voluntary basis. These data include patient-level data on the major diagnosis and other diagnoses, clinical interventions (i.e., medical procedures), patient characteristics (specifically age, gender, and weight of newborn children), cause of hospital admission and discharge, as well as accompanying cost data as measured by workforce and technical resources and pharmaceuticals. Based on that information, cases are assigned to DRGs, and cost weights are set for each DRG. There is a two-year lag between hospitals submitting cost data and these data being converted into relative weights and prices. The catalogue of cost weights is approved, and the growth rate of the federal base rate is negotiated annually by the associations for statutory health insurance, private health insurance providers, and hospital federation. The three negotiating parties are obliged to mandate the regulatory authority to calculate the federal base rate. These calculations are based on the state base rates, the total expenditures, and the case mix of the preceding year. The growth rate of the federal base rate is based on two parameters: the average change rate of contributions by SHI enrollees and the average change rate of hospital costs. The latter is calculated annually by the German Federal Statistical Office. If the change rate in contributions is higher than the cost increase, this rate is chosen automatically. If costs increase at a higher rate, the three negotiating parties (representing statutory health insurance, private health insurance providers, and hospitals) determine an increase in the rate, which must fall within the range between both rates.

The value in costing studies is in demonstrating information about the underlying cost structure. A good costing exercise can help identify the costs of different service delivery configurations.

5.4 Changing the cost structure

Cost accounting exercises have limitations. They result in an estimate of the average cost of service production under the assumption that cost and production functions for health services are fixed. They reflect how efficiently services are being produced, existing prices, and the level of capacity and utilization at one point in time. However, the unit costs reflect one point on a cost curve that is unobserved. Therefore, the "true" costs cannot be known. What may be observed is an estimate of unit cost at one point along a function.

That point also embodies how efficiently services are being produced, existing prices, and the level of capacity utilization. Point estimates will not provide any certainty about the "right" level of resource requirements. Costing exercises also reflect the existing service delivery systems, including their

inefficiencies and quality. Bottom-up costing based on inefficient delivery structures may include inappropriate technologies, services, or level of care. If the purchaser uses average costs to inform payment rates, these rates will reflect the current clinical practices in the health system –and fail to reward efficient behaviours (Özaltın and Cashin, 2014).

Therefore, the value of costing studies is in demonstrating information about the underlying cost structure. A good costing exercise can help delineate service delivery scenarios and assumptions to identify the relative costs of different service delivery configurations (WHO, 2015b). Such an analysis of the different options facilitates decision-making about optimal ways to deliver services and contributes to building a strong purchasing system to drive efficiency and quality.

Take the primary care approach, for example. Evidence suggests that it will cost less to deliver a large share of the basic benefits package by doctors at the primary care level, rather than by specialists working out of hospitals. A useful costing exercise could provide an estimate of the investments needed to strengthen the primary care level to change the cost structure in other parts of the health system. Costing of specific steps can be valuable, such as cost accounting to set provider payment rates or costing of specific investments to produce reform – in this example, investments in primary care facilities. Other examples of policies that can change the cost structure include those that influence the demand for health services and products, including pharmaceutical price controls, regulation of private health care providers, and health promotion and prevention. Ultimately, costing exercises are useful beyond the estimation of unit costs in demonstrating service delivery alternatives that improve efficiency, quality, and promote the appropriate volumes of care.