

## Top-down cost allocation can help universal healthcare schemes in developing countries set better package rates

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**Governments looking to expand universal healthcare schemes need to ensure that appropriate rates are paid to providers. A top-down cost-allocation approach can evaluate the true expense of the procedures and help healthcare schemes offer more realistic rates that attract high-quality private hospitals and other providers. This, in turn, allows schemes to obtain reasonable and credible participation rates that are required for a system aiming to serve a larger population.**

Many governments in the developing world are looking at universal health insurance schemes as a mechanism to cover the healthcare needs of their population. Following the success of mass social insurance schemes for the poor, governments are looking at expanding these to offer wider coverage and access to fulfill the public policy goals of universal health insurance. Active networking with private healthcare providers to ensure wider access for areas where public health services are unavailable or restricted has been crucial.

This is a tall order, since private providers would not accept unrealistic pay rates and the schemes work within limited budgets. A strategic balance is required in order to ensure that providers get adequate payment for their expenses while also allowing for control on any gaming or abuse by providers. Bundled payments—or package rates—for common procedures are often used in these schemes as a way to manage cost and control utilisation. This ensures that providers get paid a preset sum for a procedure without it being affected by the actual resource usage, although some recognition of the difference in severity (and therefore resource usage) can be made in the way the packages are structured. If the payments for these packages are not well conceived and reflective of true provider costs, problems will arise.

As a result of poorly designed tariff structures, high-quality providers are often reluctant to join these schemes, citing payments that are too low for their services. If they do participate, they often cut corners, which negatively impacts outcomes. Overall, this undermines government's objective of providing quality healthcare access to all. Transparent costing approaches in developing countries are needed to ensure that the package rates reflect provider expenses. Participation of sufficient numbers of local public and private providers is important to ensure that adequate health services are available for all the enrollees.

### TOP-DOWN COST-ALLOCATION APPROACH

Top-down costing methodology—also called macro costing, gross costing or average costing—focuses on averaging costs

for a group of hospitals' current utilisation and actual expenses. For each hospital, it uses a 'top-down' approach, taking the institution's total direct and indirect expenses and allocating them to various specialties and service areas to ensure that no provider expense is ignored.

Each specialist department's total expense is divided by the total bed days utilised by that department to calculate the average per-day expense. Each procedure's cost is calculated as the average length of stay multiplied by the per-day department cost. Since per-day costs in each department are based on utilisation and activity, they depict a fairer estimation of costing than arbitrarily set bundled rates.

A key advantage of the cost-allocation approach is that the data is generally maintained by healthcare providers in developing countries. For example, financial and utilisation information is available through the hospital balance sheets and departmental records.

Contrast this approach with activity-based costing, which involves identifying cost components of care from the bottom up, such as physician/nurse time, investigations or consumables used on the ward or theatre or ICU in a typical surgery, which are added up to price the procedure. Unfortunately, this approach has limitations, such as variations within cases for similar surgery and the need for very detailed data on units and costs for each component. In developing countries, particularly where data is scant, the top-down methodology has emerged as a practical and feasible approach.

### MEGHALAYA HEALTH INSURANCE SCHEME

Milliman recently worked with the government of Meghalaya, India, to help expand the state's coverage. In 2012, the government implemented a Universal Health Insurance Scheme (UHS) based on a national model, with an enhanced coverage for below- and above-poverty-line households.

Meghalaya is situated in the northeastern part of the country, and is mostly a rural, agrarian state marked by difficult terrain, with a population of about 3 million. There are only two main cities—Shillong and Tura—so providing universal healthcare to the rest of the state initially proved difficult for the government.

In its first phase of rollout, the Meghalaya Health Insurance Scheme (MHIS) had limited benefits. The government wanted to expand its scope to better serve the population by providing a wider breadth of procedures, including tertiary care specialist procedures in oncology, neurosurgery and cardiac surgery. However, to make its second phase a reality, the Meghalaya scheme needed greater participation by private healthcare providers offering such specialist services. The state needed to offer realistic pay rates to private healthcare providers to attract participants.

Milliman helped the state identify the potential demand and gaps in benefits by conducting an extensive review of hospital utilisation data, publications about disease burden and disease registries in the state. This was the basis of recommendations for additional surgical procedures that needed to be included in the scheme to ensure comprehensive coverage.

Milliman was asked to develop indicative prices for recommended additional surgical procedures under expanded benefits. To determine rates, Milliman used a top-down cost-allocation approach to estimate the cost of each procedure, using local hospital utilisation and financial information. We developed specific tools to collect data from a representative group of hospitals.

**SELECTING A GROUP**

To build a strong frame of reference for pricing, we sought to get a representative selection of hospitals.

The basis of selection of a representative sample included:

- Level of care: secondary, tertiary and specialist centres
- Ownership structures: private, mission and public
- Hospital size: number of hospital beds
- Diversity: geographical location of the hospital

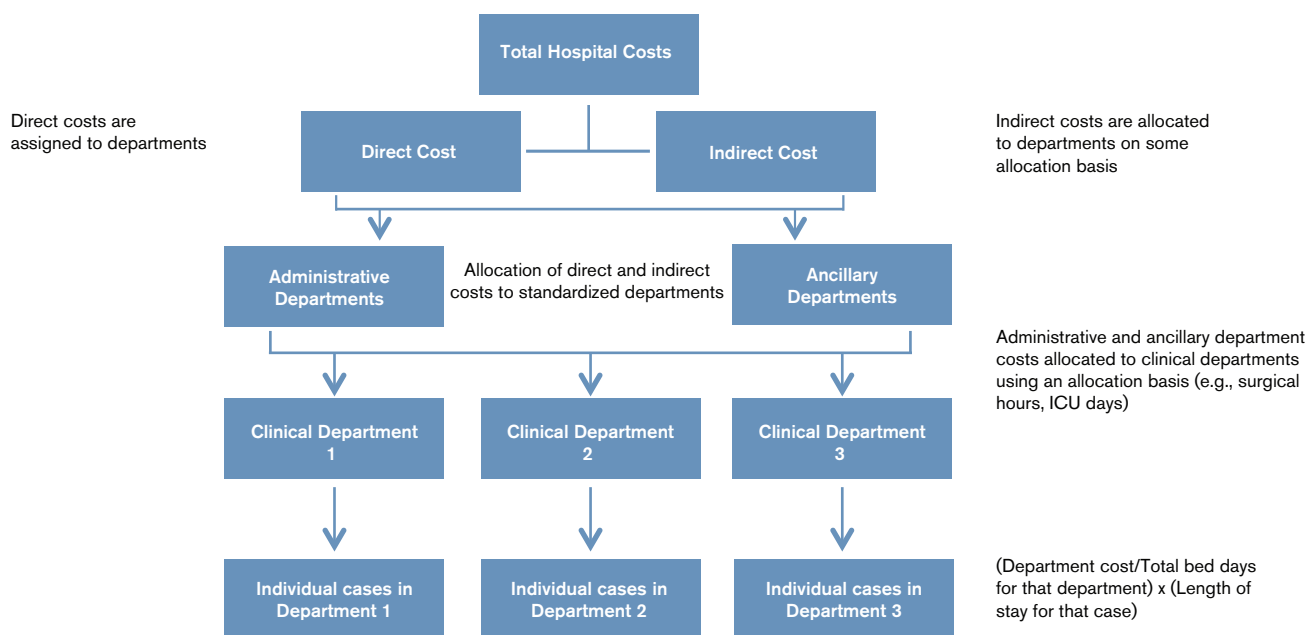
The quality and completeness of requisite data was a key challenge throughout the data-collection process. Some providers were reluctant to share financial details; others did not have some key data points in their records or hospital information system.

Hospitals cited various reasons for non-participation or did not provide adequate data. As a result, the final list of hospitals was whittled down from 18 to five, a group that would give us enough reliable data. This group met our objectives partially for a varied sample in terms of geography and size: it included two private hospitals in Shillong, two private hospitals in Guwahati and one from the Delhi region. This sample had the representative mix of hospitals and specialist providers we sought but not ownership representation, as it did not include public healthcare facilities.

**BREAKDOWN OF THE TOP-DOWN COST-ALLOCATION APPROACH**

Essential principles of a cost-allocation approach involve understanding all expenses of a hospital and allocating them to various departments. Each department had some direct clinical costs such as department staff salaries (doctors, nurses and technicians) and indirect costs such as ancillary services, theatre services, lab and radiology, pharmacy, and ICU services and ward services. We identified all these cost centres and expenses by examining hospital financial statements and records.

**FIGURE 1: TOP-DOWN COST-ACCOUNTING FRAMEWORK**



Adapted from USAID/World Bank 2009 publication: *Designing and Implementing Health Care Provider Payment Systems - How to Manuals*; Edited by John C. Langenbrunner, Charyl Cashin, Sheila O'Dougherty

**DATA COLLECTION**

We used various tools to collect data. For hospital infrastructure and utilisation information, we looked at variables such as the number of beds, staff, departments, theatres, ICU and the floor area of different cost centres, such as wards, theatre, outpatient, pharmacy and labs. For ward utilisation, we looked at patient numbers (inpatient and outpatient), bed occupancy, number and details of diagnostic and surgical details by department. We also included lab and radiology utilisation, such as the number of tests by department from lab registers. We measured theatre utilisation, using frequency and duration of surgery by department and information from theatre registers. We also considered ICU utilisation, looking at the frequency and duration of ICU by department and using information from admissions.

For financial information, we examined the balance sheets for fiscal year 2013, worked with the hospital charge-master, and used data-collection tools to gather information on inpatient and outpatient traffic. We also took a close look at the use of medical supplies and pharmacy expense allocation, surgeon fee schedules and billing data.

We used inventive ways to address the gaps created by data shortfalls. If information wasn't available in the hospital information system or billing data, we explored alternate sources such as using laboratory registers to get details of the number of investigations for different specialties. If a particular expense breakup wasn't available, we used the ratios derived from a similar hospital as a reference. We conducted various validation checks to ensure that the data was accurate. This included using audited financial statements and expense ratios as reference points or comparison of reported information against the expected utilisation.

The costs were then allocated to each clinical department based on certain criteria. For example, all utility expenses for the

hospital are allocated to each service department based on the square footage it uses in the building. Major cost centres like lab, pharmacy, theatre and ICU expenses are allocated based on utilisation by the different departments.

**FIGURE 2: ALLOCATION BASIS OF DIFFERENT INDIRECT COSTS**

EXPENDITURE	BASIS OF ALLOCATION TO EACH DEPARTMENT
Travelling & Conveyance Expenses	Proportion of staff
Training Expenses	Proportion of staff
Housekeeping, Washing & Cleaning	Proportion of Carpet/Floor area
Lease Rent on Building	Proportion of Carpet/Floor area
Security Expenses	Proportion of Carpet/Floor area
Water & Electrical Expenses	Proportion of Carpet/Floor area
Repair & Maintenance	Proportion of Carpet/Floor area
Laboratory Expenses	Proportion of tests done
Patient Meals	Proportion of patient bed days
Printing & Stationery	Proportion of patient bed days
Management Consultancy	Proportion of patient bed days
Legal Expenses & Other Fees	Proportion of patient bed days

*These are just some of the many expenses that were allocated to departments using appropriate criteria.*

We then performed step-down allocation of all expenses. Administrative departments providing services to all the departments are placed at the top of the list, so their costs are allocated 'downward' to the other administrative and ancillary departments listed below it. As shown in Figure 3, the cost of the Accounting department is allocated to all other departments listed below it. Eventually all the expense of administrative departments is allocated to ancillary departments.

**FIGURE 3: TOP-DOWN COST-ALLOCATION PROCESS**

	TOTAL DIRECT AND INDIRECT EXPENSES ATTRIBUTED TO THE DEPARTMENT	ACCOUNTING	HOUSEKEEPING	SECURITY	TOTAL EXPENSE OF ANCILLARY DEPARTMENT
<b>ADMIN</b>					
Accounting	250,000	250,000			
Housekeeping	207,000 +	43,750 =	250,750		
Security	80,000	31,250		111,250	
<b>ANCILLARY</b>					
OT	245,000	18,750	31,826	11,920	307,495
ICU	1,000,000 +	18,750 +	38,191 +	11,920 =	1,068,861
Laboratory	580,000	12,500	5,691	7,946	606,138
Ward	2,676,000	125,000	175,042	79,464	3,055,506
<b>Total Expense of the Hospital</b>	<b>5,038,000</b>				<b>5,038,000</b>

- The purpose of this step is to allocate the expense from administrative departments to the ancillary departments. The expense attributed to Accounting, Housekeeping and Security is now distributed to the ancillary departments on the basis of their respective allocation basis.
- 250,000 is allocated to all other departments on the basis of total staff in each department listed below Accounting.
- For the Housekeeping department: The expense allocated from the Accounting department (43,750) is added and then this new total (250,750) is allocated to all the other departments listed below Housekeeping.
- The total expense for each of the ancillary departments is the sum of its direct/indirect expense and the other administrative department cost allocated to it. Likewise, 1,068,861 for ICU is comprised of the direct/indirect expense of ICU and the cost allocated from the other administrative departments.
- These expenses are taken from of the hospital accounting books.

*Figures shown in these tables are for illustrative purposes only.*

The expense allocated to ancillary departments is then allocated to various clinical departments based on each ancillary department's allocation basis. For example, the expense of Laboratory is allocated to various clinical departments on the basis of number of diagnosis tests done under each of the clinical departments. Figure 4 shows how the expense of ancillary departments is further allocated to clinical departments.

### CALCULATING PACKAGE RATES FOR PROCEDURES

We then developed costs of each recommended procedure by using the per-day cost of that surgical department, the average length of stay for that procedure, the professional fee and any high-cost consumables or prosthesis to develop the bundled cost of the procedure.

**FIGURE 4: EXPENSE ALLOCATION FROM ANCILLARY TO CLINICAL DEPARTMENTS**

	OT	ICU	LABORATORY	WARD	TOTAL EXPENSE ALLOCATED TO THE CLINICAL DEPARTMENT
<b>TOTAL OF ANCILLARY DEPARTMENT</b>	<b>307,495</b>	<b>1,068,861</b>	<b>606,138</b>	<b>3,055,506</b>	
GENERAL SURGERY	107,623	106,886	90,921	763,877	1,069,307
CARDIOLOGY and CTVs	61,499	427,544	181,841	611,101	1,281,986
OBSTETRICS & GYNAECOLOGY	122,998	53,443	121,228	458,326	755,995
GASTROENTEROLOGY	15,375	53,443	90,921	305,551	465,289
INTERNAL MEDICINE	-	427,544	121,228	916,652	1,465,424
<b>TOTAL</b>					<b>5,038,000</b>

Total expense for each ancillary department is allocated based on its respective basis of allocation. For example: surgical hours for OT expense, ICU bed days for ICU expense, number of diagnosis tests for Laboratory expense and ward bed days for Ward expense.

Figures shown in these tables are for illustrative purposes only.

### UTILISATION ANALYSIS

After data collection, utilisation analysis of all clinical activities was conducted: medical admissions, surgical admissions, procedures conducted and the length of stay for each admission. We calculated the occupancy rate of the hospital and identified total bed days in ward or ICU, and total hours of theatre used for all major surgical or medical procedures. By dividing the total expenses of each clinical department and the bed days utilized, we were able to calculate the average per-day cost of medical and surgical admission for each department.

The per-day costs of a specialty department included bundled ward costs, theatre costs, ICU costs, pharmacy, investigations and personnel costs—direct and indirect—required for the hospital stay.

Thus we calculated the cost of all procedures using this equation:

$$\text{Cost of a particular procedure from a department} = [(\text{per-day cost of that department} \times \text{average length of stay of that procedure (ALoS)}) + (\text{per day professional fee} \times \text{ALoS}) + \text{Cost of implant/prosthesis (where appropriate)}]$$

**FIGURE 5: KEY STEPS OF THE PROCESS**

1. Standardize hospital departments
2. Determine direct cost for each clinical department
3. Determine allocation basis for apportioning indirect costs to each hospital department
4. Determine allocation basis for apportioning administrative and ancillary costs to clinical departments
5. Perform step-down costing
6. Determine costs per bed-day for each department
7. Determine cost of procedure

### REASONABILITY CHECKS

We then tested the reasonableness of our results against the real world. Reasonability checks are a critical part of the process to ensure that the derived results are valid and in line with commercial market rates. This is important in order to encourage participation from providers. The reasonability checks included costs and clinical reasonability tests.

**Cost reasonability:** We compared the cost of common procedures with the cost of these procedures in other social insurance schemes and rates paid by a commercial health insurance company. We compared relativities between procedures in each of these schemes with our study results. We compared the relative distribution of expenses across departments in participating hospitals.

**Clinical reasonability:** We checked for internal consistency in results in cost, length of stay and complexity of procedures—e.g., similar complexity procedures should have similar costs. This check ensured that the cost of complex procedures with higher surgical time or expensive consumables or longer length of stay have higher prices than lower-complexity, shorter-duration procedures. This also included identifying and adjusting for outlier anomalies.

Thus we ensured that the results matched the expected patterns. Any variations were re-examined or explained.

## OUTCOME AND IMPORTANT CONSIDERATIONS

Using the top-down costing approach, we were able to estimate the costs of the following:

- Per-bed-day department cost for the five hospitals in the study
- Cost of 20 common surgeries in MHIS Phase I as a reference point for comparison with existing package rates
- Cost of 160 surgical and 20 medical conditions for tertiary care benefit expansion in Phase II

Developing the final package rates involves additional parameters, making adjustments for inflation trend, capacity utilisation, quality, profit margins and specific variations among the participating hospitals. MHIS will need to apply various adjustments for these parameters to arrive at the final cost of each procedure for the social insurance scheme.

If providers are not keeping reimbursements in line with their expenditures to manage a clinical condition, there will be a tendency to pass on the shortfall to the members and deny or avoid admissions for procedures, potentially compromising the quality of care. This makes it critical that frameworks for costing are regularly updated. These frameworks also need to seek wider participation from providers. Apart from recurring medical inflation, wider provider participation and cost impact of new practices should be consolidated in updates.

## TRUER RATES, GREATER PARTICIPATION

Overall, the cost-allocation approach allows government healthcare schemes such as MHIS to offer more realistic package rates than the rates they might now use. The approach uses data supplied or self-reported by healthcare providers, along with applied industry expertise. This allows for the development of fairer rates that are critical to attracting private providers, allowing schemes to expand coverage to a greater population in terms of geography and number of procedures.

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