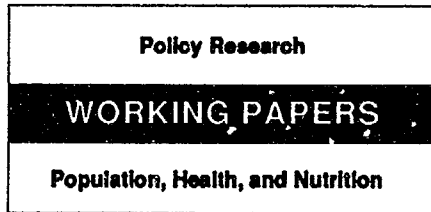


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Public Hospital Costs and Quality in the Dominican Republic

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Dominican public hospitals provide health care inefficiently, with enormous shortages of goods and equipment, with excessive personnel, especially physicians, and with few incentives for, or controls on, quality performance. The organization and delivery of health care require basic reform, with more accountability and quality control and better physician payment practices.

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Measuring costs in public hospitals in developing countries is hampered by the lack of an appropriate costing system, or of any systematic cost accounting. Invoices for goods and services, prices for inputs, and patient records are generally absent. As a result, "cost measures" have historically been based on budget figures — the only available financial data. But budget allocations bear little relationship to the resources actually required to provide services to hospital patients.

The patient-based methodology described by Lewis, Sulvetta, and LaForgia circumvents this problem by measuring actual hospital resources allocated to patients. Their study was conducted in a single Dominican hospital during a one-week period in April 1989. Their approach documents and gives prices for goods, services, and personnel time provided by the hospital to emergency patients, inpatients, and outpatients.

They used the following to measure quality and efficiency:

- The qualifications and relative costs of medical manpower delivering services.
- The extent and nature of shortages.
- Comparisons of physician orders and actual services provided.

- (For selected diagnoses) the specifics of clinical practices in the hospital, compared with accepted clinical norms for the Dominican Republic.

They found that average and total costs of services understate the true costs — because of shortages, inappropriate and underused personnel, and nonfunctioning equipment. Quality of care measures suggest low quality and poor efficiency. Norms of medical practice were not followed in more than 80 percent of the cases examined. Rates of completion for diagnostic tests were below 50 percent for outpatient services and between 60 and 70 percent for inpatient and emergency services. The study registered significant monthly "savings" of \$641 for noncompletion of tests and \$824 for nonavailability of drugs.

Policy recommendations of Lewis, Sulvetta, and LaForgia center on the need to reform the organization and delivery of health care as well as physician payment practices — and to giving more authority to hospital administrators. To make Dominican hospitals more efficient, there must be greater authority and accountability for hospital directors and better incentives for improving medical and management performance. Quality assurance needs great improvement if the Dominican system is to ensure a basic standard of care.

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I. INTRODUCTION

Costs are the basis for measuring efficiency in the delivery of all goods and services. Health care is no exception. To maximize efficiency, total costs--and marginal costs in particular--are essential elements because they capture the differences in resources required to produce a given output. As such, costs are fundamental inputs into resource allocation decisions.

Quality must also contribute to resource allocation decisions in health care. Without a basic level of quality, improvements in quantity or efficiency are meaningless. Indeed, quality and efficiency are not mutually exclusive goods, since poor organization or management that lead to inefficiency can also allow quality to deteriorate. Good clinical practice requires oversight and quality control measures to establish and maintain standards of care.

In most developing countries, governments have committed themselves to the financing and delivery of free health care for all citizens in an effort to ensure equal access. As a result, the public sector dominates the delivery of health care in most countries. Due to the lack of sound methodologies and data, public health care delivery costs are typically measured by expenditures, and quality has been largely unmeasured.^{1/} Despite the latter, an undefined but acceptable standard of quality and efficiency is implicitly assumed to exist in public facilities, and comparisons of "cost" estimates across countries or facilities involve similar assumptions. However, equating costs with expenditures is fallacious. It distorts the definition of costs since the efficiency of expenditures is unknown, quality is uncertain, and benefits are unmeasured because expenditures only capture budgetary flows and their allocation.

Studies by Mills et al. (1989), Russell et al. (1988) and Raymond et al. (1986) adopted the budget allocation (or full cost accounting) method for measuring costs in Malawi, St. Lucia, and Belize, respectively. Each has applied a traditional hospital costing approach that divides the hospital into cost centers and effectively analyzes where resources are distributed, but without regard to how they are applied. The final "cost" is then the allocation of the total budget, plus other identifiable transfers. These studies are useful tools for managers but are limited in that they are not tied to the production of any service. Moreover quality of output is ignored.

The limits of traditional "costing" efforts and the distortion of quality can be illustrated by the phenomenon of a "unit cost": (a) increase, which can result from a budget increase and/or a decline in patient load, and, similarly, (b) decline due to a fall in budget allocation or a rise in the number of patients. The implication is that if budgets are reduced, costs will fall; and, if the laboratory is closed and laboratory exams are no longer provided, costs will decline. There is, however, an obvious loss of quality or quantity from these decreases in "cost". Moreover, the distribution of specific inputs (personnel, drugs, etc.) in each budget allocation cannot be determined, which

^{1/} Quality has been measured in Mexican social security hospitals, however, which has promise for application elsewhere (Barajas, 1990).

leads to the assumption that the distribution of input costs parallel budget categories.

Public hospital quality can be measured by evaluating either medical/technical competence or patient satisfaction. Donabedian (1988) aggregates quality measures of the former into the following broad categories: (1) structure, such as peer review, (2) qualifications and mix of staff and service delivery process, and (3) practitioners' diagnoses and treatment patterns. This study measures quality through all three, by defining norms based on Dominican developed standards, comparing practitioners' diagnoses and treatment patterns with norms for specific diseases and patients, and analyzing staff qualifications and mix.^{2/}

Two recent studies in Canada (Pineault et al., 1985) and Colombia (Shepard et al., 1991) have attempted to measure costs and quality jointly. Pineault et al. compare clinical outcomes and costs of care between patients treated on an outpatient and inpatient basis for three surgical procedures.^{3/} Shepard et al. measure indirect and direct costs (excluding the costs of diagnostic tests) of a single surgery in two Colombian health facilities (an intermediate health unit and a hospital) and compare the cost, quality and effectiveness of care in each of the two settings.

Both studies estimate the costs of alternative surgical treatment(s) using a methodology similar to that applied here. Their drawbacks are in the fact that only a small number of specific treatments are costed out, which do not permit generalizing cost estimates. Although both are methodological advances in measuring quality and costs in public facilities where cost data are generally scarce, they offer limited information regarding hospital costs other than surgery. Moreover, their methodologies are only appropriate for surgical procedures. They cannot be applied to inpatient or outpatient care where costing is more difficult due to the range and severity of diagnoses and the need to track and cost-out patient contact with different medical services. As a result, their policy implications are severely limited. The findings are useful for fine tuning how a hospital provides some surgical services, but they cannot provide policy guidance to policymakers and hospital directors on the efficiency, costs and effectiveness of the health services provided.

This study goes beyond estimates of surgeries to measuring cost and quality of all types of hospital services (inpatient, outpatient, emergency and surgery). In doing so, an innovative methodology is developed and applied to accommodate the limitations of existing approaches, to compensate for the complete lack of data in Dominican public hospitals, and to produce findings that inform policy on key issues regarding hospital performance and productivity. A general public hospital in the Dominican Republic is used for empirical estimation.

^{2/} See Lewis et. al, 1992 for detailed analysis of staff qualifications and mix applying the data from this study.

^{3/} Pineault et. al (1985) also measure patient perceptions, but this goes beyond the issues of concern here and are not discussed.

II. BACKGROUND

The Dominican Republic is a Caribbean island of about 6 million people and a per capita income in 1988 of US\$720. Unemployment was about 30 percent in 1985 according to the Central Bank, but has reportedly risen more recently. Infant mortality is estimated at between 80 and 84 per thousand live births, with most deaths due largely to preventable causes (Rodriguez-Grossi, 1989). Health care services are available in both the private and public sectors, with the latter made up of State Secretariat of Public Health and Social Assistance (SESPAS) hospitals and clinics, and social security (IDSS) and armed forces and national police (ISSFAPOL) facilities. Care is provided free of charge to all patients, although only SESPAS facilities are open to all citizens as enrollment in special public insurance plans is not a prerequisite as is the case with IDSS and ISSFAPOL.

SESPAS Organization and Financing of Hospital Care

SESPAS provides care for the population it serves through 34 general and specialty hospitals and 392 health centers and clinics owned, operated, and largely financed by the government. SESPAS provides monthly budgets for these facilities, controls the hiring of all medical and nonmedical personnel, and directly pays the salaries of hospital staff. Thus, individual facilities have little or no control over the number or mix of personnel.

In addition to the budgets provided by SESPAS, facilities also receive in-kind transfers of essential pharmaceuticals and supplies through a SESPAS sub-organization entitled Program of Essential Medicines, or PROMESE. This suborganization is charged with the purchasing and distribution of drugs and medical/surgical supplies to SESPAS facilities. Ordering and distribution of drugs is largely undertaken without input from hospital users. The drugs and supplies are purchased from local distributors or manufacturers in bulk, reportedly at bulk-rate prices, although the latter cannot be verified with current recordkeeping practices.

Additional, albeit sporadic, support for SESPAS facilities has come from the Office of the President, which has made special drugs and funds available; donor projects; and other miscellaneous sources. In addition, many facilities have charges for non-inpatient services despite the official government policy that health care is to be provided free of charge to SESPAS patients (La Forgia, 1989; Lewis, 1992).

Hospitals are financed by SESPAS through provision of monthly transfers meant to cover all variable (non-personnel) costs. Personnel are hired and paid centrally with the value recorded against each hospital's total budget. Budget allocations are primarily based on the prior year's allocation. Data on other allocations from the central government are rare. PROMESE does not maintain records on what supplies or drugs individual hospitals have received, and information on prices paid by PROMESE are difficult to obtain.

SESPAS facilities do not collect cost information. The hospital administrators know the monthly subsidy received from SESPAS for nonpersonnel expenditures, but rarely have information on what monthly expenditures are, even by major expenditure category (e.g. food, supplies, administration, etc.). Patient record information is spotty at best, so that frequently administrators do not even know how many patients they treat each year. As a result, SESPAS is unable to develop budgets for its individual facilities which relate in any way to the actual operating expenses in the facility. Most importantly, there is no means to gauge the efficiency or effectiveness of resource use.

The current system has few incentives and fundamental distortions in the organization and financing of health care. The effects of these policy decisions and their implementation are measured and discussed here through the examination of quality and the costs of quality in a SESPAS hospital.

Survey Site: Aybar Hospital

Aybar Hospital is a 271-bed teaching facility in a poor barrio of Santo Domingo. The main hospital was constructed in 1945. The facility has four operating theaters, 23 outpatient consultation rooms, and an emergency wing. Twenty-nine specialty services are provided, including particular strength in ophthalmology and gastroenterology.

Aybar has 230 physicians, including residents and interns. Nurses (208), laboratory technicians (19), administrative staff (41) and others (61) make up the staff of about 560 (Candelario et al., 1988; Corona Bueno, 1989). Based on the results of this survey, it serves about 78,000 emergency patients and 125,000 outpatients per year. Approximately 2,000 operations are performed each year.

The occupancy rate is estimated to be between 90 and 100 percent depending on the specialty with some ward occupancies over 100 percent not uncommon. The survey estimated the overall average length of stay at 9 days, but lengths of stay vary, with internal medicine estimated at 24 days and surgery at 8. The hospital estimates that about 25 percent of drugs are paid for by patients because the hospital either is not supplied with the drug(s) or does not have the resources to buy them (Candelario et al., 1988). The study results suggest that the overall figure is closer to 50 percent, with outpatients buying most drugs from private outlets but few inpatients purchasing their own drugs.

The official budget of the hospital in 1989 was DR\$531,334 (US\$84,607) per month. The monthly non-salary portion of DR\$113,573 (US\$18,084) is transferred to the hospital. Salaries amount to 79 percent of the total monthly transfer, and are managed and paid by SESPAS, and are effectively outside the hospital's control. The value of additional transfers from PROMESE or the President's special fund are not known for the reasons indicated above.

Controlling the hospital is difficult, because staff do not report to nor are they beholden to hospital management. With staff assigned and deployed from the center, hospital managers have little or no control over staff performance or location. Shortages exist in equipment for both diagnosis and treatment and reliable supplies are few. Much of this is due to nonavailability from PROMESE and other central government sources, as well as the inadequacy of the operating

budget to meet the needs of the patient volume. Thus the facility is hamstrung by rigid bureaucratic arrangements.

These circumstances do not differ from reports of other hospital directors in the Dominican Republic and are similar to observations elsewhere in the region. In this sense, Aybar Hospital is typical.

Medical Staff Characteristics and Earnings

Because medical staff constitute such a larger proportion of the hospital's SESPAS budget and medical qualifications are important measures of quality, a brief description of the medical staff, their characteristics, and earnings are provided here.

Salaries for specific types of workers are set with minimal differences across employees. Employees receive no fringe benefits outside of meals in the hospital. Rigidity in salaries prevents adjustments for staff education or experience. Therefore the earnings of physicians with 20 years of experience is identical to that of a new medical graduate. More importantly, rewards for good performance either through bonuses or promotion are impossible under this simplistic system of employment.

Aybar had 56 interns assigned to the hospital during the study period. Interns are not paid, although they are provided meals. Interns are in their last year of undergraduate training in medicine. Unemployment among physicians is high in the Dominican Republic. Interns are virtually unemployable as medical staff and employment prospects outside of medicine are poor given an unemployment rate of around 30 percent. Hence a shadow wage for medical staff is not appropriate.

The physician-nurse ratio of 235:208 is inefficient given patterns observed in other countries. Low levels of compensation and limited potential for upward mobility offered by this system provide a perverse set of incentives for medical staff. These incentives are further distorted by the fact that personnel are paid regardless of whether they perform their duties. And good performance is not rewarded. Thus, the issue of personnel is a serious one for the hospital, particularly as it relates to both hospital costs and quality of care (Lewis, et al, 1992).

III. METHODOLOGY

The study was designed to adjust for the shortcomings of existing methods for measuring costs in public hospitals, and for the gross lack of cost, performance and quality data in all Dominican public hospitals. This survey provided the first data on hospital operation, finances and performance in the Dominican Republic. As is typical for Dominican hospitals, no routine data collection existed for utilization or diagnoses; no surveys of any aspect of hospital service quantity, patient volume or quality of care had ever been undertaken; and price and cost information on human, material and financial

inputs were virtually unknown. Even inventory systems were lacking. The study collected the information regularly included in patient records in developed countries. This entailed tracking patients as they moved through the hospital and recording the type and quantity of all services, pricing all components of those hospital services, collecting price data for all delivered services, estimating time costs of medical personnel, and undertaking a measure of all indirect costs.

Cost and Data Collection Methodology and Approach

Variable costs were collected using a combination of time and motion studies to examine the nature and cost of medical services, and the resource use and value of ancillary services and other inputs devoted to patient care. Close to census samples were taken since virtually no information on patients, providers or non-personnel inputs existed for the hospital.

Survey of Patients. A set of questionnaires and registries was developed and implemented in Aybar Hospital during the period April 17 through 28, 1989. The questionnaires were used to collect information on patient socioeconomic characteristics, patient care time by medical staff, and use of consumables, drugs, diagnostic tests and operating theater; registries collected information on services rendered to categories of patients not surveyed with the questionnaires. A set of questions on shortages and their impact on medical decisions was also included to capture the extent of unusable or unavailable equipment, instruments, consumables or drugs.^{4/} All questionnaires were pretested by a team of Dominican physicians. Data collectors were all graduated physicians.

The sampled patients include the following: all patients entering emergency service over a one-week period; a sample of outpatient visits during that week, and those not included in the outpatient survey were inventoried;^{5/} and inpatients admitted to five of the hospital's 18 wards during a two-week period (3 surgical wards and 2 ophthalmology wards). Inpatients were tracked daily after the termination of the survey until their discharges. Hence, the sample of inpatients was not truncated.

Time allocation of all physicians and nurses providing care to or for patients was included in the emergency, outpatient, and inpatient surveys. Data collectors recorded the amount of medical attention, administration for the patient, and supervision/observation of/by medical staff (to capture teaching and

^{4/} The Spanish language questionnaires are contained in Appendix A of Lewis et al. (1990).

^{5/} Originally all outpatients were to be surveyed; however, the concentration of consultations in the early hours of the day due to physicians' schedule preferences, forced physicians to double and triple up in consultation rooms. Thus, the enumerators surveyed as many patients as possible, and only counted the overflow whom they did not have time to include in the survey.

learning). In addition, the level of staff providing services to patients was recorded to allow differentiation in physicians and nurses services cost. Among inpatients, time and motion studies conducted over one week provided the basis for extrapolating an average amount of medical attention for subsequent periods.

A separate survey form was used for drugs, diagnostic tests and surgery. Where drugs were ordered, prescribed, given to the patients (to take at home) or applied to the patient, the drug and the hospital's source (e.g., PROMESE, private sources, SESPAS, etc.) were recorded. Who paid for the drugs and who applied them to inpatients and emergency patients were included to allow costing of donated drugs. Subsequent follow-up and matching with registries--set up by the project at all sources of drugs (subsidized sale of drugs at Botica Popular; pharmacy in the hospital) and all diagnostic test sites--provided information on whether the hospital filled prescriptions, or followed orders properly or at all.

Twenty-three surgical operations were surveyed, with an attempt to gain at least two wound, appendicitis, cataract, hysterectomy and hernia operations so that some rough average for operations in general, and specific kinds of procedures in particular, could be costed out. The level and function of personnel in the operating room were recorded along with the use of equipment, instruments, consumables, drugs and pharmaceutical products.

A registry to capture patient flow on the wards was included in the survey to allow calculation of occupancy rates. Registries in the first aid and immunization rooms captured patients using only those services and the time use of nurses, and a registry of social workers summed the number of daily patient visits.

Collection of Prices. No price information existed in the hospital prior to the study. Price information for drugs and consumables the hospital received from the central government and for goods the hospital purchased outside the facility at wholesale and retail outlets was collected directly from the source. Inventories of stocks were usually available. How much the government paid for those products, and the unit cost of items obtained in bulk, were obtained from the multiple sources of goods.

Unit prices of all potential inputs (hospital official stock and actual usage varied) were obtained from all sources. For example, all drug prices for different concentrations and presentations (liquid, tablet etc.) from the various sources used by the hospital (PROMESE, the drug procurement parastatal; SESPAS; Office of the President; private distributors; and private pharmacies) were collected. The unit cost of each lab, x-ray, pathology and special test was calculated using the appropriate fraction of technicians' time, consumables, reagents and any other inputs.

Prices were obtained from: searching PROMESE records for what was paid for different products, reviewing SESPAS financial records, studying receipts in the hospital's accounts, interviews with pharmaceutical companies and their distributors, interviews with medical equipment distributors, interviews with distributors of special items such as oxygen, and private pharmacists. In all, prices for 154 consumable items and 1002 drugs were obtained.

Data Collection. Data collectors (enumerators) were dispatched to different sites with a stack of questionnaires, and followed between one and three patients at a time. Data collectors were equipped with a stop watch for each patient. Time allocation by staff and use of all equipment, consumables and orders for tests or drugs were recorded by that data collector, and attending medical staff interviewed. Supervisors reviewed completed forms after every shift, and filled out the codes for diagnoses, symptoms, drugs, and other goods.

Each patient entering Aybar hospital was assigned a number and an enumerator to track the services received from the hospital in outpatient, wards and emergency. Supervisors reviewed completed forms after every shift, and filled out the codes for diagnoses, symptoms, drugs, and other goods. The information collected was the following: the time, type of personnel (e.g., level of physician or nurse, or other) and kind of service (attention, supervision/observation, and administration) received based on observation; use of other inputs (consumables, equipment) based on observation; the nature and reason for shortages according to the attending physician; socioeconomic information from the patient; and diagnoses and ordered tests or drugs from the attending physician(s).

Those patients who had other services indicated (drugs, tests) had a questionnaire filled out with the appropriate name and identification number. Those numbered questionnaires were used to follow up to determine if tests had been completed (and if not why not), and if ordered drugs had been obtained from the hospital's pharmacy or botica popular. Registries at each site for tests or drugs were used to determine whether the ordered item(s) had been obtained and the value of the service or product.

Surgery questionnaires were filled out for the 23 surgical procedures sampled based on observation and interviews with the surgeon(s) performing the operation. These were not linked to the patients on the wards. Although modifications in staff behavior were anticipated due to the study, no evidence of shifts in behavior surfaced when compared to pre-survey patterns.

Quality of Care Methodology. Quality is captured in four ways in the study. First, the attending physician was interviewed during the patient survey to determine if any goods or services were unavailable for diagnosis, or if treatment protocols were modified because of expected or known shortages. Second, a set of clinical protocols for specific diagnoses was developed outlining Dominican norms for diagnosis and treatment.^{6/} Third, the level of attending medical staff and the time each spent providing medical care to patients was recorded. Finally, ordered and completed drug prescriptions and diagnostic tests were matched to measure the cost reductions due to quality lapses.

Protocols for hernia, appendicitis, cataract surgery, birth, cesarean section, hysterectomy, prenatal care, diarrhea, acute tonsillitis and

^{6/} Protocols developed for the project are contained in Appendix F of Lewis et al. (1990).

hypertension were developed for the Dominican Republic by a team of Dominican physicians. These are used to compare practice patterns and costs of the ideal procedures with actual diagnosis and treatment to evaluate quality of care as well as possible unnecessary expenditures.

IV. QUALITY OF CARE

Quality is difficult to measure. An important gauge of quality is typically the qualifications of attending staff. In the developing country context, the lack or inappropriate mix of manpower and other inputs (e.g., drugs, consumables and so on) is reported to compromise quality; however, no good evidence exists on this issue. Another accepted but indirect measure of quality has been government expenditures on health or on particular health facilities. Unfortunately, the allocation and use of resources is rarely examined, nor is efficiency controlled for, so that this too is an inappropriate quality measure.

In attempting to complement these types of measures and adjust for shortcomings, data were collected in Aybar Hospital to examine: (1) the qualifications of medical manpower delivering services, (2) the extent and nature of shortages, (3) the services on which the hospital has actually spent its resources, as compared to what was ordered by physicians, and, (4) for selected diagnoses, the specifics of clinical practices in the hospital and how they compare to accepted clinical norms. The latter comparison is based on norms developed by Dominican physicians for this effort (See Lewis, et al. 1990).

Medical Staff Time Allocation

Although almost every patient treated at the hospital received some physician attention, very few inpatient or emergency patients were treated by a staff physician or higher level physician. Table 1 summarizes the doctor-patient contacts by physician level. The vast majority of emergency and inpatients were treated by interns and lower level residents (89 percent and 62 percent respectively). Outpatients, however were treated by higher level physicians 86.2 percent of the time.

Among nursing staff, a similar pattern for inpatients and emergency patients emerges, with auxiliary nurses providing over 90 percent of the patient care. In outpatient services, nursing care was minimal--affecting only 111 patients, and provided almost exclusively by auxiliaries.

This pattern of care suggests a low level of service provided to patients, especially in emergency and the wards. Moreover, since most of the attending physicians are students, involvement of staff and chief-of-service physicians would be expected. Other evidence from the study suggests that few interns and residents are under the supervision of experienced physicians. Very little supervision/observation time was recorded for the higher priced physicians who constitute the teaching staff, which means that a limited amount of instruction occurs during patient care (See Lewis et al., 1992).

Table 1

Probability of Being Seen by Different Categories of
Physicians and Nurses at Aybar Hospital
by Level of Training and Setting

Category of Medical Staff	Emergency		Inpatient		Outpatient	
	Number of Patient Contacts ^a	%	Number of Patient Contacts ^a	%	Number of Patient Contacts ^a	%
Chief of Staff/ Staff Physician	98	3.3	6	4.9	1,336 ^b	86.2
Resident III-IV	216	7.2	40	32.5	87	5.6
Resident I-II	1006	33.7	54	43.9	121	7.8
Intern	1669	55.8	23	18.7	206	13.3

Graduate Nurse	62	8.9	137	17.9	1	1.0
Auxilliary Nurse	634	91.1	629	82.1	110	99.0

Source: The Urban Institute

- a. A contact does not necessarily represent the amount of time a physician or nurse spent with a patient, but the total number of staff contacts with patient(s). Thus one chief of staff physician could have contact with 6 inpatients, six chiefs of staff could have treated one patient or some multiple that produces six contacts between inpatient(s) and chiefs of staffs.
- b. Nineteen general practitioners represent twenty-five percent of staff physicians and provide about forty percent of outpatient consultations.

Another quality measure of physician services is the small fraction of contracted physician time devoted to patient care. Only 12 percent of all SESPAS-contracted time can be accounted for in indirect and direct patient care in emergency, inpatient, outpatient and surgery services. This suggests that physicians are either engaged in a considerable amount of non-patient care activities or that they are not fulfilling their obligations to SESPAS and Aybar Hospital and are not reporting to the hospital. In either case, resources are not being applied to ensure the maximum quality of care for patients, or for the efficient use of resources.

Shortages and Noncompliance

While outpatients receive more physician care, their share of hospital provided drugs, diagnostic tests, and other inputs is considerably lower. Although physicians were reluctant or too uninformed to realize the existence of shortages, some did report a lack of consumables, working equipment or other inputs. For outpatients, emergency and inpatients the proportion of reported shortages was 12.6, 6.9 and 6.3, respectively. Based on these findings, outpatient services appear to be particularly disadvantaged in access to nonpersonnel inputs, but higher level medical staff provide the bulk of the medical attention.

Another means of measuring shortages is through examination of ordered and completed diagnostic tests. Ordered tests are those requested for the patient by the physician in writing. Completed tests are those performed for the patient by Aybar Hospital.^{7/} A diagnostic test order does not guarantee that the test will be conducted by the hospital. Table 2 compares the ordered versus completed tests in the emergency rooms, outpatient clinics, and inpatient wards.

The number of ordered and the proportion of diagnostic tests completed vary across services. Outpatients have a large number of tests ordered relative to other patients, particularly for laboratory tests. The ratio between the number of lab tests ordered and the number of patients is only about half for emergency patients, compared to 139 percent for outpatients. However the completion rate for outpatient lab tests is less than 10 percent, as compared to 70.0 and 71.1 percent, respectively for emergency and inpatient lab tests. This means that the number of completed outpatient tests is only about a third the number completed for emergency patients. The hospital gives priority to emergency and inpatient laboratory analyses, which may account for the large discrepancy in completion between outpatient and these other two services.

The pattern is somewhat similar for x-ray. During the survey period, 255 radiology procedures were ordered. Roughly 42 percent of all ordered X-rays were for emergency room patients, an additional 40 percent were ordered for outpatients, and the remaining 18 percent were for inpatients. Completion rates were much higher for the inpatients and emergency room patients than for

^{7/} It is conceivable that tests are completed by an outside laboratory, but these are neither subsidized nor are they guaranteed. No information is available on whether laboratory tests were carried out commercially once the patient left the hospital.

Table 2

Summary of Shortages and Ancillary Services Provision for
Outpatients, Emergency and Inpatient Services

	Outpatients	Emergency	Inpatient
Number of Patients	1554	1616	61
Lab Tests			
Number Ordered	2,163	830	152
% Completed	9.1%	70.0%	71.1%
X-Ray Tests			
Number Ordered	101	108	46
% Completed	27.7%	72.2%	60.9%
Noninvasive and Pathology Tests			
Number Ordered	128	88	35
% Completed	69.5%	90.9%	57.1%
Reported Shortages of Any Kind	12.6%	6.9%	6.3%

Source: The Urban Institute

outpatients. Roughly 72 percent of all X-rays ordered for emergency department patients were actually performed, compared to 61 percent of orders for inpatients, and only 28 percent for outpatients. The cardiology and general medicine clinics were responsible for the largest numbers of ordered X-rays. Approximately 44 percent of the X-rays ordered by physicians in the general medicine clinic were actually performed, compared to 32 percent of the radiology procedures ordered by cardiologists. Completion rates across all the outpatient departments were generally low. Chest x-rays were the most frequently performed radiology procedures.

For the noninvasive tests, once again the largest number of services were ordered for outpatients, followed by emergency patients and inpatients. Almost ninety-one percent of all special services requested for emergency patients was completed. Roughly 70 percent of the services ordered for outpatients were completed, while inpatient orders were completed only 57 percent of the time.

Major mitigating factors for outpatients are that the hospital is not necessarily responsible for the uncompleted tests and modest fees are levied for some services. Some patients prefer to use private or other public sources and some neglect to submit the request. Thus, uncompleted tests are due to a number of factors. The hospital is responsible for providing insufficient information to patients on how to proceed, not following up on patients (i.e., setting up subsequent appointments or checking up on test results), and for shortages that prevent conducting tests. Patient preferences and behavior account for some of the uncompleted tests, but how much cannot be measured without a follow-up household survey of patients.

The conclusion from these data is that patients are not receiving the basic level of services that public hospitals are intended to provide. It suggests further that the quality of attending physicians as well as the availability of other medical inputs and diagnostic tests is sufficiently low that basic quality of care is jeopardized. The qualifications of attending physicians are low and they are largely unsupervised, which brings into question whether the appropriate inputs are even being ordered. Thus the issue is not only what the hospital lacks in nonpersonnel inputs, which has been outlined here, but whether the inputs ordered are those that are required. This is the subject of the next subsection.

Comparison of Norms and Clinical Practices

Norms can be applied to examine how well clinical practices conform to acceptable patterns of diagnosis and treatment. They provide an objective standard to determine the frequency with which required diagnostic tests were ordered by physicians; whether patients received the specified drugs for their diagnoses; whether the proper instruments and equipment were used; and whether the appropriate amount and category of consumables was used in diagnosis and treatment. The analysis in the next subsection is confined to analyzing physician ordering of diagnostic tests and drugs.

The clinical norms for this project were developed by a group of Dominican physicians (see Appendix F in Lewis et al., 1990) for selected diagnoses, to establish a standard upon which to compare diagnostic and treatment practices of

attending physicians in the Dominican Republic. This project has developed norms for specific diagnoses for the Dominican Republic that can be used not only for this project but for quality control and quality measures throughout the country. Norms for clinical practice are virtually nonexistent in the Dominican Republic.

Dominican-specific norms were required to define what was appropriate in that country's context, given local epidemiological and financial realities, and limited access to some inputs. It was unrealistic to apply high cost, high-technology approaches from more developed countries without careful assessment of their appropriateness to Dominican circumstances.

The norms developed for this project are simple listings of the nature of the diagnoses, and the diagnostic tests, quantity of specific consumables, instruments and equipment, drugs, and surgery gowns, where relevant, needed to provide a basic level of care. Skeletal norms consisting largely of lists were designed to avoid long, complicated and often confusing explanations of medical procedures. Clearly stated norms were required, emphasizing the inputs needed to define an adequate level of quality of care. The norms needed to be in a form that would permit costing of appropriate diagnoses and treatment for each diagnosis.

The diagnoses included are high volume services of Aybar Hospital. They include hernia, acute tonsillitis, appendicitis, cataract surgery, hypertension and diarrhea. This method for measuring quality is experimental. It does not allow for medically acceptable substitutes, which is a reality in any medical setting, and does not account for physician's possible knowledge of a particular patient's medical history. Thus, the results need to be tempered and the limitations kept in mind in interpreting the findings.

The norms apply to outpatient, inpatient and emergency services, although the applicability of the diagnoses to each service varies. Table 3 summarizes the sample of patients used in the comparison of norms and actual treatment, and includes the number of patients in each diagnostic category and the services where they were seen. Hypertension is the most common of the diagnoses in the sample. Over 200 patients were seen over the course of a week. Appendicitis is the smallest sample. Inpatient diagnoses are the smallest category because of the small overall sample of that service (61 patients).

Diagnostic Tests. The comparison between the number of indicated tests under the norms and proportion of diagnostic tests ordered, and between norm costs and norm-specified costs covered by the hospital are provided in Figure 1. Comparisons among the costs of the full complement of norm-specified tests, the actual hospital expenditure on all (specified and non-specified) diagnostic tests and the cost to the hospital of the diagnostic tests completed according to the specified norms is provided in Table 4 for the six diagnoses. The criteria for whether a test, or drug (see below), should be ordered is rigidly defined according to the norms. No deviation is accepted as a substitute. That is, if the norms state that penicillin is required and ampicillin was provided, the treatment is out of compliance with the norm. This may be overly rigid, but is provided here in this form to indicate the extent of specific compliance with

Table 3

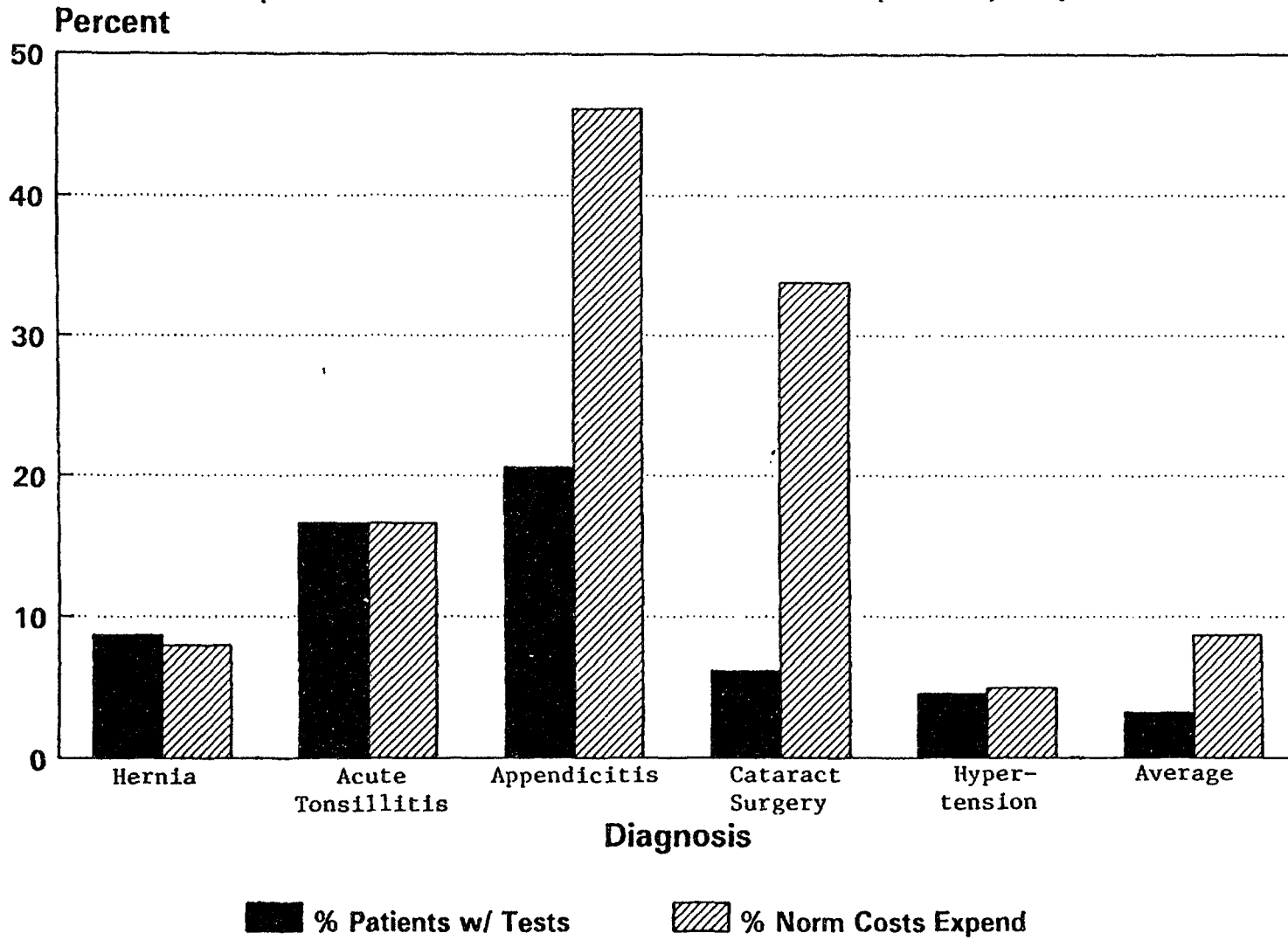
Number of Sampled Patients with Selected Diagnoses for Quality
of Care Measures by Hospital Service

Diagnoses	Total Sample ^a	Number of Outpatients	Number of Emergency Patients	Number of Inpatients	Number of Surgeries
Hernia	56	28	8	17	3
Acute Tonsillitis	101	32	69	0	0
Appendicitis	23	8	9	4	2
Cataract Surgery	34	27	0	3	4
Hypertension	204	144	60	0	n.a.
Diarrhea	83	10	73	0	n.a.

Source: The Urban Institute

- a. Each diagnosis sample consists of all patients presenting with that diagnosis during the period of the survey.

Figure 1
Percent of Patients Receiving Any Norm -
Specified Tests and Percent of Tests Costs Expended by Hospital



Source: The Urban Institute

Table 4

Comparison of Costs of Norms and Actual Expenditures
for Diagnostic Tests of Selected Diagnoses (DR\$)

Diagnoses	Number of Tests Specified in Norms	Expected Cost of Meeting Norms	Actual Expenditure on Tests Specified in Norms	Total Expenditure on Norm-Specified & Unspecified (Other) Tests
Hernia	9	\$606.73	39.05	\$44.35
Acute Tonsillitis	1	231.29	47.47	38.93
Appendicitis	5	121.60	37.09	55.63
Cataract Surgery ^a	6	216.07	26.90	69.70
Hypertension ^b	13	3,591.95	217.87	200.16
Diarrhea	0	0.00	19.75	n.a.
Total/Average	7	4,767.64	388.18	409.20

Source: The Urban Institute

a. Outpatient only. No emergency cases. Unclear when inpatient tests completed
The data suggest it may be prior to admittance.

b. Outpatient and emergency only.

accepted Dominican practice. As a result the findings should be interpreted with caution.

The tests discussed here are ordered, not completed, tests. The costs associated with the ordering is meant to provide a comparison with the norms so that the "savings" from deficiencies in medical care quality can be measured. The "savings" due to uncompleted tests has already been discussed above.

The number of tests indicated, based on the norms, were costed out by estimating diagnostic test costs for the hospital. For those tests that the hospital does not conduct, prices were excluded for both the norms and the hospital costs. This will, therefore, underestimate the true cost of meeting basic standards of care. The tests that are not performed by the hospital's lab are included in Figure 1, showing the proportion of the indicated tests that were ordered. It is the cost component in Table 4, columns 2 and 3, where the costs are excluded. This omission has obvious implications for quality of care. If norms indicate that certain tests should be provided for patients with a given diagnosis and the hospital never performs such tests, then quality standards cannot be met unless the hospital is willing and has sufficient resources to purchase goods and services outside the facility. What is important, however, is that quality standards cannot be met from the outset under current circumstances where all required diagnostic tests are not even available.

The actual costs of providing the necessary tests to all patients arriving with the diagnosis is provided in column two of Table 4. Column four indicates how much all completed diagnostic tests cost the hospital. In many cases, multiple tests not called for in the norms were ordered. This may be due to the ordering of tests related to the secondary or tertiary diagnoses rather than the primary diagnosis. This analysis relied solely on the primary diagnosis for selection of patients into the quality of care sample and for specifying the norms. Thus the total expenditure on diagnostic tests (column 4) may exceed what should have been spent.

Column two sums the diagnostic test costs as indicated by the norms for five diagnoses from the sample (diarrhea is excluded since no tests were indicated in the norms). Figure 1 shows the cost of tests ordered according to the norms as a proportion of the total cost of the norms. This provides the proportion of "savings" from not ordering the diagnostic tests needed to properly diagnose and treat a particular ailment. Alternatively, it is the fraction representing hospital compliance with the Dominican norm.

Twenty percent or fewer of diagnostic tests indicated by the norms are ordered for patients presenting with the sampled diagnoses. With hypertension, only 5.2 percent of the required tests are ordered. Compliance here is the number of ordered tests divided by the total number of indicated tests across patients for each diagnosis. Thus the proportions indicate whether any tests were ordered but does not specify which ones. Typically, some tests are not ordered for any patient and a few are ordered for many. In no instance was a set of tests indicated by the norms ordered for all patients.

The hospital spends only a small fraction of the cost of diagnostic tests called for under a basic standard of care.^{8/} The "savings" for these five diagnoses over a one week period amount to \$DR4,358.44 (US\$694.02), or over 90 percent of the resource cost of DR\$4,767.64 (US\$759.18). Moreover, as mentioned above, this is an underestimate because the costs of needed tests not performed by the hospital are excluded from the savings estimates. This is balanced to some unknown extent by patients who have already been diagnosed and have completed test results.

The implication of these results is that quality is quite low as measured by compliance with Dominican norms for diagnostic testing, at least for certain diagnoses. Although these data represent only a sample of the diagnoses the hospital treats, there is no reason to believe that they represent extremes. Observation, experience and interviews suggest that these are not exceptions but are instead indicative patterns for the general patient population.

Drugs. The comparison between indicated drugs and the number and value of those received by patients for the six diagnoses are provided in Figure 2 and Table 5. The information is similar to that provided for diagnostic tests in Figure 1 and Table 4. The criteria for whether a drug was ordered are the same as that for diagnostic tests, and no deviation from the norms is considered. The drug definition is based on the WHO drug code number.

Drug ordering differs from diagnostic tests in that some drugs only apply to inpatients or to surgical procedures (i.e., anesthesia). In either case this is indicated in the footnotes to the table. The use of drugs in surgery is based on drug use recorded in the sample of surgeries.

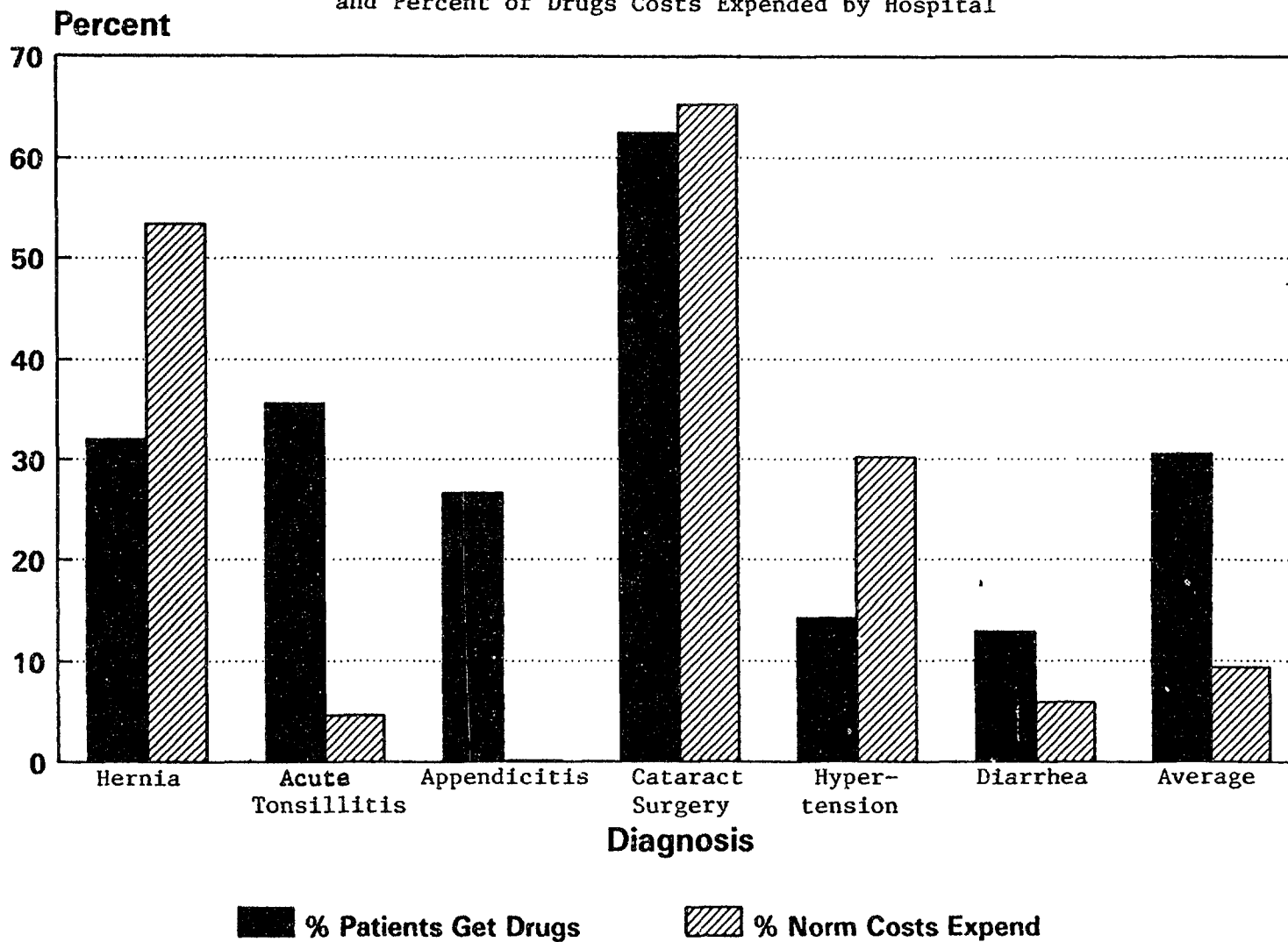
The average number of drugs required ranges from one for mild diarrhea to six for appendicitis. The latter is due to some extent to surgical procedures, which require additional drugs for both anesthesia and fighting post-operative infection. As shown in Figure 2, on average 30.6 percent of required drugs are ordered for patients, a significant increase above the 12.1 percent average for diagnostic tests. For cataract surgery, almost 63 percent of the indicated drugs are ordered for patients.

The hospital spends a small percentage of the amount required to meet the value of drugs indicated by the norms. As indicated in Figure 2 on average 9.4 percent of the expected expenditure on drugs is spent by the hospital. The range is between less than 1 percent for appendicitis to 65.3 for cataract surgery. Drugs are not provided to emergency appendicitis patients, and the inpatients in the sample received only two of the six drugs indicated in the norms. Cataract surgery patients have drugs ordered that exceed the value of the drugs indicated in the norms and they receive a significant proportion of what is required by the norms. The reasons for the divergence from the norms was not pursued in the survey.

^{8/} This calculation assumes that all ordered tests are completed, which is unrealistic given the high proportion of uncompleted tests. Thus the total "savings" are greater than those reported here.

Figure 2

Percent of Patients Receiving Any Norm - Specified Drugs
and Percent of Drugs Costs Expended by Hospital



Source: The Urban Institute

Table 5
 Comparison of Norms and Compliance for Drugs
 Across Selected Diagnoses
 (DR\$)

Diagnoses	Number of Drugs Indicated in Norms	Expected Cost of Meeting Norms	Actual Expenditure on Drugs Specified in Norms	Total Expenditure on Norm-Specified & Unspecified (Other) Drugs
Hernia	4 ^a	\$148.80	\$79.46	\$212.28
Acute Tonsillitis ^b	2	4,387.44	200.59	1,250.24
Appendicitis	6 ^a	160.76 ^c	0.12	5.77
Cataract Surgery ^c	4 ^a	56.01	36.57	109.13
Hypertension ^d	4	752.76	227.26	1,085.89
Diarrhea	1-3 ^e	679.77	39.78	145.54
Total	3.7	6,185.54	583.78	2,808.85

Source: The Urban Institute

- a. Drugs required for treatment and for surgery.
- b. Data only indicates the number of individual drug orders made were consistent with the norms. It does not indicate that the necessary quantity (e.g., 10 day therapy) was provided in each case.
- c. Applies only to inpatients.
- d. There is very wide variation in both the numbers and costs for hypertensive patients. For example, in emergency, one drug is ordered 58.3% of the time, but no other drug is ordered.
- e. Number of drugs required varies by severity of the diagnoses. The figures reported here are for moderate cases and 2 drugs.

The level of hospital expenditures on drugs outside the norms exceeds the expected cost of drugs under the norms for some diagnoses. For cataract surgery, hernias and hypertension the hospital spends more on drugs than would be spent if the norms were followed. However, it is not clear whether it is substitutions among drugs, or additional drugs due to complications or secondary diagnoses that inflate the cost of drugs. Moreover the reasons for variation from good clinical practice are not evident. Conceivably, shortages of some drugs may force substitution of more or different drugs any of which may be more costly than those indicated in the norms. Overall, expended drugs represent about 45 percent of the cost of the required drugs under the norms.

The "savings" from not ordering drugs is substantial. DR\$5,601.76 (US\$892.00) is saved from not ordering the indicated drugs. This means that on average only 9.4 percent of the required drugs are provided to patients. Only DR\$3,376.69 (US\$537.69) is saved (or 60 percent of norm cost) if the comparison is between the value of what should have been ordered and what the hospital spent on drug treatment beyond the norms for these patients.

A striking result from this analysis of drug ordering is the high cost of certain drug therapies. In particular, the cost of treating tonsillitis is extremely high because it entails ten days of antibiotics that are very costly. There are alternative therapies for some conditions that can be treated by equally effective and less costly drugs, but these are not the products specified in the norms. Every drug has a price attached to it, based on where the hospital has obtained the drugs. The relative costs of drugs available in the hospital are generally unknown to physicians, however. Without knowledge about how much drugs cost or encouragement to use less expensive drugs over other, more costly, alternatives, there is neither the information nor the incentive to adapt prescription practices to financial realities. These circumstances will inflate hospital drug costs, which are a significant proportion of total costs, especially for inpatients. Moreover it is not clear whether or to what extent alternative or additional expenditures enhance quality.

VI. CONCLUSIONS AND POLICY RECOMMENDATIONS

Conclusions

The study has demonstrated the fallacies implicit in earlier cost studies that a basic level of quality and efficiency can be assumed in public hospitals. The low quality and efficiency in Aybar Hospital raises questions regarding the appropriateness of expenditure studies in guiding health policy. Moreover, Donabedian's (1988) model is ideal for measuring quality in a developing country's public hospital setting.

Budget data in public hospitals do not accurately reflect costs. First, because they underestimate the resources required to provide a basic level of service to patients (i.e., they do not measure efficiency). Second, because budget figures mask qualitative differences that effectively save resources but reduce quality of care, the implicit, underlying assumption of quality in public hospitals is unlikely to hold.

The quality of care in Aybar Hospital is low, although there is considerable variation across specialties. Overall, however, based on the performance and level of physician training, the frequency of shortages, the high deviation from accepted norms for the Dominican Republic, and savings from both not ordering and not completing basic diagnostic tests and drugs, Dominican medical practice in Aybar Hospital is not meeting a basic standard quality of care.

The qualifications of medical staff diagnosing and treating patients are inadequate given the heavy reliance on students and their lack of supervision. It represents a serious compromise of health care quality. Interns, and first and second year residents provided over 60 percent of all inpatient and emergency care, with minimal if any medical supervision. Nurse auxiliaries provided 82 to 99 percent of all nursing services and supervision is virtually nonexistent. Part of the latter can be explained by the small number of graduate nurses assigned to the hospital. Physicians appear to be in oversupply according to the budget and physician numbers, but they appear to concentrate on treating outpatients. These results raise serious questions about whether quality health care can be delivered at the hospital because the availability of medical personnel for patient care is inadequate. This is despite a significant budgetary allocation to medical manpower and physicians in particular.

The reasons for the poor quality of care have to do with government health policy and its management of public hospitals, uncertain qualifications and training of physicians, and insufficient resources. Hospitals expected to operate with insufficient resources are forced to compromise the quantity of services, which inevitably affects quality of care. Not completing tests, not repairing equipment and other lapses which affect quality can often be traced to a lack of resources.

Resource constraints can be relieved to some extent, however, by improvements in efficiency and in incentives for hospitals and medical staff. Even with improved efficiency, however, resources will likely be inadequate to meet a basic Dominican standard of care, based on the evidence provided here. Given budget levels and the current "savings" documented above from not ordering or completing tests and drugs for six diagnoses, as well as the evidence on overall noncompletion of ordered tests and shortages in the hospital, resources recouped from greater efficiency are not likely to be sufficient to meet the current resource gap. Pruning physician roles, however, would contribute to improved resource allocation. There is an oversupply of physicians relative to patient levels, beds, and services provided to patients. Consideration of alternative mixes of manpower, particularly the physician-nurse balance, and means of encouraging both higher quantity and quality of services from physicians are key to reducing costs and improving quality.

Government policies regarding the hiring and supervision of physicians; the serious constraints on hospital managers regarding both staffing and access to subsidized drugs and other inputs; and rigidities in the allocation of the nonpersonnel budget overly constrain hospital managers' abilities merely to operate the hospital, much less control quality. Indeed, quality control or supervision of clinical services does not exist at all, which helps to explain the lapses cited in this study. Where staff are not accountable to the hospital

director, quality standards cannot be enforced in any case, either in hiring or in performance, and no outside body has the authority or incentive to fill the vacuum. Moreover, there is no body within the hospital to oversee medical practice from a professional perspective. In short, there is no quality assurance system to substitute for, or complement medical staff management.

The issue of the adequacy of training is apparent from the minimal instruction that occurs at Aybar Hospital, a recognized teaching facility, and the common medical practices of the physicians providing care. It is a topic well beyond this study but one that deserves to be addressed further if quality of care is to be ensured.

Recommendations

Reform in Health Services Delivery. Transfer of authority to hospital directors for managing facilities is essential. They are responsible for hospital services but currently do not have the authority to control the personnel, services or the quality of services provided. Incentives to prevent abuse by making directors accountable for hospital performance are needed to complement the transfer of authority and provide the appropriate signals for public managers. This reform is critical to improving hospital management, which in turn is the key to improving health services at public hospitals. Without it few other reforms can be effective.

Resources of the system also need to be reallocated. It is clear from this analysis that there are too many physicians relative to their contribution, and that some ancillary services may not be receiving the full complement of staff or supplies and patients certainly receive low quality nursing services. Adjusting the mix of personnel could promote an improved team approach to patient care as well as allocate resources more efficiently and effectively.

Although the ancillary services also require improved personnel oversight and management, working conditions are poor. Inappropriate, insufficient or marginally operating equipment, uneven supplies of reagents and consumables all contribute to demoralized and underperforming staff. Poor working conditions and shortages of drugs and other consumables extend to wards and other parts of the facility although as mentioned above, the survey was conducted during a period of relative plenty. Much of the problem is due to insufficient resources; however, reallocation away from personnel to address some of the infrastructure problems that define the working environment may help to motivate staff and provide the necessary complementary inputs.

The policy issues are closely intertwined with other areas for reform discussed below. Indeed, the following subsections elaborate on many of the subjects raised here.

Options for Cost Containment. Cost containment is an important aspect of improving the quality of care. Reducing costs can lead to greater efficiency, higher productivity and enhanced quality because needed inputs are more available. Containing costs, however, involves structural policy changes as well as adjustments at the hospital level. Any serious containment of costs will

entail a major restructuring of the way public health care is delivered and financed. Indeed, reform of the medical personnel system as well as the introduction of basic management tools are key to reducing costs.

At the hospital level, basic management tools need to be established and appropriate incentives put in place to ensure their use. More importantly, hospitals need better and more systematic access to in-kind inputs, and their priority supplies need to be considered in SESPAS bulk ordering. The latter has already been considered above.

A potentially valuable means of containing costs and improving physician performance is through an incentive system that rewards efficient performance. Under current arrangements financial incentives are not permitted, and salary levels and adjustments are the sole purview of SESPAS. Current incentives are perverse and promote inefficiency and poor performance.

A related recommendation is encouragement in the use of generic drugs and those provided to the hospital gratis. Physicians are not aware of the relative prices of drugs. Moreover, costs to the hospital of the same drug will vary depending on the source. Better information to and incentives for physicians and improved stocking procedures that promote free or low-cost drugs could be beneficial.

Another aspect of cost containment is controlling patient numbers. As efficiency improves additional patients can be treated. Moreover, as quality improves, patient composition is not likely to remain constant as higher income users are attracted to the facility. Since care is free, some method of targeting subsidized services and rationing health care will be needed. These are important since a dramatic rise in patient demand due to improvements in efficiency and/or quality will not contain costs. Indeed, it is likely to have the opposite effect of increasing the number of patients and thereby the overall costs.

Generalizability of Study Results & Recommendations for Additional Study

The study has carefully measured costs, quality, and the costs of quality and efficiency in a single hospital in the Dominican Republic. Expansion to include additional facilities within the public network as well as comparisons with private health care delivery would place Aybar Hospital's experiences and costs in context, and permit estimates of average costs for the system as a whole. Controlling for Dominican practice and efficiency standards in public and private sectors would allow more accurate interpretations of the findings.

The methodology is highly replicable. The structure and operation of public hospitals are not significantly different in most developing countries, and the dearth of good cost information is virtually identical. Moreover, the approach is appropriate to the needs of both policymakers and managers as the results provide insights into the scope, operation, and limitations, as well as the costs, of hospitals and hospital systems.

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