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Clinical Practice and the Use of Laboratory Tests at the May 15 Hospital in Egypt

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The purpose of this study was to assess physicians' practices in the use of laboratory tests at a public hospital in Egypt. Methods included medical record reviews, interviews with selected physicians, literature review, and cost analysis. Three variables were examined in the medical record: appropriateness of laboratory tests, laboratory tests performed but not used as a basis for clinical treatment, and laboratory tests requested but not performed. Direct and indirect costs for each test were calculated. Results of the study indicated that 31.4% of the tests were inappropriate, 20.1% of test results were not used in treatment decisions, and 16.3% were not performed. Inappropriate and unused tests accounted for 22.6% of the annual total budget deficit for the hospital laboratory. To improve the quality of patient care and to decrease the wasteful use of resources, the hospital formed process improvement teams to develop clinical guidelines for problem-prone tests and to improve processes for requesting and providing laboratory results in a timely manner.

Key words: Quality assurance, appropriate use of laboratory tests, variation in clinical practice, process improvement of laboratory procedures/functions.

INTRODUCTION

The Ministry of Health (MOH) in Egypt initiated the Cost Recovery for Health Project (CRHP) in 1988 with funding from the United States Agency for International Development (USAID).

The Ministry of Health in Egypt subsidizes health care in Egypt through various sources, including allocations from the national budget, beneficiary payments, insurance, and donor funds. These subsidies are presently very limited, which results in high cost, low utilization, and low quality of hospital care. The objective of this project was to help selected MOH facilities generate and manage their own income through the development of cost recovery systems.

The Cost Recovery for Health Project focuses on mechanisms that will provide recovery of the greatest percentage of costs for the Ministry of Health curative services from those who can afford to pay. The MOH recognized, however, that in order for hospitals to generate income, the quality of care must be improved so that those clients able to pay for services will be willing to do so. Thus the need for quality assurance strategies to enable public hospitals to function more autonomously, with decentralized management, to attain higher quality and more efficiency.

The May 15 Public Hospital, where the government budget allocation is fixed and limited, is in a period of transition to a cost recovery hospital that can generate and manage its own income. Identifying sources of waste and inefficiencies is crucial to the achievement of this objective.

May 15 Public Hospital is one of the CRHP

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hospitals that started its quality improvement initiative through the development of a Quality Assurance (QA) Program. To improve the quality of patient care and to decrease waste, the hospital Quality Assurance (QA) Committee conducted a series of studies to assess physicians' diagnostic practices. This paper presents the results of a study conducted to assess physicians' practices in the use of laboratory tests.

MATERIALS AND METHODS

Medical records of all patients admitted to the hospital during the month of August 1993 (n = 275) were selected as the sampling frame. These records were reviewed to select only patients for whom laboratory tests had been requested (n = 66). Figure 1 presents the operational framework used in this study.

The next step was the medical record review conducted by the Chief of the Pediatrics Department. The reviewer examined the following variables:

1. Appropriateness of laboratory tests, defined as the degree to which laboratory tests requested were relevant to patient's symptoms and provisional diagnosis.
2. Unused laboratory tests, defined as tests conducted but for which treatment decisions were made without the use of test results. Treatment decisions were defined as any kind of medical intervention provided by a physician ranging from the prescription of medication, performance of surgical or non-surgical procedures, to referring or discharging patients. A test was considered unused if one of two criteria was met: the treatment provided to patients was clinically inconsistent with the laboratory test results; or the test results were made available to the physician *after* the patient was treated.
3. Laboratory tests requested but not performed, defined as those tests requested but for which results were not available in the medical record at the time of the review in October 1993 (all laboratory results at May 15 Hospital, including late results, are added to the medical record in order to complete the patient's file upon discharge).

May 15 Hospital has no explicit clinical guide-

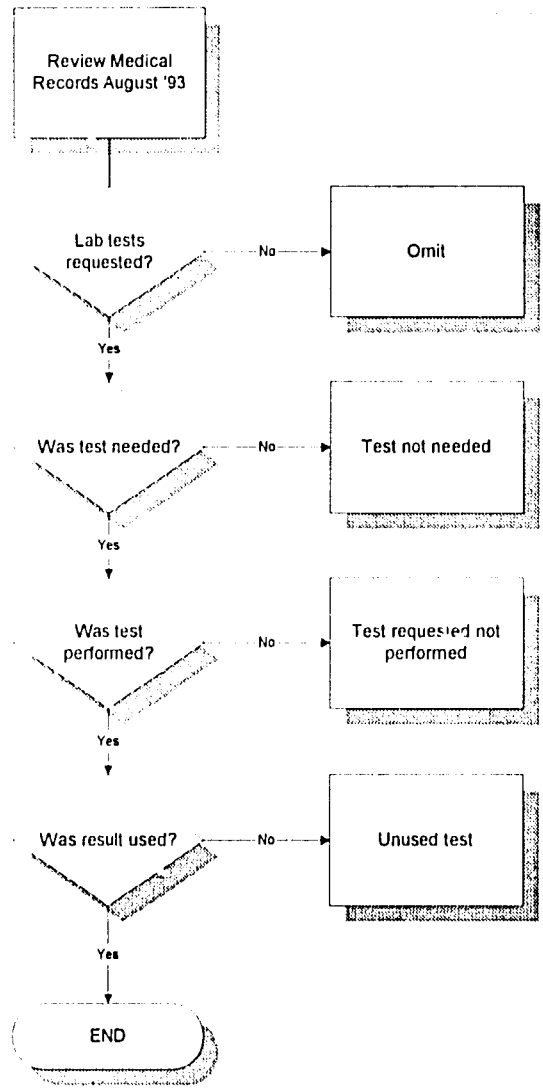

FIGURE 1. Operational framework of the study.

lines to assess the appropriateness of patient care. Instead, implicit guidelines based on the physician's knowledge and experience are used as the accepted standards of care.

There are several limitations to implicit guidelines. Physicians have different opinions of case management which may contribute to variations in clinical practice. Similarly, physicians may have different levels of stringency in case management. Since guidelines for case management are not predetermined it is difficult to assess performance among physicians for the improvement of clinical practice.

Thus, explicit standards can lead to improved case management by introducing specific guide-

TABLE 1. Financial loss due to inappropriate and unused tests

Type of test	Total number of inappropriate and unused tests	Cost/test (L.E.)*	Total loss/month (L.E.)
Urine	15	1.40	21.00
Stool	8	1.80	14.40
Blood Urea	22	4.50	99.00
S. Creatinine	10	5.20	52.00
SGOT	7	7.75	54.25
SGPT	2	7.30	14.60
S. Bilirubin	7	11.00	77.00
Alkaline Phosphate	7	8.60	60.20
CBC	8	8.50	68.00
Hb	27	2.70	72.90
Bleeding Time	6	1.60	9.60
Clotting Time	6	1.60	9.60
ESR	2	2.50	5.00
Fasting Blood Sugar	6	2.25	13.50
Post-Prandial Blood Sugar	3	2.25	6.75
Total	136		577.80

Estimated loss per year = 6933.60 (L.E.).
*L.E. = Egyptian Pounds; 3.77 L.E. = U.S. $1.00.

lines for case management which will allow for more careful and effective review of performance among physicians. They enhance the utility of patient records by enabling physicians and other care givers to record what they have done, and why. This allows for more careful and effective review of performance, which provides opportunities for analysis to determine improvements which could be made.

Since there were no explicit guidelines, the reviewer developed a graduated system for reviewing patient records for indications of the use of appropriate laboratory tests. The reviewer compared the provisional diagnosis, treatment, and final diagnosis to determine whether there was clinical consistency between them. In the reviewer's areas of expertise (pediatrics and obstetrics/gynecology), she used her own clinical knowledge to determine appropriateness of tests. Because of the lack of explicit guidelines, the investigator conducted meetings with a panel of physicians to assess the clinical appropriateness of laboratory tests in cases in their areas of expertise. These panels included the physician handling the case.

Three orthopedic, five urology, and four internal medicine cases were reviewed in this manner with the panel of physicians and the physician in charge of the case to clarify questions related to patient management. In cases where disagreements continued to exist among the reviewer, the panel, and the physician, a literature review was conducted to ascertain clinical standards and resolve the ambiguities.

Finally, cost analysis was conducted by the Chief Hospital Accountant for all cases with tests judged as inappropriate or in which results were not used. Direct and indirect costs for each test were calculated, and the total estimated loss for the month of August was determined. An estimate of the loss per year for all tests was then calculated (see Table 1).

RESULTS

Sixty-six patients admitted to the hospital in the month of August 1993, had at least one laboratory test ordered; there were a total of 264 tests ordered for these 66 patients. A review of the medical records showed that at least one inappropriate laboratory test was requested for 34 of these 66 patients (52%). Of the total of 264 laboratory tests ordered, 83 tests (31.4%) were inappropriate.

Figure 2 presents the number of requested laboratory tests judged as inappropriate, unused, and/or unperformed for each type of test. Blood Urea was the most inappropriately

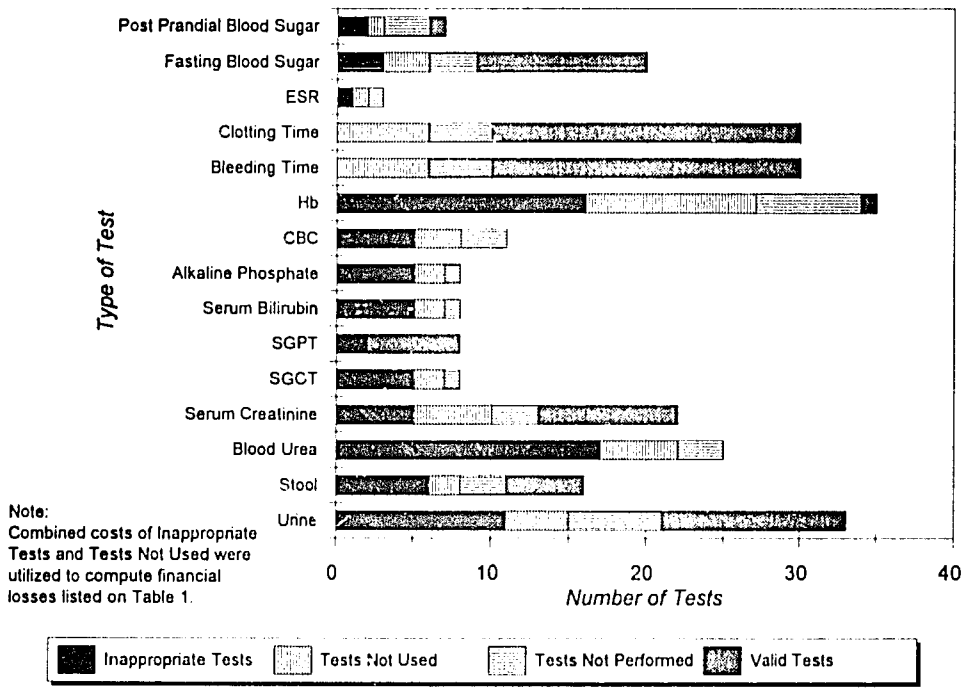

FIGURE 2. Distribution of laboratory tests.

used test, since 68% of test requests were judged as clinically unnecessary. For SGOT, Alkaline Phosphate, and Serum Bilirubin tests, 62.5% of tests requested were unnecessary. All Bleeding Time and Clotting Time tests ordered were considered to be medically needed because all patients for whom the tests were ordered were scheduled for surgery.

Analysis of unused laboratory tests indicated that 56 of 264 requested tests (20.1%) were performed but were not used in treatment decisions (Fig. 2). These tests were found in 13 of the 66 patient records reviewed (19.7%). Further analysis indicated that for 80% of these tests, the treatment provided was not clinically consistent with the test results. For example, a CBC test was requested for suspected appendicitis. The results of the test indicated a Normal Leucocytic Count. In spite of the test result, an appendectomy was performed. For the remaining 20% of tests, results were provided after the physician had treated the patient. This was determined by comparing the date of the test result with the date of the treatment in the medical record. For example, in 13% of surgery cases, surgery was performed prior to the availability of Bleeding Time and Clotting Time test results.

Further analysis of the records showed that 43 of 264 tests requested were not performed (16.3%). These tests were ordered for 12 of the 66 patients whose records were reviewed (18.1%). Figure 2 indicates the distribution of these unperformed tests by type of test requested. Post Prandial tests had the highest percentage of unperformed tests (42.8%). On the other hand, all SGPT tests were performed. While all Bleeding Time and Clotting Time tests were identified by surgeons as clinically necessary, results indicated that 13.3% of Bleeding Time and Clotting Time tests requested were not performed.

Several reasons may have contributed to inappropriate tests, unused results, and/or unperformed tests. Patients left the hospital without physician consent ($n = 4$); patients left the hospital with physician's consent because they did not want to complete treatment ($n = 5$); and patients died ($n = 2$). Other possible reasons included lack of interdepartmental coordination (for example, physicians from different departments treating the same case may request tests independently) and incomplete medical records (for example, a specialist re-requests medical tests because of incomplete patient records).

Laboratory tests were not done (n = 43) because of lack of supplies, equipment failure, laboratory response time, and poor communication between the laboratory and doctors (such as physicians requesting tests which are unavailable/unperformed at the May 15 Hospital). Another possible reason for unused tests is the lack of confidence among physicians in hospital laboratory results.

The number of inappropriate and unused tests for each type of laboratory test was determined and summed (Table 1). A total of 136 tests were found to be either clinically unneeded or performed but not used in clinical treatment. The cost of each inappropriate test was then calculated. The total loss incurred due to these tests during the month of August 1993, was 577.8 Egyptian pounds (L.E.; as of November 1994, 3.37 L.E. = U.S. $1.00). An estimate of the financial loss during a one-year period was calculated by multiplying the loss during the month of August by 12 months and was found to be 6933.6 L.E. This loss accounts for 22.6% of the total budget deficit of the hospital laboratory.

DISCUSSION

The results of this study provided concrete evidence that QA approaches and techniques can be used in developing countries to identify quality-related problems. This is a necessary step for performance improvement and can lead to practical outcomes. It is important to note, however, that the primary function of this study was to provide quantitative measures based on sound data to the QA Committee and managers of May 15 Hospital to assist them in their decisions about how to improve the quality of care. The study was not designed to provide sample sizes large enough to permit generalization.

In the first stages of development of the QA Program at May 15 Hospital it was evident that quantitative data were needed to identify weak areas of performance and to prioritize areas of improvement. The use of quality-of-care analysis to understand clinical practices related to laboratory testing was the first attempt to gather such data—and proved useful. It provided the QA Committee and physicians with documented evidence of variation in clinical practice among physicians; such variation had been doubted by physicians prior to the study. The performance of surgery without the results of Bleeding Time and Clotting Time tests, in spite of surgeons' agreement on their need, provides a good example of such variations.

This study demonstrated that some requested tests were clinically unnecessary, while other essential tests were not performed. It also demonstrated to the QA Committee and the hospital administration that there is significant waste in the use of laboratory tests since many performed tests were either unnecessary or were not used in treatment decisions. This finding is especially important for May 15 Public Hospital, where efficiency is crucial for achieving cost recovery objectives.

In addition, patient quality of life and care issues must be taken into account. Many laboratory tests are painful, time-consuming, and costly. Thus, inflicting inappropriate or unused laboratory tests on patients can lower their opinions regarding the hospital, providing disincentives to being willing to pay for hospital services.

As a result of this study, dialogue was initiated between the QA Committee and physicians. The QA Committee communicated the results of the study to the heads of clinical departments, who agreed on the importance of the findings and suggested that the information be disseminated to all physicians and residents to create awareness among them about the problem. Meetings with various physician groups followed, resulting in fruitful discussions about possible causes of variation and strategies for improvement. Physicians agreed that the development of standardized guidelines would improve clinical practices and reduce waste. Furthermore, discussions with physicians highlighted possible barriers to appropriate performance, including problems with the accuracy of laboratory results and the laboratory response times.

A number of follow-up measures were planned based on these discussions. The QA Committee formed process improvement teams to develop clinical guidelines for selected procedures. Clinical guidelines for laboratory tests have already been developed for the Departments of Obstetrics and Gynecology and Pediatrics. Preparation of additional clinical guide-

lines is planned for the Department of Surgery in the near future. Similarly, the QA Committee initiated an interdepartmental process improvement team—consisting of a physician, a nurse, and a laboratory technician—to analyze laboratory processes. The aim of this team is to review key laboratory functions, identify inefficiencies, and provide solutions that will improve processes related to requesting and providing laboratory results in a timely manner.