An inpatient reference test formulary reduces cost.

Abstract

Context. As most inpatient revenue is dependent on Diagnostic Related Group (DRG) payment, reduction of cost is necessary to protect margins.

Objective. This study examines the impact on inpatient reference test order spend when an efficient formulary including reference test identification, relative cost and turnaround time information is embedded within an electronic order entry system.

Design. An inpatient reference laboratory formulary at a 400+ bed community hospital was created by deletion of reference tests ordered less than 4 times per year. The list of remaining tests ordered at least 4 times per year was reviewed with additional commonly misordered tests also being removed from formulary. The remaining 176 tests were then identified as reference tests with relative cost and turnaround time information embedded into each test name listed in the inpatient physician order entry system.

Results. In the 12 months following implementation average monthly inpatient reference test cost declined by 35%. During the study period monthly inpatient admissions decreased by 5.1% but case mix index increased by 3.5%.

Conclusions. The results indicate that a streamlined inpatient reference formulary with reference identification, approximate cost and turnaround time data in an electronic order entry system decreases overall cost.

Introduction

Over the past few decades there has been enormous growth in healthcare expenditure in the United States. Healthcare spending is projected to grow at an average rate of 5.8% per year and by 2024 will comprise 20.1% of gross domestic product[1]. Due to the overwhelming costs attributable to healthcare delivery, payers ranging from Medicare and Medicaid to private health insurance are rapidly moving to pay for performance reimbursement strategies such as Medicare Shared Savings Plan, Medicare Access & CHIP Reauthorization Act (MACRA), and other value based payment models. Given these challenges it is essential for healthcare systems to reduce unnecessary expenditures and maximize quality and value. Within this context effective laboratory utilization is critical as laboratory testing is the single highest-volume medical activity with an estimated 13 billion tests performed in the United States each year[2]. In addition, approximately 70% of downstream medical decisions are based on laboratory results[3,4]. For this reason there is a great deal of interest in developing techniques and strategies ensuring appropriate laboratory utilization.

Several articles demonstrate examples of successful laboratory utilization strategies including creation of multidisciplinary formulary committees[5] and implementation of electronic laboratory utilization management systems[6]. The move toward creation of laboratory formularies is logical given exponential growth in diagnostic test development. By one estimate approximately 8-10 new genetic tests enter the healthcare market daily[7]. With the expanding list of available tests, laboratory formularies provide guidance in appropriate test selection ensuring quality and value.

While creating a laboratory formulary via a multidisciplinary utilization committee and integrating utilization management into an electronic order entry system serves as a strong basis for laboratory utilization efforts, little has been published on the impact when information such as identification of reference tests (versus testing performed in house), approximate cost, and estimated turn-around time (TAT) are provided to clinicians within a provider order entry (POE) system. This paper examines the financial impact of a laboratory formulary created at regional tertiary hospital with 400-500 beds. The test formulary was embedded as a test menu - including identification of reference tests, approximate cost and turn-around time estimates - into the physician order entry system. The focus of this paper is to examine the impact on test ordering patterns when identification of reference tests, approximate cost and TAT is embedded into the test names within a formulary in an inpatient POE system.

Material and Methods

Clinical Setting

The hospital in this study is a non-profit hospital on the east coast of the United States with between 400-500 beds and is a level 1 trauma center serving multiple surrounding counties. In addition, this hospital serves as a teaching hospital affiliated with a nearby university. During the one-year timeframe of this study the hospital had approximately 24,600 inpatient discharges, approximately 265,000 outpatient visits and the laboratory performed approximately 1,430,000 billable tests (combined in house and reference tests).

Laboratory Utilization Activities

Prior to the period of this study the Medical Executive Committee of the study facility established a multidisciplinary Laboratory Utilization Committee chaired by a Pathologist with standing members including department chairs of internal medicine and various subspecialties (oncology, infectious diseases, pediatrics, and gastroenterology). Key activities included consolidation of reference testing from multiple reference labs to a primary reference laboratory and activities to reduce redundant in-house tests. Within the first-year significant cost savings were attributed to lab utilization efforts – primarily through consolidation of reference testing to a single primary reference lab. With these successes the committee next attempted the creation of an inpatient reference test formulary. As a starting point for a draft formulary the volume of all reference testing over the preceding 12-month period was reviewed and reference tests with fewer than 4 tests ordered in the preceding calendar year were excluded from the menu as were select problematic tests ordered more than 4 times per year (folate RBC, MTHFR, and Factor V Leiden). Upon completion the revised test menu in the

order entry system decreased from 847 reference tests to 176 tests. Of note, while 671 tests had been eliminated, clinicians would still be able to order "non-formulary" tests by free texting a special lab request to the laboratory with a brief explanation justifying the request.
During the process of creating the formulary, members of the multidisciplinary committee voiced concern over the inability of clinicians to readily determine which tests represented reference tests versus in-house tests, lack of knowledge regarding cost and absence of turn-around time information. By adding turn-around time data it was proposed that test ordering decisions might be impacted by whether results would be available during the course of a patient's hospital admission. The utilization committee therefore elected to embed reference test identification, relative cost, and approximate turn-around time directly into the test name within the order entry system for all reference tests on the formulary. For example "Homocysteine" became "Homocysteine (REF,$$,3d)" wherein "REF" identified the test as a reference test, each "$" sign represented $50 cost increments based on institutional costing tool data, and "3d" represented an approximate 3 day turnaround time. Much discussion centered on the appropriate format of cost data within the test menu. Initial consideration was given to providing exact reference lab cost or patient charge but maintaining accurate pricing presented challenges given fluctuations in test cost over time. Also, secondary to wide variation in payer reimbursement (Medicare, vs private insurance vs self-pay) determining out of pocket expense for patients was not feasible. Instead, by using "$" signs in $50 increments based on data from the institutional costing tool, a practical sense of relative cost scale was imparted rather than contending with possible pitfalls associated with providing the precise reimbursement or cost.

In summary, the formulary consisting of 176 reference tests (instead of 847) with embedded reference test identification, turnaround time, became the list of orderable reference tests in the inpatient order entry system.

Results

Reference test invoices from the primary reference laboratory were reviewed for the 12-month period prior to the revised formulary incorporation within the order entry system as were invoices from the 12-month period following implementation. Specifically, invoices were reviewed by hospital financial analysts to identify inpatient test cost, specifically excluding outpatient cost (not impacted by the changes made within the inpatient order entry system). As demonstrated in Table 1, during the 12-month period following the implementation of the lab formulary with reference test identification, relative cost, and turn-around time on all 176 reference tests, average inpatient reference costs per month decreased by 35% as compared to the average monthly cost calculated from the 12 months prior to implementation. This represents an average monthly savings of $11,026 with a projected yearly cost saving of $132,309.

Table 1. – Impact on Average Monthly inpatient test cost.

	12-month Average spend pre-Formulary	12-month Average spend post-Formulary	Percent decrease
Inpatient Reference spend	$13,054	$20,028	35%

Discussion

While implementation of the inpatient reference test formulary reduced the average monthly inpatient reference spend by 35%, during the study timeframe average monthly inpatient admissions decreased by 5.1% while case mix index (CMI) increased from 1.42 to 1.47 (3.5% increase). The precise impact of the small decline in admissions on inpatient reference test ordering is uncertain in the face of slightly increasing CMI, the net result is unlikely to fully account for the overall 35% reduction in average monthly inpatient reference spend. During the study timeframe no other educational activities were employed to address misordered reference tests and the number of active medical staff at the study hospital remained relatively static during the time period of the study. Therefore, the cost reduction does not appear related to a decrease in medical staff members or possible turnover of high-volume ordering physicians.

In summary, the 35% decrease in monthly average reference lab cost appears to be the result of the formulary based upon removing tests ordered less than 4 times per year and embedding identification of reference test, relative, cost, and TAT in the order entry system.
No formal process was employed to assess medical staff response to implementation of the formulary but inquiries at various medical staff functions and committees were unanimously positive. Members of the medical staff voiced greater satisfaction due to streamlining of previously lengthy menus presenting numerous similar and generally unneeded tests. Staff comments also centered on appreciation for the identification of reference tests as most had little to no awareness of tests performed in house versus reference testing. Several providers voiced specific examples where test selection for specific patients was guided by comparing TAT to identify optimal diagnostic strategy.

Conclusion

The results demonstrate the benefit of an efficient inpatient reference test formulary including reference test identification, relative cost, and TAT data. Developing a laboratory formulary with an emphasis on removing infrequently ordered tests, deleting commonly misordered tests, and embedding reference test identification, cost, and TAT, decreases inpatient reference test spend. With more efficient test ordering the downstream impact on medical decisions, while difficult to measure directly, likely generates exponential savings beyond that achieved for the laboratory budget alone. As healthcare systems face the challenge of transitioning to value-based payment models, optimal laboratory utilization strategies are critical to delivering high quality while containing the growing cost attributable to healthcare in the United States.

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