



Invited critical review

A clinician's perspective on laboratory utilization management



D. Dante Yeh*

Clinical Instructor, Harvard Medical School, Massachusetts General Hospital, 165 Cambridge St. #810, Boston, MA 02114, United States

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ABSTRACT

Background: Excessive laboratory utilization is a common problem in the hospital setting. Physicians control up to 80% of healthcare costs and wield great influence.

Methods: This review article describes reasons for overutilization of labs and recommends interventional strategies to change clinician ordering behavior.

Results: Powerful factors exist that encourage overutilization, including fear of missing a diagnosis, provider inexperience, peer pressure, financial rewards, practice inertia, and fear of legal punishment. Features of automated order entry, such as bundling and “daily until discontinued” options contribute to wasteful ordering behavior.

Conclusion: The most successful and long-lasting interventions are multi-faceted and have included a combination of education, feedback and audit, and administrative changes. The support of senior physicians and top administration is critical to the success of any initiative and ideally, interventions should be original from a multi-disciplinary committee of respected individuals.

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1. Introduction

Despite the fact that healthcare spending in the United States far-exceeds all other developed nations [1] (Fig. 1), outcomes in the U.S. are no better than, and are, in fact, worse than some countries with far fewer resources. Excessive spending without markedly improved outcomes implies that there is an opportunity to improve the quality

of care as measured by cost efficiency. Though the problem of excessive healthcare expenditures is an important issue to address for society at large, it is difficult to relate to as a single individual physician, and a common response is one of defeatist complacency. The average physician acknowledges the problem of excessive spending but feels powerless to effect any meaningful change. Yet through individual, day-to-day decisions, physicians control up to 80% of healthcare costs and “in effect, it is the physician who is the true purchasing agent of health care services [2].” Clinicians wield far more power over healthcare costs than is commonly believed.

* Tel.: +1 617 724 8604.
 E-mail address: dych2@partners.org.

Exhibit 1. International Comparison of Spending on Health, 1980–2009

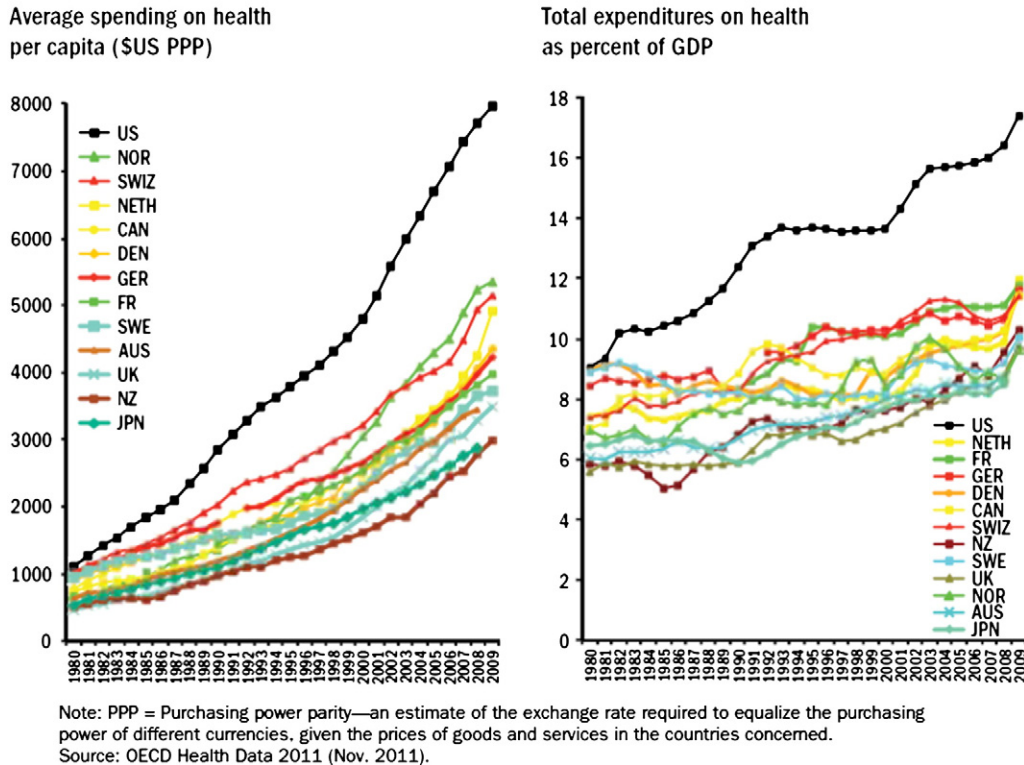


Fig. 1. International comparison of spending on health, 1980–2009.

Diagnostic testing can account for up to a quarter of total expenditures [3–5]. Although much attention is focused on expensive, cutting-edge technology, or “big ticket” items, the mundane and ubiquitous “little-ticket” items can comprise an even greater portion of hospital charges [2]. Studies have documented great variability (up to a 17-fold difference) in lab-ordering behavior amongst physicians treating the same diagnosis [6,7], implying that clinical indications for some tests are not clear, and that this discretionary behavior may be amenable to improvement. There is geographic variability between nations and even between regions within the United States [8]. Some authors have concluded that 30% to 50% of tests are unnecessary [9] and that there is no obvious correlation between more testing and better outcomes. Some have even reported a negative association between the amount of testing and the outcomes of care, suggesting that less competent physicians tend to order more labs [10]. Excessive laboratory investigations have real adverse effects beyond mere cost and it is incumbent upon the bedside clinician to be aware of the consequences of thoughtless ordering practices. A comprehensive review of all aspects of laboratory investigations is beyond the scope of this paper and therefore the focus will be on “little-ticket” items ordered for hospitalized patients.

2. Reasons for ordering a lab

The most common reasons to order a lab are: to aid in the diagnosis of an unknown disease (ex.: ordering an amylase level in a patient with abdominal pain), to follow up on an abnormal value (ex.: repeating the total bilirubin in a patient with cholelithiasis), to monitor therapy (ex.: checking the INR in a patient initiating warfarin), or to screen for occult but clinically significant diseases (ex.: checking a hemoglobin level to screen for post-operative bleeding). These are all valid reasons for testing, yet, the diagnostic yield varies substantially.

Before every lab order, a mental calculation should take place to consider the pretest probability, the positive predictive value (PPV), the negative predictive value (NPV), and the overall accuracy of the test, as these may vary depending on the patient and setting. For example, a d-dimer value is very useful in the outpatient setting or emergency department (ED) to exclude the diagnosis of deep vein thrombosis (DVT) [11], but in the intensive care unit (ICU), the PPV is so low as to render the test practically useless [12]. Likewise, the “fever work-up”, which commonly includes blood cultures, urine culture, and chest x-ray (CXR), has an exceedingly low yield in the first few days after a major operation or major trauma.

In the early part of a patient’s hospital course when the diagnosis may be obscure, the “shotgun” or “carpet bomb” approach to diagnostic workups is very common. The differential diagnosis for vague complaints such as “fatigue” or “dizziness” is broad, and it is important to avoid the pitfalls of premature closure and anchoring bias. When investigations are carried out in parallel rather than in sequence, the added cost of the additional investigations may be outweighed by the benefit of more rapid diagnosis. This may translate into overall cost savings realized through decreased ED dwell time and shortened hospital length of stay.

Repeating abnormal values, such as an elevated troponin in acute myocardial infarction (MI) or a creatinine in acute kidney injury (AKI) is valuable when there is a correlation between the degree of derangement and prognosis, or when the treatment may change based on the trend. However, in other cases, repeating an abnormal value just for the sake of following the trend, such as amylase/lipase in established acute pancreatitis, is wasteful and unnecessary when the degree of elevation and slope of change do not affect treatment and often do not correlate with clinical status.

Ezzie et al. have classified the indications for testing into five broad categories: screening, homeostatic, case-finding, diagnostic, and therapeutic [5] (Table 1). Within the context of this classification, the clinician should consider the utility of the test in terms of its potential to influence

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