Reducing Duplicate Testing

A Comparison of Two Clinical Decision Support Tools

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Key Words: Test utilization; Clinical decision support; Meaningful use

ABSTRACT

Objectives: Unnecessary duplicate laboratory testing is common and costly. Systems-based means to avert unnecessary testing should be investigated and employed.

Methods: We compared the effectiveness and cost savings associated with two clinical decision support tools to stop duplicate testing. The Hard Stop required telephone contact with the laboratory and justification to have the duplicate test performed, whereas the Smart Alert allowed the provider to bypass the alert at the point of order entry without justification.

Results: The Hard Stop alert was significantly more effective than the Smart Alert (92.3% vs 42.6%, respectively; \( P < .0001 \)). The cost savings realized per alert activation was $16.08/alert for the Hard Stop alert vs $3.52/alert for the Smart Alert.

Conclusions: Structural and process changes that require laboratory contact and justification for duplicate testing are more effective than interventions that allow providers to bypass alerts without justification at point of computerized physician order entry.

Laboratory tests are a critical component of the assessment of patients for the diagnosis, monitoring, and treatment of most diseases. Unfortunately, the indiscriminant use and overuse of laboratory tests contribute a significant and unnecessary burden on the health care system.\(^1\)\(^-\)\(^4\) Unnecessary duplicate laboratory testing occurs for a variety of reasons, but in our experience, it is often because the ordering physician is unaware that the test has already been ordered. To address this type of overuse, we devised and implemented a clinical decision support tool (CDST) (i.e., the Hard Stop alert) that would block tests that were deemed to be unnecessary more than once per day in clinical practice.\(^5\) We implemented processes within our system whereby the ordering physician could obtain the blocked test if he or she decided it was clinically necessary. To obtain the blocked test, the provider was instructed to contact our client service section of the laboratory for instructions regarding how to obtain the desired test. The approval code used in the bypass process is changed daily to avert the establishment of a simple method to bypass this process. We have recently reported the effectiveness and cost savings associated with this type of intervention.\(^5\)

Although the Hard Stop CDST has proven highly effective in our primary hospital (i.e., the main campus of Cleveland Clinic), for a variety of reasons, it was not thought to be the best CDST for the hospitals in our regional practice (see Discussion). We wanted, however, to share the successes of such an intervention with our colleagues in the regional practices, so we devised an alternate CDST for use in these settings (i.e., the Smart Alert). The Smart Alert had largely the same alert configuration as the Hard Stop alert. Both alerts notified the ordering provider that the test he
or she was ordering was a duplicate and that the particular test was not usually necessary more than once per day. The result from the previously ordered test was embedded in the alert screen, if it was available. This latter feature has been a welcome addition in both these alerts. The configuration of the Smart Alert, however, allowed the ordering provider to bypass the alert at the computer terminal (ie, the point of order entry; he or she did not need to call client services for an override code).

**Materials and Methods**

We compared the Hard Stop and the Smart Alert CDSTs for their effectiveness in preventing duplicate test orders and the associated laboratory cost savings for these interventions. The study period was for 12 months, from February 1, 2013, through January 31, 2014. The Hard Stop CDST was used on our main campus, whereas the Smart Alert was studied in seven of the regional hospitals in the Cleveland Clinic Health System (CCHS).

The number of duplicate orders averted by the Hard Stop CDST was determined by the number of initial times the alert fired for each intervention minus the number of times providers obtained the duplicate test through client services. For the Smart Alerts, the number of duplicate orders averted (ie, the numerator) was compared with the number of initial activations of this CDST for the same test (ie, the denominator); this was used to determine the percentage of tests averted and, thereby, the effectiveness of the CDST.

Figure 1. Duplicate activations of either of the CDSTs by the same provider were counted only once, since it has been our experience (data not shown) that these represent individuals likely not reading the alert and do not represent additional duplicate test avoidance. The two-sample t test between percent calculation was used to determine significance of the difference between the effectiveness of the two CDSTs (StatPac, version 4.0; StatPac, Bloomington, MN).

The laboratory savings was determined using the costs for materials and labor for each test, which is maintained by our laboratory. This was multiplied by the number of times each test was averted. The average cost savings associated with the activation of each alert was determined by dividing the total cost savings achieved from each alert by the number of initial times the alert was activated.

**Results**

The Hard Stop CDST was activated for 5,858 duplicate test orders during this 12-month study period. The clinician contacted the laboratory client services section to request an override of the blockade only 453 times; all override requests were granted. The Hard Stop CDST was 92.3% effective in averting duplicate orders. The calculated cost savings for this intervention was $94,225.

The Smart Alert CDST was activated for 12,990 duplicate tests. The providers chose to electronically bypass the blockage at their computer terminal 7,321 times (ie, 5,669 tests were blocked). The Smart Alert CDST effectiveness was, therefore, only 43.6% (Figure 2). The cost savings realized for the Smart Alert CDST was $45,681.

The differences between the percent effectiveness (92.3% vs 43.6%) for the CDSTs was statistically significant.
The annual cost of health care in the United States continues to increase every year. This, in part, is secondary to advances in technology that benefit patients and prolong life. Unfortunately, a substantial portion of the cost is secondary to waste in the American health care system. More than $6 billion per year of the health care costs in the United States is incurred due to testing or procedures that are not medically necessary. In addition to increased health care costs, these unnecessary procedures and tests may cause patient harm. Despite excessive spending in our health care system, quality and outcomes are often not comparable to other countries that employ different processes and spend less, as reported in numerous publications from the Institute of Medicine (http://www.iom.edu/Reports.aspx).

The cost of laboratory testing as a proportion of the overall cost of health care continues to grow, in part due to the increased use of expensive molecular tests; however, the overuse of low-cost, high-volume tests also contributes to rising health care costs. Improving the utilization of low-cost, high-volume testing is often challenging, since it may not be deemed worth the effort to try to improve the utilization of any one of these tests alone. There are many approaches to improving test utilization. We have employed a system-based approach to substantially decrease the overuse of more than 1,200 tests on our test menu. These tests have been identified by our multidisciplinary test utilization committee as not being needed more than once per day in usual practice. The intervention at our main campus uses the hospital information system (Epic, Verona, WI) and a custom-programed CDST that stops the duplicate order at the point of order entry.

The implementation and meaningful use of the electronic medical record are an ongoing initiative of the Obama administration, which is linked to financial penalties for noncompliance. One of the numerous benefits to an electronic medical record is computerized physician order entry, which decreases the likelihood of a transcription error by an intermediary, such as a unit clerk. The CDST, as described above, offers an opportunity to unidirectionally interact with the ordering physician at the instant of order entry. However, these tools, commonly referred to as “popups,” can be irritating to the recipient and, if used nonjudiciously, will often be ignored.

This study examined the utility and cost savings of two different types of CDSTs, both designed to decrease unnecessary duplicate testing. The Hard Stop CDST has been used at the main campus of the Cleveland Clinic for several years. We routinely track the number of tests averted and calculate the cost avoidance associated with not performing the unnecessary, duplicate laboratory tests. This program has been very successful with the members of our group practice and has become part of our culture.

We sought to share the successes of this program with the regional hospitals in the CCHS. Unfortunately, a number of factors were prohibitive to the use of the Hard Stop CDST in this setting. The three main reasons for not using the Hard Stop intervention tool in our regional hospital setting were as follows: foremost, it was known that although the computerized physician/provider order entry system was implemented in all regional facilities, it was not always used by all physicians. There was a concern that some providers would give written orders to a nurse or a unit clerk, and we did not want these individuals to essentially be “stuck in the middle,” having orders they were trying to place being stopped by a CDST and the physician not nearby to address the issue. Next, not all the physicians who practice at our regional hospitals are Cleveland Clinic physicians, so accepting of such an intervention may be an issue. Finally, at the time of this intervention, our client services area was not equipped to place orders for regional physicians, who had their orders blocked by a CDST. Therefore, the Smart Alert CDST was derived, which included the benefit of incorporating the previous test result into the alert but allowed for the bypassing of the alert (ie, the ordering of a duplicate test) at the computer terminal, rather than requiring the provider to call the laboratory. This gave us the opportunity to study two different CDSTs for the same types of duplicate tests.

The effectiveness of the Hard Stop CDST for determining the ordering of duplicate tests remained high, as...
This CDST deterred 5,405 duplicate tests in a 12-month period with 92.3% effectiveness (Figure 2). The providers called the laboratory only 453 times (7.7%) throughout the year to request an override of the Hard Stop. Although this process to obtain the duplicate test is not onerous, it is not as simple as clicking a box on the computer screen. It requires a telephone call, the reason for the request, and reordering the test with a code that is changed daily.

The Smart Alert CDST was much less effective (Figure 2). Of the 12,990 times it was activated, the provider chose to bypass the notification 7,321 times. The reason for the ordering of the duplicate test is not recorded with this intervention, since a call to the laboratory is not required. This intervention has been far less effective, likely because of the simplicity of just checking a box on the computer screen to get the test and get past the alert. We have evidence from previous investigations (data not shown) that “popup fatigue” does occur and that the CDSTs are often not read and simply “clicked through.” If the Hard Stop CDST, which had an intervention effectiveness of 92.3%, had been used by the regional hospitals, then 11,990 of the 12,990 duplicate tests would have been stopped, rather than 5,669. Similarly and by proportional comparison, the cost savings would have been $96,615 rather than $45,681.

In conclusion, the CDST that allowed the provider the option to bypass the blocking of a duplicate test result at the order entry screen was significantly inferior to the Hard Stop CDST, which required contacting the laboratory to obtain the duplicate test. These findings support the enhanced role of the laboratory in effective test utilization.

References