

WhitePaper

Case Studies in Clinical Laboratory Test Stewardship:

The Financial and Clinical Impact of Clinical Decision Support
in Hospital Laboratories

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Introduction

With current events highlighting the critical role of the hospital laboratory as the primary source of diagnostic information and with legislation such as PAMA (Protecting Access to Medicare Act) reducing reimbursement, hospital laboratories must determine the best direction in defining the role of the laboratory and its value to the hospital or health system.

Unfortunately, the laboratory's critical role in determining diagnoses and treatments also makes it vulnerable to abuse. Studies estimate that from 10% to 25%¹ of all hospital-performed laboratory tests in the inpatient setting are not indicated. Additionally, an increasingly complex, ever-expanding set of diagnostic test options necessitates heightened awareness in order to choose the right laboratory test at the right time.

Responding to these problems, laboratory stewardship establishes a true collaboration and partnership between the organization's clinical leadership and the laboratory to the benefit of both.

This white paper is the third in a three-part series developed in collaboration with Mayo Clinic Laboratories and Change Healthcare. The series aims to help clinical laboratories understand the risks and requirements, as well as the clinical and financial benefits, of implementing a clinical decision support (CDS) system.

This paper provides frontline perspective and commentary from Mayo Clinic Laboratories experts and physicians on the application and value of decision support in the laboratory. It also includes early-adopter proof points from hospital laboratories that have successfully implemented third-party decision support to achieve their stewardship goals, including EHR interventions and ongoing monitoring of utilization.

Chapter 1:

Taking Control of Test Utilization to Curb Clinical Laboratory Waste

The blueprint and efficacy of laboratory test stewardship is well documented as a mechanism to curb overutilization and improve value. Within a stewardship program, laboratory expertise expands to inform the medical practice, while the practice utilizes the laboratory more effectively for the purpose of improving patient care—both clinically and with regards to cost. Most importantly, unlike other efforts that simply focus on making the laboratory as fast and lean as possible, stewardship has the potential to truly align the laboratory with the hospital’s strategic priorities.

Defining specific stewardship goals and measuring progress toward them, however, requires data. A robust analytics tool integrated with the electronic health record (EHR) measures provider behavior against evidence-based guidelines and gives organizations the means to take control of test utilization.

There is general agreement that widespread low-value laboratory testing generates substantial waste and is a valid target for stewardship. Casting a wide net to search for inappropriate utilization that is not supported by evidence allows organizations to base hospital laboratory stewardship objectives on specific opportunities that offer the greatest financial savings and clinical improvement.

According to Don Flott, Senior Director of Value-Based Medicine for Mayo Clinic Laboratories, “It’s the data surveillance and the analytics, connected to the guidelines, that provide the most value to the organization, which leads to effective stewardship. You need both. Analytics without clinical standards to support them only tells you what’s common and where you fit among your peers. Analytics backed by standards tells you what you ought to be doing.”

Guidelines created by the Mayo Clinic are being used in a growing number of health organizations around the country, added Flott. They assist by identifying the specific laboratory tests that are most commonly misused or overused by their providers. This is important because value-based initiatives include reducing low-value care, and unnecessary variation is widely recognized as a systemic weakness.

To address these problems, as providers place laboratory orders in the EHR, the orders are evaluated for appropriateness in real time using an integrated surveillance tool, which feeds a robust set of analytics. The information is used to pinpoint locations, departments, and individual providers who most frequently place orders outside of the evidence-based clinical standards from the Mayo Clinic.

A classic example involves a 1,200-bed hospital in the Midwest, where a surveillance tool identified that B-type natriuretic peptide (BNP) was frequently over-ordered on their inpatient wards. This laboratory test pattern created the hospital's fourth largest source of inpatient laboratory waste by spend.

During the first month after turning on the alert, the facility saw inappropriate BNP orders reduced by 33%.

The information influenced clinical leadership to initiate a point-of-order alert to warn and inform providers that the test had been recently performed for the patient, and then presented guidance from the Mayo Clinic about appropriate use of the test. During the first month after turning on the alert, the facility saw inappropriate BNP orders reduced by 33%. The decline continued and resulted in a monthly average 42% drop in inappropriate orders compared to the previous baseline.²

“While providers’ ordering patterns sometimes differ for good reasons, literature has repeatedly highlighted the fact that providers are often making choices that are not supported by evidence. Our early results have found this to be true as well,” explained Dr. Sean McCormick, Physician Informaticist at Change Healthcare, adding that each organization presents unique opportunities for correction and savings.

*Prioritizing
stewardship is
an opportunity
to align the
laboratory with
the hospital's
strategic
priorities.*

Across an initial base of nine organizations that implemented a core set of Mayo Clinic–authored appropriateness guidelines for the laboratory, data showed that almost half of all high-opportunity tests (tests where there was the greatest potential for savings) were unique to only one of the organizations.³

“When we look at lab data for the organizations we’re working with, we find that a high percentage of opportunity is unpredictable,” added Dr. McCormick. “Although a few guidelines show up on almost every group’s list of those most commonly failed, the majority of an organization’s opportunity is from guidelines that only one or two groups are commonly failing.”

Searching for utilization that is not supported by evidence provides the objective evidence necessary to prioritize, motivate, and measure the impact of laboratory stewardship efforts, and align them with the hospital’s strategic priorities.

Chapter 2:

Reducing Variation in Laboratory Testing and Care Delivery

It is important for leaders of the laboratory stewardship effort to take a constructive and clinically grounded approach to their role in reducing unnecessary variation in testing and care delivery in their organization. Medical practitioners operate in a fast-paced, rapidly changing, data-rich environment. An increasingly complex, ever-expanding set of laboratory test options necessitates a structured, data-driven, scalable approach to laboratory stewardship.

“The vast majority of physicians are well-meaning, hard-working, informed professionals,” explained Dr. McCormick, “but it is difficult to keep up with the constantly evolving medical literature. New tests, procedures, and therapies are regularly appearing, and the strength of evidence for them varies considerably. Meanwhile, existing and long-trusted tests and treatments become outdated as new information emerges. Clinically-grounded guidelines, applied in an organization that is responsive to change, can help address this dilemma to the benefit of patients and providers.”

“Organizations must realize that even while using advanced analytics to aid in their efforts, lab stewardship is not an IT solution, it’s a medical solution.”

—Dr. Curt Hanson
Mayo Clinic Laboratories

Early results show that organizations that have implemented the guidelines-informed laboratory stewardship analytics tool typically find measurable, specific issues to target within the first 60 days of kicking off in surveillance mode. The most successful organizations have generally seen significant change around targeted utilization issues in the first 30 days after executing interventions to address them.⁴

Out of the 17 organizations observed that have implemented the laboratory stewardship tool, most change management interventions are educational or center around order set redesign. Only 5-10% of interventions across the customer base are interruptive EHR alerts.⁵

Although their methods for changing providers' laboratory test ordering patterns vary, all of these organizations have an important element in common: taking action to address the issues they uncover. Implementing a laboratory stewardship program using evidence-based standards and being driven by data is an organization-wide effort.

“Organizations must realize that even while using advanced analytics to aid in their efforts, lab stewardship is not an IT solution, it’s a medical solution,” explained Dr. Curt Hanson, Executive Physician for Healthcare Innovation for Mayo Clinic Laboratories and also Professor of Laboratory Medicine and Pathology. “Lab stewardship deserves the attention of clinical leaders at healthcare organizations. And, when applied with an intentional, systematic approach, it rewards that attention with clinical and financial benefits.”

LABORATORY STEWARDSHIP BENCHMARKS



60 DAYS

AFTER STARTING DATA COLLECTION, THE AVERAGE TIME TO FIND A SPECIFIC ISSUE TO TARGET AND EXECUTE A PLAN

30 DAYS

NUMBER OF DAYS TO SEE A MEASURABLE IMPROVEMENT IN THE TARGETED ISSUE

90 %

SUCCESSFUL INTERVENTIONS WERE NON-INTERRUPTIVE TO CLINICIAN WORKFLOWS

(Source: CareSelect User Analytics, National Decision Support Company, a Change Healthcare Company, February 2020)

Chapter 3:

Data from Lab Test Stewardship Using Third-Party Clinical Decision Support in the Hospital Laboratory

CASE STUDIES

These case studies also applied an analytics and intervention tool integrated with the EHR.

ANALYTICS PROVIDED

A meaningful way to identify waste across the organization. Clear, vetted, evidence-based clinical guidelines help the organization define which orders are appropriate and which are not. Understanding test appropriateness in the context of the patient being seen, and the provider placing the order, is essential to identify areas of waste.

Access to actionable data that is specific to the organization. Experience shows that each organization faces different utilization challenges. Organizations need to understand the current state of lab utilization in order to prioritize, target, and execute interventions that meet their unique challenges with both over- and underutilization.

A scalable method to support stewardship goals, including EHR interventions and ongoing monitoring of utilization. Just as each organization has its own challenges, each organization also needs to determine how to address the challenges and measure the impact.

Early adopter case study results document the experiences of organizations that have implemented a maintained and scalable lab stewardship program founded on evidence-based clinical guidelines.

Consider vitamin D testing, for example. Over a 16-year span, testing vitamin D levels evolved from being relatively rare to mainstream. In 2008, American insurers spent around \$1 million on vitamin D tests. Eight years later they spent \$129 million, and by 2016, Medicare patients alone accounted for \$365 million worth of testing.⁶

In a fee-for-service world, the flood of vitamin D testing means more money for the laboratory—the more tests performed, the more that is paid. In a value-based world, what matters more is that the test is appropriate to the clinical scenario, and not all vitamin D tests are equal.

The Choosing Wisely recommendation on vitamin D testing is clear: “When trying to assess vitamin D stores or diagnose vitamin D deficiency (or toxicity), 25-hydroxyvitamin D is the correct test.” Also clear is this statement of the problem: “Many practitioners become confused when ordering a vitamin D test. Because 1,25-dihydroxyvitamin D is the active form of vitamin D, many practitioners think that measuring 1,25-dihydroxyvitamin D is an accurate means to estimate vitamin D stores and test for vitamin D deficiency, which is incorrect.”⁷

Tests that are improperly ordered due to provider confusion are ideal for intervention by evidence-based CDS.

Tests that are improperly ordered due to provider confusion are perfect candidates for intervention by evidence-based CDS.

“First, this is because they are obviously inappropriate. Second, running in surveillance mode lets you find where this problem may exist within your organization,” said Mayo’s Flott. “But it’s the ability to look at the data at the facility level, then at the department level, then at the provider level that is the greatest benefit, since you can address it as broadly or as specifically as you need to in order to fix the problem. That lets you avoid blanket solutions that might not apply to those who are doing the right thing and that may seem invasive.”

Being able to evaluate the laboratory’s data and target actions toward the root of the problem improves the chance of success.

1,25-dihydroxyvitamin D orders coming out of rheumatology or the kidney clinic may be appropriate, while those coming out of family practice may not.

For instance, at one 600-bed hospital on the East Coast that has implemented CareSelect Lab as part of their stewardship program, data revealed that a single provider in one family medicine clinic was responsible for 10% of the inappropriate 1,25-dihydroxyvitamin D testing.⁸ By simply addressing this one provider’s ordering pattern, the hospital can potentially save money month after month. Consider that the top three failing providers were responsible for a full quarter of inappropriate orders amongst them, and the savings are much greater.⁹

As Flott noted: “Embracing stewardship is an incremental process. You don’t just find one or two big things to address and then you’re done. It’s an iterative, ongoing process that shows more value the more you progress.”

Similarly, a 1,594-bed hospital in the Midwest, which had implemented a lab stewardship program, addressed the problem of commonly confused tests as the first step of their stewardship program.

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A 1,594-bed hospital in the Midwest addressed the problem of commonly confused tests as the first step of their stewardship program.

GOAL

TARGET INAPPROPRIATE USE OF 1,25-DIHYDROXYVITAMIN D TESTS

INTERVENTION

ALERT PROVIDERS AT POINT-OF-ORDER AND SUGGEST ALTERNATE TEST

RESULTS

36%

REDUCTION IN INAPPROPRIATE 1,25-DIHYDROXYVITAMIN D SEND-OUTS

OPPORTUNITY

\$7,318

PER MONTH
(\$87K ANNUALIZED)
ON COMMONLY
CONFUSED TESTS

CASE STUDY
AT A GLANCE

(Source: CareSelect User Analytics, National Decision Support Company, a Change Healthcare Company, March 2020)

The first month of data surveillance uncovered that 76% of all orders checked against the system’s Commonly Confused guidelines failed the check.

Initially, the hospital focused on 1,25-dihydroxyvitamin D. An alert was set up to warn providers that they were about to order the wrong vitamin D test and proposed an alternative. The result was a 36% drop in inappropriate 1,25-dihydroxyvitamin D tests across the organization.

“However,” pointed out Dr. McCormick, “this is more impactful than just the drop rate. Since 1,25-dihydroxyvitamin D is a send-out for this organization, a drop in ordering volume is also a drop in the number of send-outs. When you consider that 86% of 1,25-dihydroxyvitamin D were ordered inappropriately, this adds up to be significant.”

In another case study, Carle Health is a vertically integrated health system with a large physician group, three hospitals with more than 450 beds in the system, and a health plan. The Carle Health laboratory supports both inpatient and outpatient practices.

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Carle Health is a vertically integrated health system with a large physician group, three hospitals with more than 450 beds in the system, and a health plan.

GOAL

REDUCE COMMONLY CONFUSED CRP AND VITAMIN D TESTS. REPLACE LOW-VALUE TESTS WITH HIGHER-VALUE TESTS

INTERVENTION

ADDRESS CRP AND VITAMIN D TESTS

RESULTS

77%

REDUCTION IN INAPPROPRIATE HS-CRP TESTS

39%

REDUCTION IN INAPPROPRIATE 1,25 DIHYDROXYVITAMIN D TESTS

30%

REDUCTION IN INAPPROPRIATE ESRs, UP TO 70% IN SOME DEPARTMENTS

(Source: CareSelect User Analytics, National Decision Support Company, a Change Healthcare Company, March 2020)

Carle Health’s journey to laboratory stewardship started in 2014 when the system began to gather and share data on blood utilization and best practices, and then it adjusted the EHR to implement those practices across the organization. Within three years, the system had built out transfusion best practices and reduced overall blood use by 35-40% per 100 patient bed days. In 2017, Carle addressed overutilization of inpatient *Clostridium difficile* PCR testing using the EHR, achieving a 50% reduction in testing.

“It was a good start,” said R. Bruce Wellman, MD, a pathologist and the Medical Director for Transfusion, Coagulation and Apheresis services at Carle Health. “But they needed more. They understood that data, joined to vetted, evidence-based guidelines, would be key to building a successful laboratory stewardship program.

“To effectively change provider behavior, you have to understand what is actually taking place at your institution. You also have to identify which best practices, supported by literature, that you want to promote,” continued Dr. Wellman. While Carle had rolled out a few utilization guidelines successfully in the system’s EHR, there was difficulty with the available databases to get rapid access to the real-time data on their testing activities, which was vital to planning and implementing a broad stewardship program.

Carle Health focused efforts on low-value testing and used access to evidence-based guidelines and data. The guidelines and data helped decide which undesirable ordering behaviors to target by specialty and individual practices, to see the variation of ordering practices within specialties.

Using CDS in surveillance mode, Carle analyzed data to raise concern about C-reactive Protein (CRP) orders. They noticed a high failure rate against the Commonly Confused guideline for C-reactive Protein versus High-Sensitivity (hs) CRP. Also seen were frequent orders for Erythrocyte Sedimentation Rate (ESR) in scenarios where—according to Mayo guidelines—CRP was a more appropriate test.

In this case, the system acted on the CRP issues. Also addressed was another commonly confused test: 1,25 dihydroxyvitamin D. Since it seemed likely that providers were simply picking the wrong name from a list of search results based on the test's name, Carle made changes to the test orderable names in the search within the system's EHR. This system change made it easier for providers to find the test they needed. It also made it harder for them to confuse tests with similar names.

The ESR versus CRP issue was addressed with an email memo that showed the guideline against which Carle's current ordering practices had been evaluated and provided insight about each test's cost versus actual clinical value—including details on how much Carle had billed insurance for each test, which in some cases could be denied by the insurer or could get passed on to the patient.

Within one week of making the changes, Carle saw results on all targets, and ordering had dropped dramatically for two of the three tests. In addition, inappropriately ordered 1,25 dihydroxyvitamin D tests were down by 39%, while the hs-CRP orders fell by 77%. An overall drop of inappropriate ESR orders across the board was also noted, with reductions as much as 70% in some specialties.

Since it seemed likely that providers were simply picking the wrong name from a list of search results based on the test's name, changes were made to the test orderable names.

“That Carle achieved these results with no interruption to their providers' ordering workflows is a prime example of how such a tool promotes good stewardship,” said Dr. McCormick. “Evidence-based guidelines let you show providers the best test to order; data analytics let you show them what they are currently ordering. Providers want to do the best thing for their patients. This data from Carle shows that if you give providers the right information, in the right way, they will respond favorably, and you will get good results.”

Continually improving the value of care for patients is vital, said Dr. Wellman. “Lab stewardship isn't just a cost issue for the lab, hospital, or integrated system,” he said. “I believe it is important to focus on the effect that unnecessary care has on patients, both economically and clinically.”

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Riverside Medical Center, a level II trauma center with both inpatient and outpatient care, is a 341-bed, short-term acute care hospital in Illinois. Surveillance began in May 2019 to target “low-hanging fruit.”

GOAL

USE 4 GUIDELINES TO TARGET LOW-VALUE, HIGH-FREQUENCY “DAILY LABS” IN INPATIENT SETTING

INTERVENTION

ADHERENCE TO FREQUENCY RULES

RESULTS

22 % REDUCTION IN TARGETED TESTS

**SAVINGS \$5,500 MONTHLY
(\$66K ANNUALIZED)**

20 % REDUCTION IN THE NUMBER OF LABS PER DISCHARGE

OPPORTUNITY

\$25K

**POTENTIAL WASTE IDENTIFIED PER MONTH
(\$300K ANNUALIZED)**

ABLE TO FREE UP RESOURCES AND BE MORE FLEXIBLE WITHIN THE LAB

(Source: CareSelect User Analytics, National Decision Support Company, a Change Healthcare Company, March 2020)

Riverside Medical Center is a 341-bed, short-term acute care hospital in Kankakee, IL. Established in 1964, Riverside is a level II trauma center serving Kankakee and the surrounding counties with both inpatient and outpatient care.

In 2006, Riverside’s laboratory became a Lean laboratory, revamping the lab’s physical layout, team interactions, and specimen flow both inside and outside the lab. This brought gains in efficiency and turnaround times, among others.¹⁰ The success of Riverside’s Lean initiative reinforced the need for laboratory leadership to stay receptive to new approaches and tools that increase the lab’s value to patient care and the organization as a whole.

In 2016, Riverside implemented Epic Beaker and saw a resulting decrease in specimen processing times.

“It became clear, however,” said Riverside Laboratory Director Stephanie Mitchell, “we can take on volume without adding resources, but we knew we had opportunities around test utilization. We liked the analytics of the CDS that let us look at our data and find opportunities for improvement based on that data, and the wide range of vetted guidelines that come ready-made, that would be maintained for us.”

Default daily lab ordering was removed from the EHR. Point-of-order feedback was configured to show when a provider places an order for a specific daily test that has already been resulted that day.

Riverside previously attempted to build their own laboratory-based CDS into the Epic EHR system using the BPA feature, but as Mitchell pointed out, “The EHR on its own can only go so far. Building our own CDS was incredibly cumbersome.”

The Riverside team built three guidelines before choosing the ready-made tool which offers dozens of frequency-related guidelines as part of the starter set. In May 2019, the CDS tool began working in surveillance mode and monitoring orders against a starter set of about 200 guidelines.

Using the CDS tool, Riverside found almost \$25,000 per month in potential savings on lab orders. Realizing that by adhering to just four frequency rules, it became apparent that the system could potentially realize a 27% reduction in the monthly waste. “Once we were able to see some numbers, we were able to validate our assumptions about utilization issues and zero in on what to target first,” explained Mitchell.

Riverside identified “low-hanging fruit”—daily labs such as CMPs and CBCs. They removed default daily lab ordering from their EHR and configured point-of-order feedback to show when a provider places an order for a specific daily test that has already been resulted that day.

First-month results of the Riverside CDS initiative included a 22% overall reduction in their targeted tests, and the number of labs per discharge dropped by 20%. Downstream effects, both inside and outside the laboratory, came as a surprise.

“Our workflow in the lab has changed,” Mitchell said. “Because the volume of inpatient 5 a.m. draws are down, we’ve been able to rethink how we use our staff in the mornings. We can be more flexible with work assignments and scheduling. We are more open to opportunity.”

Outside the lab, the success of Riverside’s first stewardship initiative has reinforced enthusiasm for the project across the organization.

“It was important to show our leadership specific examples of where the potential was and physician acceptance,” Mitchell concluded.

Conclusion

Decision support is vital to driving a strategic stewardship initiative, which is important today as two directions have emerged to fundamentally change the operating landscape of hospital laboratories in the U.S.

The first option views the lab as a commoditized service and often results in the selling of the hospital lab to a national, at-scale provider such as Quest or LabCorp. In this scenario, economies of scale create a competitive advantage, as do relationships with suppliers of reagents and equipment.

The second option involves the creation of a value-based laboratory that leverages its unique position as a primary source of diagnostic information to influence care delivery. In this scenario, the lab drives lowering the cost of care through improved utilization. This is achieved by using data, maximizing relationships with clinical leadership, and aligning the lab with the hospital's strategic priorities.

Thought leaders who have chosen the second option have identified overutilization and inappropriate laboratory testing as areas to target for process improvement and cost savings, thus reinventing their role in the organization. A laboratory test stewardship program requires organizational attention, physician champions, meaningful data, and dedicated IT resources to enact changes.

Clinical decision support tools, such as CareSelect Lab, which merge evidence-based guidelines with strong analytics, are coming to their aid. CDS effectively supports lab stewardship initiatives that are producing noticeable improvements as outlined in this white paper, part three of the series produced in collaboration with Mayo Clinic Laboratories.

Beyond the immediate benefits of reducing unnecessary laboratory waste, and perhaps most importantly, as a result of point-of-order CDS, patients themselves are more likely to get the correct diagnostic test and less likely to receive an unnecessary test.

Those choosing to implement a strategic stewardship initiative can expect to target specific issues within the first 60 days of data collection and see measurable improvement in a targeted issue within one month of intervention.

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About CareSelect Lab, A Change Healthcare Solution

CareSelect™ Lab, developed by a Change Healthcare Company, National Decision Support Company, is a decision support tool that integrates with leading electronic health record (EHR) solutions and aggregates clinical knowledge around a select menu of routine conditions, then translates that knowledge into maintained medical policies and best-practice recommendations.

It is unique in that its underlying clinical guidance includes more than 1,800 best practice rules authored, curated, and maintained by Mayo Clinic physicians and scientists. The guidelines are grounded in evidence-based research, industry best practices, and vetted Mayo Clinic policies and procedures. They collectively constitute one of the most comprehensive and detailed set of evidence-based tools for clinical laboratory testing available today.

Learn more at: www.NationalDecisionSupport.com

About National Decision Support Company

National Decision Support Company (NDSC), a Change Healthcare company, developed the CareSelect™ clinical decision support (CDS) platform to deliver medical guidelines at the point of order through integration with leading electronic health record (EHR) systems. CareSelect has been widely adopted by healthcare providers across the U.S. These guidelines help organizations comply with regulatory requirements, benchmark and reduce variations in care with the goal of improving care, reducing costs, and streamlining the payer and provider data exchange.

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DARK Daily is a concise e-news/management briefing on timely topics in clinical laboratory and anatomic pathology group management. It's a solution to the dilemma facing anyone in the laboratory profession.

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