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The Triple Attribution Leadership Model

Re-engineering reactive confirmation based on symptomology into a proactive prediction platform of diagnostics based on longitudinal biomarkers

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Abstract

Laboratory medicine generates data that informs most clinical decisions, yet the profession is often evaluated primarily on test production rather than diagnostic impact. The authors present the Triple Attribution Leadership Model, aligning three complementary leadership pillars. This article describes a Leadership Model that includes the Pathologist as Clinical Care Leader, the Doctorate in Clinical Laboratory Science (DCLS) as Operational Leader, and the Advanced Medical Laboratory Scientist (MLS) as Analytics Leader to reposition the clinical laboratory as healthcare's first responder and a catalyst for population health. Grounded in Clinical Lab 2.0 principles (1) and aligned with system-level value frameworks (2), the model transitions organizations from reactive confirmation based on symptom presentation to proactive prediction using longitudinal biomarkers. We describe the rationale, governance, implementation roadmap, and a Mass General Brigham (MGB) case example, and conclude with policy recommendations that support value-based diagnostic practice (3,4).

Executive Summary

The Triple Attribution Leadership Model provides an integrated governance structure for diagnostic excellence. By formalizing lab-initiated clinical interventions and triggers, converging clinical and operational leadership, and building analytics that track disease rather than tests, organizations can shorten time-to-diagnosis, reduce unwarranted care variation, and demonstrate value in outcome-based payment models.

Background: The Diagnostic Paradox - Essential Yet Marginalized

The laboratory faces several challenges that result in a diagnostic paradox. This paradox, while highlighting the essential role of the clinical **laboratory,** also helps us understand how lab's role is marginalized.

Historical context

The maturation of laboratory medicine has paralleled advances in analytical chemistry, hematology, microbiology, and informatics. Yet strategic discourse has frequently framed the laboratory as a back-of-house service optimized for throughput rather than as a clinical partner responsible for diagnostic yield and patient outcomes. The 2015 National Academies report on diagnostic excellence formalized the need to integrate diagnostic processes with clinical decision-making and systems engineering (5).

Identity crisis: tests versus diagnosis

When the profession is measured by CPT-coded procedures, value is conflated with the number and accuracy of tests performed rather than with the accuracy, timeliness, and clinical utility of diagnoses supported. The result is an identity in which laboratories are reimbursed for analytical steps while their core contribution, diagnostic intelligence, is under-recognized (3,5).

Consequences of test-centric valuation

Procedure-centric incentives amplify care variation: equivalent results may trigger inconsistent actions across sites, clinicians, and populations. The invisibility of diagnostic outcomes in common quality frameworks (e.g., turnaround time over diagnostic impact) leads to underinvestment in consultative, integrative capabilities such as laboratory-driven referrals, protocolized actions, and longitudinal surveillance (3,6).

Diagnostic error ranks among the three leading causes of medical harm, yet its downstream consequences, diagnostic harm, remain underappreciated in quality frameworks. Epner, Gans, and Graber proposed an outcomes-based approach that shifts focus from analytical accuracy alone to the clinical consequences of diagnostic failures, including delayed treatment, inappropriate therapy, and preventable morbidity (7). This reframing supports the Triple Attribution model. By embedding lab-initiated triggers and protocolized interventions, laboratories can intercept diagnostic errors before they propagate into patient harm.

From tracking tests to tracking disease

A disease-tracking paradigm reframes the laboratory as the earliest detector and steward of disease trajectories. By integrating longitudinal biomarkers, risk stratification, and protocolized triggers, laboratories can convert diagnostic signals into reliable clinical actions and measurable outcomes (1,2).

The Clinical Laboratory as First Responder and Population Health Catalyst

First to know, first to act

Validated laboratory results have zero latency: they are available for clinical action immediately upon release. Without embedded pathways, however, high-risk signals await review, introducing delays that can affect morbidity and mortality (5).

Population health catalyst

While reactive diagnostics lead to confirmations of diseases and conditions, the use of longitudinal biomarkers and registries enable proactive identification of deteriorating trajectories (Figure 1) for chronic diseases and other health conditions. Embedding laboratory analytics within care management programs allows for proactive diagnostics leading to earlier intervention, reduction of emergency utilization, and harmonization of actions across sites. Alignment with the Triple Aim clarifies the business case for investment in diagnostic intelligence and surveillance (2).

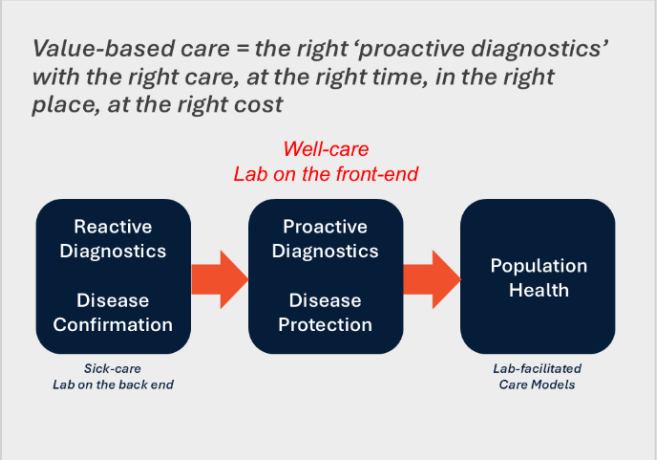


Figure 1*. By focusing on proactive diagnostics and disease prediction, laboratory's role is promoted to support population health and value-based care through the use of laboratory facilitated care models.*

The Optimization Cascade

The optimization cascade (Figure 2) begins with time-to-diagnosis and extends through diagnostic optimization (right test, right time, right interpretation), care optimization (risk-stratified routing and protocolized interventions), and therapeutic optimization (dose, duration, monitoring). These steps culminate in surveillance that feeds back into detection. This continuous loop operationalizes Clinical Lab 2.0 principles at the population level (1,2).

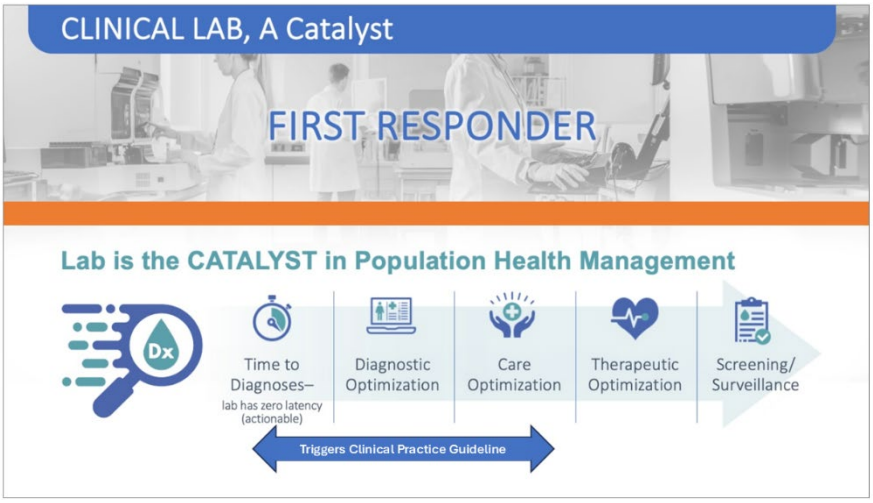


Figure 2*. Optimization Cascade from detection to surveillance [1,2]*

Clinical Lab 2.0 Initiated Care Model

The Clinical Lab 2.0 Initiated Care Model (Figure 3) supports the Clinical Laboratory's role to develop facilitated interventions that can become part of a healthcare organization's care pathways. The model utilizes longitudinal lab data along with laboratory domain knowledge to create meaningful clinical insights. These insights, in turn, can be used to develop multidisciplinary and lab facilitated interventions to support early intervention, proactive screening and population health initiatives. These actions can result in improved clinical and financial outcomes including cost avoidance and improved quality to support population health and value-based care.

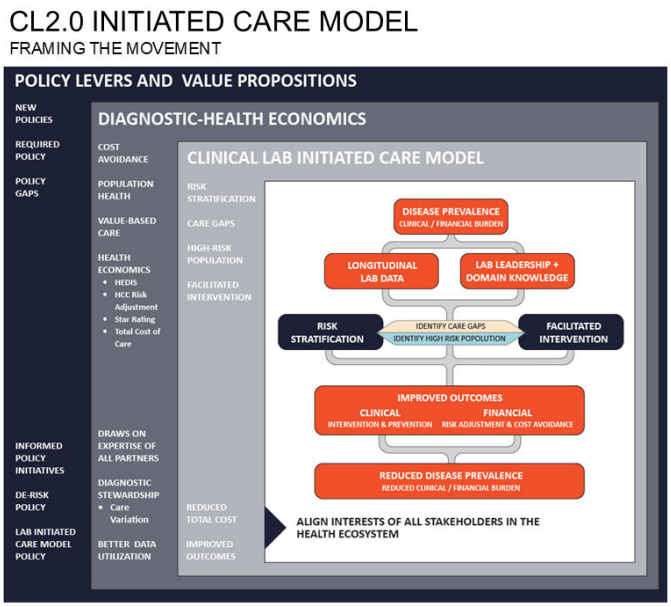


***Figure 3**. The Clinical Lab 2.0 Pathway*

The Triple Attribution Framework

The Triple Attribution Framework provides a mechanism for laboratory's role in population health by moving from reactive confirmation based on symptoms to proactive prediction using longitudinal biomarkers. The Framework codifies pathologist-authorized thresholds and DCLS-implemented workflows to activate consultations and care bundles with near-zero latency (Figure 4). Examples may include automatic anticoagulation consults for discordant coagulation profiles, sepsis bundle activation for positive rapid markers, and expedited cardiology notification for critical troponin elevations.

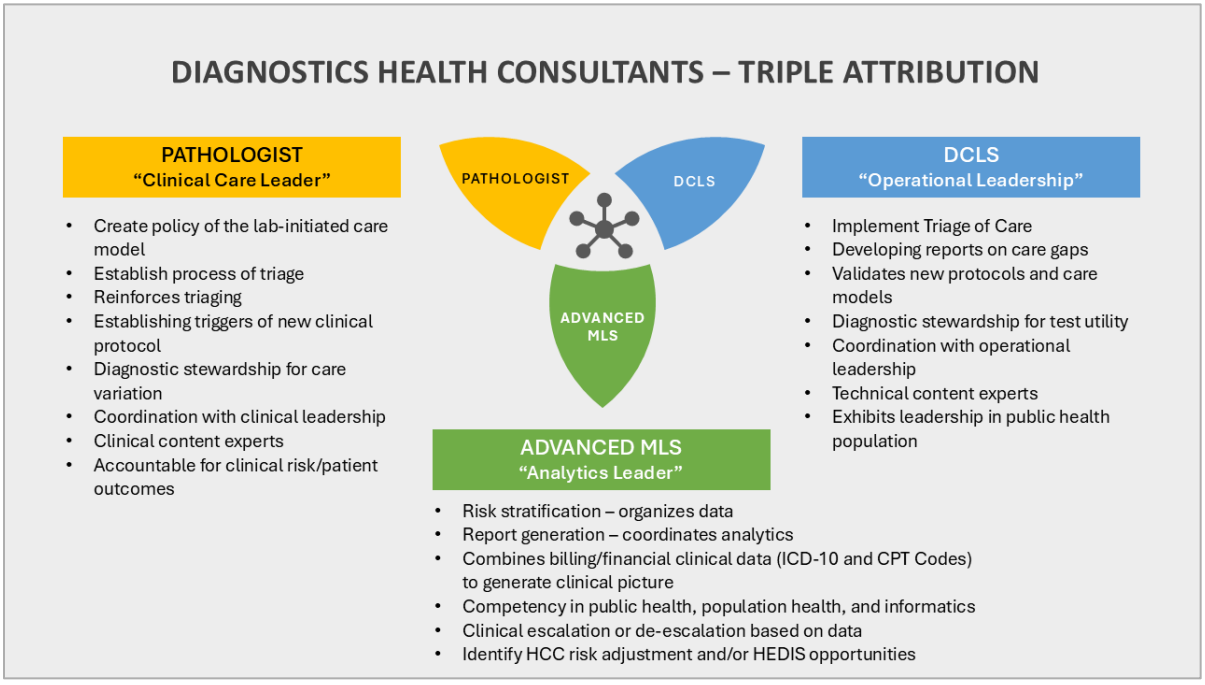


***Figure 4**. Triple Attribution Leadership Model Overview (1)*

The Diagnostic Leadership Council

Rationale and governance

No single role can simultaneously provide medical authority, operational execution, and advanced analytics. The Triple Attribution Leadership Model establishes a Diagnostic Leadership Council composed of the pathologist, DCLS, and Advanced MLS. The Council's role is to define charters for protocol authorization, support implementation, and develop measurement tools and analytics. The Council oversees disease-focused dashboards, trigger thresholds, escalation pathways, and feedback loops to ensure reliability and consistency across the enterprise (1,6).

Interdependencies and convergence

Roles within the Leadership Council are interdependent: pathologists set clinical thresholds and accountability, DCLS leaders convert thresholds into workflows, education, and rounding practices; and Advanced MLS leaders build analytics that integrate clinical, operational, and financial data. Convergence ensures that each signal is interpreted accurately, acted upon promptly, and measured transparently, reducing unwarranted variation and cognitive burden (1,8).

Capabilities by Leadership Pillar

Pathologist (Clinical Care Leader): Provide oversight for protocol authorization, triage frameworks, stewardship to minimize care variation, liaison with clinical leadership, and outcome accountability [1,5].

DCLS (Operational Leader): Support multidisciplinary collaboration, consultative decision support, and education for trainees and clinical care members and MLS staff, leadership for test utilization and participation in stewardship committees. Additionally, this role supports implementation of optimal care pathways through the use of evidence based guidelines, review of reference lab partnerships, new technology review and oversight of upstream data-driven interventions for conditions such as chronic kidney disease (1.5)

Advanced MLS also serve as Analytics Leaders: risk stratification, disease registries, longitudinal dashboards, predictive models, escalation/de-escalation decision support, and value-based measurement aligned with HEDIS and risk-adjustment constructs (1,8).

Case Example: Ryan Mize, Mass General Brigham (MGB)

At MGB, Ryan Mize operationalizes Clinical Lab 2.0 through enterprise initiatives that resolve fragmentation and deliver uniform interpretation. The Special Coagulation Integrated Laboratory Service rationalized menus, courier logistics, staffing, instrumentation, and reflex protocols enable consistent interpretive outcomes across sites. Standardized coagulation reference ranges and unified anticoagulation monitoring eliminated institution-specific differences that previously complicated decision-making, decreasing cognitive load and error risk.

As CLIA Laboratory Director for MGB Home Hospital, Dr. Mize assures point-of-care testing selection, analytical validity, and context-specific interpretation for decentralized acute care. He directs targeted education for physicians, advanced practice providers, paramedics, and medical assistants on performance characteristics and limitations of rapid assays compared with central laboratory testing—an essential component of diagnostic stewardship in nontraditional environments.

Across roles, he serves as a consultative resource for complex coagulation questions, supports enterprise protocols (e.g., heparin therapeutic ranges, pharmacy nomograms), and leads education for trainees and MLS teams to reinforce evidence-based utilization and a shared diagnostic language.

Context and objectives

Mass General Brigham (MGB) operates a geographically distributed academic health system that requires uniform interpretive standards across high-complexity and community sites. The primary objectives of the coagulation enterprise redesign were to (1) reduce unwarranted care variation through standardized menus, reference ranges, and reflex algorithms; (2) centralize expertise while maintaining access and turnaround times across sites; and (3) formalize consultative pathways that translate complex results into timely clinical actions.

Intervention design and implementation

The Special Coagulation Integrated Laboratory Service was engineered as an enterprise resource with system-wide governance. Key design elements included harmonized test menus, tiered courier logistics for time-sensitive specimens, consolidated instrumentation platforms to minimize inter-method variability, and evidence-based reflex protocols for discordant or high-risk results. Pathologist-led interpretive standards and DCLS-driven operational playbooks ensured that result significance and next steps remained consistent regardless of testing location.

Operational model and governance

Governance was formalized through a Diagnostic Leadership Council (pathologist, DCLS, Advanced MLS) with charters for protocol authorization, operationalization, and measurement. Routine case reviews and variance audits were scheduled to identify care variation and close loops with corrective actions. Accreditation-aligned documentation (e.g., CAP checklist traceability, competency records, and protocol change logs) supported reliability and accountability at scale.

Outcome domains and measurement framework

Outcomes were organized into domains enabling holistic assessment: (a) detection timeliness (time from result validation to clinical action); (b) diagnostic reliability (concordance across sites, inter-method agreement); (c) care consistency (trigger adherence and protocol fidelity); (d) therapeutic optimization (dose/monitoring alignment with unified therapeutic ranges); and (e) population surveillance (longitudinal biomarker trajectories, escalation/de-escalation rates). Measurement drew on enterprise analytics and dashboards aligned with Clinical Lab 2.0 and Triple Aim constructs.

Education and workforce development

Structured education programs supported clinicians, trainees, pharmacists, paramedics, medical assistants, and MLS staff. Content integrated assay performance characteristics, interference recognition, and clinical application. DCLS leaders facilitated multidisciplinary rounds and at-the-elbow consults, cultivating a shared diagnostic language and strengthening stewardship behaviors across the care continuum.

Home Hospital laboratory program specifics

For MGB Home Hospital, laboratory services were adapted for decentralized, mobile acute care. The CLIA Laboratory Director role encompassed POCT selection and validation, regulatory compliance, and context-aware interpretation. Protocols differentiated when rapid point-of-care assays sufficed versus when centralized testing was indicated. Standardized documentation, competency assessments, and quality audits ensured analytical integrity despite nontraditional settings.

Risks, mitigations, and compliance

Key risks included inter-site variability, specimen transport constraints, POCT analytical limitations, and interpretive inconsistency. Mitigations comprised consolidated platforms, courier redesign, confirmatory pathways for critical POCT results, and protocolized interpretive triggers. Compliance alignment leveraged accreditation frameworks, internal audits, and change-control governance to ensure sustained reliability.

Lessons learned and replication guidelines

High-impact lessons included the necessity of enterprise governance for interpretive consistency; the value of DCLS operational leadership in translating clinical standards into repeatable workflows; and the importance of Advanced MLS analytics for visibility into disease trajectories and trigger adherence. Replication guidance emphasizes staged rollouts, rigorous validation studies, and transparent communication with clinical stakeholders.

Future directions at MGB

Future expansion areas include tighter integration of predictive models into clinical decision support, enhanced interoperability for cross-site registries, and broader application of enterprise protocols beyond coagulation (e.g., thrombosis risk stratification in oncology, perioperative hemostasis bundles). Alignment with interoperability rules enables scalable analytics and standardized care pathways across settings.

Policy Framework: Gaps and Recommendations

Reimbursement realities

Under PAMA, survey-based pricing compressed reimbursement for many routine tests, impacting sustainability without addressing diagnostic value (3). Proposals such as Saving Access to Laboratory Services Act (SALSA; S. 1000/H.R. 2377) aim to stabilize rates while stakeholders advocate for models that recognize laboratory contributions to outcomes, care coordination, and risk mitigation (4).

Scope of practice and accreditation

State practice acts may limit protocolized laboratory consultation and ordering authority essential for first-responder functions. Accreditation checklists (e.g., CAP All Common, Quality System) increasingly emphasize quality systems, yet measures still privilege turnaround time and analytical precision over demonstrable diagnostic impact. Updating scopes and checklists to recognize lab-initiated protocols, disease-tracking analytics, and outcome attribution would enable the Triple Attribution vision at scale (6).

Data interoperability and measurement

Interoperability rules under the 21st Century Cures Act facilitate data exchange that is foundational for disease registries and surveillance (8). Aligning laboratory dashboards with organizational quality programs (e.g., HEDIS) and risk adjustment frameworks positions the laboratory as a measurable driver of value.

Policy recommendations

(1) Develop value-based diagnostic reimbursement pathways recognizing laboratory-triggered interventions; (2) formalize DCLS and Advanced MLS roles within ACO/PCMH care teams; (3) implement disease-focused quality metrics capturing detection timeliness, action reliability, and outcome improvement; and (4) modernize accreditation standards to include protocolized laboratory consultation and surveillance infrastructure (3,4,6,8).

Implementation Roadmap

Phase 1: Foundation (Months 1–6). Establish a Diagnostic Leadership Council (pathologist, DCLS, Advanced MLS) and conduct readiness assessment; baseline disease-tracking metrics (beyond test volumes); select pilot domains for lab-initiated protocols. (1,2)

Phase 2: Capability Building (Months 7–12). Recruit/develop DCLS and Advanced MLS talent and implement analytics for longitudinal biomarker surveillance; develop actionable triggers in practice guidelines and pilot the optimization cascade. (1,2)

Phase 3: Scaling (Months 13–24). Expand protocols across domains; deploy predictive analytics for proactive risk identification; integrate therapeutic

optimization and feedback loops; measure outcome improvements. (1,2)

Phase 4: Transformation (Months 25–36). Fully integrate the lab as first responder and population health catalyst; publish outcomes and advocate policy reform. (1,2)

Conclusion

Triple Attribution reframes the laboratory as a generator of diagnostic intelligence that reliably triggers care and enables population health management. By aligning medical authority, operational execution, and analytics, organizations can transition from reactive confirmation to proactive prediction, reduce unwarranted variation, and demonstrate outcome-oriented value consistent with modern payment and quality frameworks. Future work should formalize disease-tracking measures, evaluate protocolized laboratory consultation across diverse settings (including home hospital), and advance workforce development pathways for DCLS and Advanced MLS leaders.

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