TRANSFORMING LABS FOR 21ST-CENTURY HEALTHCARE

By Martin Wilkinson, InterSystems
Health systems around the world are transforming to meet the needs of the 21st century. Advanced healthcare information technologies, including electronic medical records (EMR), are being deployed to support connected health, patient-centered care, and preventive medicine while controlling ever-increasing costs.

Despite the fact that 70 percent of clinical decisions rely on pathology results, clinical laboratories are not usually central to healthcare transformation. Laboratories are also transforming, but it is often happening in isolation from the rest of the healthcare ecosystem, and with different objectives that are not necessarily aligned with or supportive of the overarching transformational agenda.

Although classified as providers of diagnostic services, laboratories are often seen as providing a backroom function. The focus of their transformation is generally to increase capacity and lower operational costs while maintaining quality. This is an understandable response to burgeoning demand for tests, the introduction of more-expensive tests, and shortages in critical skills. It also reflects a common misalignment between funding and the operational and strategic demands of laboratory services.

With minimal focus on clinical outcomes or overall healthcare system improvements, however, there is a danger that any laboratory transformation will not meet the needs of a 21st-century healthcare ecosystem. Connected health, patient-centered care, and preventive-medicine initiatives may be impacted as a result, and quality-of-care and cost-containment benefits may not be realized.

There is an increasing shift toward a “spend to save” approach within laboratories that risks forgoing impactful, transformational changes in favor of a short-term, tactical focus. A narrow focus on cutting the cost of laboratory services ignores the potential to create overall improvements and savings in healthcare. End-to-end information sharing, for example — not just of test requests and results, but also of test processes, treatment outcomes, and costs — can promote systemwide efficiencies and patient benefits.

At the moment, many healthcare and laboratory transformation strategies are out of alignment. There are enormous potential benefits — for patients, laboratories, and the overall effectiveness of healthcare systems — in bringing them together.
Visibility and management of test turnaround times

When assessing the performance of healthcare organizations, inpatient performance and average length of stay are key measures. Improving turnaround times, by speeding up tests or reducing the amount of retesting, contributes to a reduction of the length of stay and improves capacity in the healthcare system. It also reduces the cost of care and improves patient satisfaction.

With laboratory transformation, we often see a drive toward consolidation and adoption of a “hub-and-spoke” model rather than a situation in which every lab does every test. Here, specialized tests are processed in a large, centralized laboratory. Smaller laboratories are the “spokes” to this “hub” and run routine tests. Under this model, some labs might only process urgent testing while the hub laboratory performs all routine work.

Adoption of this model of service delivery is increasing in the United Kingdom and Europe, allowing centralized labs to operate at higher scale with more-sophisticated machines that deliver clinical results at a lower cost per test. But this model also results in increased handling, storage, and transport of samples; greater logistical complexity; and the potential for slower overall turnaround times.

Laboratory transformation, involving substantial investments, often takes place without a full understanding of the costs of each test and only a very basic understanding of turnaround times. With current laboratory information systems, costs typically are not captured with sufficient process granularity. Performance is commonly measured based on per-test turnaround time — assessed from the time a request is received to when the result becomes available — and not broken down into its procedural component timings.

If the objective is continuous improvement, then systemic changes should be based on accurate baseline and ongoing measurements. To manage this process effectively, individual laboratories — and the healthcare system as a whole — need visibility into granular and summary information, as well as the tools required to truly understand this information, so that they can make informed decisions on the delivery models within the service.

Investment in modern laboratory management systems would allow labs to immediately identify operational bottlenecks, enabling managers to apply resources more effectively and resolve impediments before they affect service delivery. This improvement in laboratory service delivery could be implemented without — or prior to — migrating to a hub-and-spoke model.

A modern information system is mandatory so that laboratories can benchmark their existing performance before transforming their services. Healthcare systems must also support the optimization of services in a multi-lab environment, by benchmarking the delivery cost and performance on a lab-by-lab basis across a region or country.

Systemic changes should be based on accurate baselines and ongoing measurements to support continuous improvement objectives.
Managing the introduction of genomic testing

Whether the term genetic medicine, personalized medicine, or genomics is used locally, there is no doubt that this emerging field represents one of the most significant transformational changes to the healthcare delivery model over the past 10 to 15 years.

Pathology is not immune to the exciting advances in this field of medicine. While some aspects of testing may be more specialized, adoption of the methodologies in this area, in both diagnostic and clinical management testing, are increasing in today’s laboratories. One example is delivering chemotherapy to a patient based on the best drug combination for a genetically typed tumor. In such cases, genomics may deliver higher treatment success rates for an overall case-based cost.

While these tests are still expensive and require highly trained people with new skills, they are likely to change the face of laboratory services within the next five years. But how do we implement today’s breakthrough technologies in environments that are often already straining under the weight of rapid increases in demand, critical-skill shortages, and long-term underinvestment?

The transition to mainstream genetic testing may not be very successful if laboratories are considered in isolation. Even if genetic centers of excellence are implemented in a consolidated laboratory environment, there is no guarantee that they will meet demand, improve overall outcomes, and offer value for the money.

Understanding the effectiveness of genomics will require ongoing measurement and analysis with end-to-end information sharing — particularly when it comes to treatment outcomes and costs. That is only possible with the implementation and integration of both advanced EMR and laboratory management systems.

In this way, any new testing can be demonstrated to reduce costs in other parts of the health system through better targeted interventions. It can be proved through end-to-end tracking of tests, treatments, and outcomes for a particular medical condition. This sort of systematic, data-driven approach can be taken on a case-by-case basis, enabling such investments to be targeted to the most clinically beneficial testing and optimizing delivery across the laboratory network.

Advanced laboratory systems working in conjunction with EMR systems can also play an important gatekeeping and data-preservation role. This approach can ensure that clinicians do not order duplicate genomic investigations, for example, and that the results of genetic tests — which may be up to 70 gigabytes in size — are effectively stored and shared with clinicians as new personalized medical treatments become available.
Ensuring the effectiveness of point-of-care testing

Another problem with any transformation focused on lower costs per laboratory test is ignoring the effectiveness and cost of tests that occur outside of laboratories. While point-of-care (POC) testing can maintain or even improve turnaround times in a consolidated laboratory network, it also raises a host of questions that are difficult to answer.

- What is the “true” cost of a POC test compared with a laboratory test?
- How efficient is the testing process, and what is the impact on clinician productivity outside the laboratory?
- How accurate are the results, and how can they be compared and calibrated against traditional test results?
- How can POC test results be preserved and shared with clinicians in other locations?

While it is accepted that the implementation of POC testing fulfils a tactical requirement to address laboratory costs and improve the availability of clinical results, the benefits must be weighed carefully. An organization might find that POC testing costs more per test and is potentially of poorer quality, and the results might not be recorded and available to all clinicians. Despite lower capital costs per device, each POC test is more expensive than a laboratory test when compared with the overall service cost from within a laboratory operating at greater than 80 percent capacity for any particular testing profile (e.g., blood gases).

While POC testing devices can reduce demand on laboratory services, they also have the potential to create a noncontiguous patient record of pathology results. And while POC results may be quick, they are not always adequately covered by an active quality-assurance program. Laboratories spend a lot of time making sure their results are accurate and consistent — with specialized staff who have different skills compared with clinicians outside the laboratory.

Without a proper understanding of the impacts, there is a danger of cost and labor shifting from laboratories to other parts of the healthcare system. As with genomics, understanding the effectiveness of POC testing requires ongoing measurement and analysis, with end-to-end information sharing that is only possible with the implementation and integration of both EMR and modern laboratory management systems.

In that way, POC results can come back to a centralized record, and trained staff can provide a clinically appropriate interpretation of any result and calibrate it against other results. Ongoing, granular capture and analysis of per-test costs and process components, both inside and outside the laboratory, can also ensure that costs are controlled and clinician productivity is maintained.
Aligning healthcare and laboratory transformations

Without a strategic focus on clinical outcomes or overall healthcare system improvements, laboratory transformations may succeed in lowering the cost per test while still failing to meet the needs of a 21st-century healthcare ecosystem. Aligning the healthcare system and laboratory transformation strategies has the potential to deliver enormous benefits, including improved test turnaround times, the introduction of genomics earlier and more cost-effectively, and more-effective use of POC testing. The result would be lower costs, improved patient experience, and better treatment outcomes that would boost the overall effectiveness of healthcare delivery.

About Martin Wilkinson

Trained as a Biomedical Scientist in the UK National Health Service and with a degree in Biomedical Sciences (UK), Martin Wilkinson progressed to the level of Chief Medical Laboratory Scientific Officer (MLSO), managing laboratory service delivery in a large teaching hospital in the UK. He has been involved in the delivery of laboratory services in the Middle East, USA, and central Europe.

Throughout his career, Wilkinson has focused on the delivery of measurable benefits through the implementation of IT solutions in healthcare. He has extensive experience in system design and optimization, business process optimization and improvement, benefit realization, technical infrastructure design, project management, and change management.

Martin has held senior executive positions in a number of organizations, including the role of Global CIO for a large multinational healthcare software provider. Prior to joining InterSystems, he was also a Director of Business Transformation involving the effective use of Healthcare IT to transform business operations.

At InterSystems, Wilkinson has global responsibility for defining and executing the company’s product strategy for the laboratory market and contributes significantly to the future direction of InterSystems’ broader healthcare business.