

# Increasing Workforce Productivity in the Diagnostic Laboratory

How Can the Lab Keep Up with Demand?

#### **Executive Summary**

Diagnostic laboratories have a dilemma. On the one hand, they are under increasing pressure to improve their capabilities by:

- Improving diagnostic accuracy
- Processing higher workloads faster and more predictably
- Expanding test menus

On the other hand, lowered reimbursements and significant staffing challenges require laboratories to become more efficient by:

- Reducing costs
- Using fewer staff

#### Investing in the latest laboratory technology

is a starting point, but it is not enough. Labor costs represent the largest portion of clinical laboratory budgets—as much as 60 percent in industrialized countries.<sup>1</sup> To cost-effectively handle the ever-increasing workload, diagnostic laboratories must significantly improve workforce productivity.

Read more to learn about the technology, techniques, and training required to help your institution's laboratory meet the demand.

"Automation was necessary to support a 35 percent increase in production over the past 8 years and to plan for retirements that will reduce our staff by 13 percent over the next 8 years."

Sivert Stenman Lab Manager Laboratoriemedicin Dalarna Falun, Sweden



#### **Increasing Pressures on Diagnostic Laboratories**

Healthcare executives understand the importance of the diagnostic lab to patient care; as many as 70 percent of clinical decisions are based on in vitro diagnostic lab results.<sup>2</sup> Unfortunately, three crucial healthcare trends present serious challenges for diagnostic laboratories:

- Growing test volume
- Shortage of staff
- Decreasing reimbursements

Test volume continues to rise due to a growing and aging population, continuous introduction of new lab tests, and increasing proactivity regarding healthcare and diseasestate management.

At the same time, it is increasingly difficult to maintain the required level of qualified laboratory technologists. The U.S. Bureau of Labor Statistics predicts 18,000 clinical laboratory science (CLS) program vacancies by 2018, but only 5,000 students graduate from accredited CLS programs each year.<sup>3</sup> This means that the educational programs preparing tomorrow's laboratory workforce are delivering less than a third of the trained professionals needed.

In most NHS laboratories in England, workload has increased over the years, yet staffing levels have remained the same or declined, resulting in stress, burnout, and reduced productivity. This puts staff under great pressure and is often associated with high error rates and negative patient outcomes.<sup>4</sup>

Laboratory staffing has a direct relationship to error rates, mortality, and patient outcome.<sup>5</sup>

"Our customers look at all avenues to reduce costs, but eventually they have to face the staffing issue. The traditional approach is to cut headcount, but that increases the risks of reporting errors and is demotivating for an already overworked staff. Labs need to focus on required skills and the demographic time bomb of looming retirements."

Jeff Appleyard Head of Healthcare Consulting Siemens Healthineers





# Measuring Workforce Productivity

# Metrics to gain insight into laboratory staff efficiency include:

- Tests (or billable results) per full-time equivalent (FTE) (including technical, nontechnical, and sample-reception staff)
- Turnaround time (TAT)

# Metrics can measure all tests or by specific categories:

- Type of test
- Routine tests versus STAT

These problems are exacerbated by declining reimbursement levels. For example, the Centers for Medicare and Medicaid Services (CMS) recently rolled out deep cuts as part of the Protecting Access to Medicare Act (PAMA).<sup>6</sup> This is expected to reduce reimbursements by as much as 8 percent overall, and as much as 30 percent for commodity tests, introducing profitability pressures for diagnostic laboratories in the United States. Europe's *Most Economically Advantageous Tender* program is having a similar effect on public healthcare procurement in Europe.

#### Improving Workforce Productivity

Clinical diagnostic testing is an interaction of people and technology performing a complex series of critical tasks in a fast-moving, high-stress environment. Studies suggest that as much as 35 percent of hospital staff time is spent on wasteful work that adds no value to patients.<sup>7</sup> Eliminating this waste has potential to increase operating margin by nearly 9 percent.



The key to addressing the diagnostic lab's challenges is to improve workforce productivity. The question is how?

At a high level, laboratories can improve productivity by focusing on three key areas:

- People and processes
- Hardware
- Digitalization

#### People and processes

With staff representing as much as 60 percent of healthcare budgets,<sup>8</sup> it makes sense to start with people and processes when optimizing workflow.

Managing a busy laboratory doesn't always allow time to step back and take a holistic view of all the processes required to implement change. As the laboratory brings in new technology and rolls out new tests, there is an opportunity to improve lab practices and processes. That's where implementing Lean healthcare practices can significantly improve workflow.

#### Comparison of Staff Movement Before and After Workflow Optimization and Total Lab Automation



Lean is a process of continuous improvement. Even incremental optimization steps can produce measureable results. By carefully observing and analyzing the laboratory's existing workflow, a comprehensive Lean transformation plan can:

- Eliminate wasteful steps and motion
- Align equipment to workflow so staff can move more efficiently
- Optimize processes before automating to standardize and ensure consistency

Clinical laboratories can manage Lean efforts in-house or engage a Six Sigma Lean-certified laboratory consultant to lead the initiative. This can help a lab to:

- Increase speed
- Raise productivity
- Improve efficiency
- Deliver better quality
- Lower costs
- Reduce errors

Staffing issues are often addressed during Lean initiatives. First, as part of the Lean process, the team looks at each step in the lab and details the precise job requirements for that activity. This allows labs to focus staff members on the analyses that are best-suited to their level of skill, i.e., "working at the top of their license." This not only saves money and increases productivity, but also greatly improves employee satisfaction.



# Case Study: North Memorial Health Care (NMHC)

Level I trauma center in Minnesota, U.S.A. supporting 673 beds at two hospitals. 24x7 reference lab with 2.3 million tests annually and 88 full time equivalent laboratory staff.\*

#### Challenge

- Streamline workflow by reducing error-prone manual processes to accommodate expected growth.
- Grow revenue by increasing outreach business.

#### Solution

- Simulation software enabled modeling of different system configurations to meet capacity and performance objectives.
- Laboratory consultants measured the movement of personnel and specimens to identify motion and steps to be eliminated or streamlined.
- Automation and intelligent software provides virtually hands-free testing from receipt of the sample and enables physicians to order additional tests to be performed without any human intervention.
- Automated calibration, maintenance, and quality control to eliminate many time-consuming manual tasks.

#### Outcomes

- 50 manual steps eliminated from pre-analytical, analytical, and post-analytical processes
- 12 percent increase in outreach testing to more than 823,000 samples per year
- ~30 percent increase in overall testing volume with improved TAT and reduced costs

Another people-focused area that diagnostic laboratories can address is ensuring that staff are well-trained for their primary role and cross-trained to fill in where needed. This helps to improve efficacy and makes it easier to handle changing demands within a core lab or across a network with multiple sites.

Classroom training can be expensive and takes people away from the laboratory. E-learning has been proven to be much more flexible to fit into busy schedules and can reduce training time by up to 60 percent. For example, by implementing online and mobile training and assessment, Baptist Health South Florida Network, with 9 hospitals and 50 outpatient facilities across Florida, USA, was able to save 600 hours in training time for 30 chemistry department technologists.\*



Implementing online and mobile training has saved up to 60 percent of the time previously needed for classroom training.

#### Hardware

Testing in a nonautomated laboratory includes many manual, error-prone, arduous, and highly repetitive tasks. Methods can also vary broadly from person to person and laboratory to laboratory. Automation not only dramatically improves key performance indicators (KPIs), but also reduces unwarranted variations, ensuring consistency by standardizing processes.

Often management focuses on automating analytical (testing) processes. However, waste is most often found within the pre- and post-analytical steps. Therefore, it is more effective to consider the entire process when conducting workflow analyses.

The benefits of automating processes in the lab can be profound:

- Decreased turnaround time (TAT)
- Increased availability of highest-certified staff to review critical samples, conduct research, and perform other complex tasks
- Increased productivity, with fewer and lower-cost staff performing more tests
- Improved quality through reduced manual errors and automated quality control (QC)
- Increased flexibility and scalability for future growth
- Reduced biohazard risk through reduced or eliminated sample handling by staff

"We benchmark the lab with a 24-hour snapshot of the workload, what tubes are arriving and what staff is present for analysis and maintenance. Then we determine how things could be improved. At NHS Tayside, a British hospital system, we showed that by changing their processes and implementing automation, the lab now requires fewer staff to support an increased workload. Staff productivity increased 65 percent."

Jeff Appleyard Siemens Healthineers



### Case Study: NHS Tayside

The UK's NHS Tayside serves a population of 480,000 through a network of 22 hospitals and infirmaries and 69 general-practice sites that rely on two laboratories. Its 900-bed Ninewells Hospital in Dundee is one of the United Kingdom's major teaching hospitals.\*

#### Challenge

- Manual disciplines were siloed and scattered throughout the facility.
- Workflows were inefficient, with excessive waste and variation.
- Turnaround time needed improvement.
- Workload needed to be reduced so staff could be redeployed to higher-value activities and patient care.

#### Solution

- Consolidated chemistry, immunoassay, hematology, and hemostasis into one automated laboratory.
- Automated previously manual pre- and post-analytical tasks.
- Deployed data-management software to automate and standardize workflows across systems.

#### Outcomes

- 65 percent increase in staff productivity
- 43 percent increase in peak-load tubes per hour
- 61 percent reduction in add-on test TAT
- 90 percent of tests confirmed with autoverification
- 246 percent increase in input potential
- Greater focus on quality among biomedical and clinical scientists



## Case Study: Klinikum Frankfurt Höchst

1000-bed teaching hospital with 36,000 inpatients and 80,000 outpatients annually. It performs 3.6 million tests annually, consuming 300,000 tubes and 25,000 cartons of reagents and other consumables.\*

#### Challenge

- Centralize and standardize inventory management.
- Free staff from the burden of managing inventory, which diverts them from their diagnostic responsibilities.
- Gain insight into and control of inventory.
- Maintain external quality accreditations (RiliBÄK).

#### Solution

- Cloud-based inventory-management solution spanning multiple laboratories.
- Wireless automatic RFID tracking of reagents and consumables.
- Predictive, automated ordering of supplies.

#### Outcomes

- **77 percent** reduction in time to conduct inventory and place orders
- **35 percent** reduction in time to manage and process inventory
- 89 percent reduction in inventory checks
- Automatic deduction of items from inventory as they are used
- Automated ordering based on real-time inventory levels
- Significant reduction in quantity and cost of inventory on hand

#### Digitalization

Digitalization of clinical laboratories with intelligent software enables better management of testing processes, leading to improved workflow and better clinical outcomes. Examples include:

- **Autoverification:** Automatic confirmation and transmission of patient results without human intervention.
- **Inventory management:** Real-time, automated consumption tracking, checkout, and ordering of reagents and other consumables.
- **Laboratory process management:** Centralized oversight of the performance of diagnostic systems, enabling staff to view and control testing, operations, instruments, automation, and IT across the entire organization from any location.
- Automated QC and calibration: Automatic calibration and quality control of analyzers without human intervention, saving operator time, reducing waste, improving quality, and decreasing turnaround time.
- **Centralized data management:** Standardized testing protocols, workflow management, and result reporting for all diagnostic systems across the network.
- **Remote system support:** Continuous instrument monitoring for proactive and predictive maintenance, as well as remote support to minimize staff intervention and maximize system uptime.
- **Vision systems:** Intelligent, camera- and software-driven characterization and management of individual samples based on STAT priority, sample integrity, fill level, and container alignment, type, cap, and labeling.



#### Summary

The diagnostic laboratory is crucial to the entire healthcare system, in terms of both quality of care and financial performance, but labs must make changes today to prepare for increased testing workloads, worsening staff shortages, and decreased revenue from lower reimbursements and competitive pressure.

By focusing on people, processes, hardware, and digitalization, diagnostic laboratories and the entire health system can benefit greatly from:

- Increased productivity
- Faster test results
- Lower costs
- Fewer errors

Diagnostic laboratories around the world have employed Lean methodologies, staff training, automation, and intelligent software to improve workforce productivity and increase laboratory efficiency to be sure they are prepared for the future.

To learn more about how investing in the clinical lab can improve the patient experience and reduce costs, read The Diagnostic Lab – The Hidden Jewel in the Health System.

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