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5 challenges for lab managers and how to overcome them



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5 challenges successful lab managers need to



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Instrument maintenance and downtime

The essentiality of a successful preventive maintenance plan

In an environment facing increasing pressure to diminish costs while assuring high quality service and safety, companies realize that their competitiveness, performance, and thus future are heavily linked to instrument reliability and the effectiveness and efficiency of maintenance management.² Implementation of a successful preventive maintenance program can help save precious time and money, and is imperative to providing highly dependable results.²⁻⁵

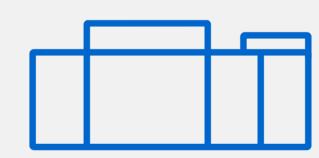
Benefits of preventive maintenance²⁻⁵

Costly major repairs reduced



- Avoid loss of revenue due to interruption of services
- Overcome need to outsource testing, potentially leading to unreliable or non-standardized results
- Reduce staffing inefficiency and disengagement due to hours spent fixing breakdowns

Increased life expectancy of assets



 Avoid costs of having to purchase new instruments prematurely

Accurate and reliable results



- Assist physicians to confidently diagnose and treat patients
- Positively impact your lab's reputation

Instrument maintenance and downtime

How to overcome this challenge

When purchasing new instruments, consider the following:

- High instrument reliability can reduce unexpected downtime, which prevents your lab from producing results until the instrument is back up and running
- Be informed about the manufacturer's maintenance requirements
- Be aware of innovative features that may reduce dedicated hours spent on maintenance, such as:
 - Automated maintenance functions that run without operator intervention
 - Integrated and parallel maintenance options that can be performed during routine operations
 - Step-by-step guidance



Unplanned downtime will inevitably occur:

- ✓ Consider purchasing instrument from a trusted provider with proven system reliability and high uptime
- Some providers may offer automated remote support solutions, or remote access connectivity for problem identification, training, and monitoring

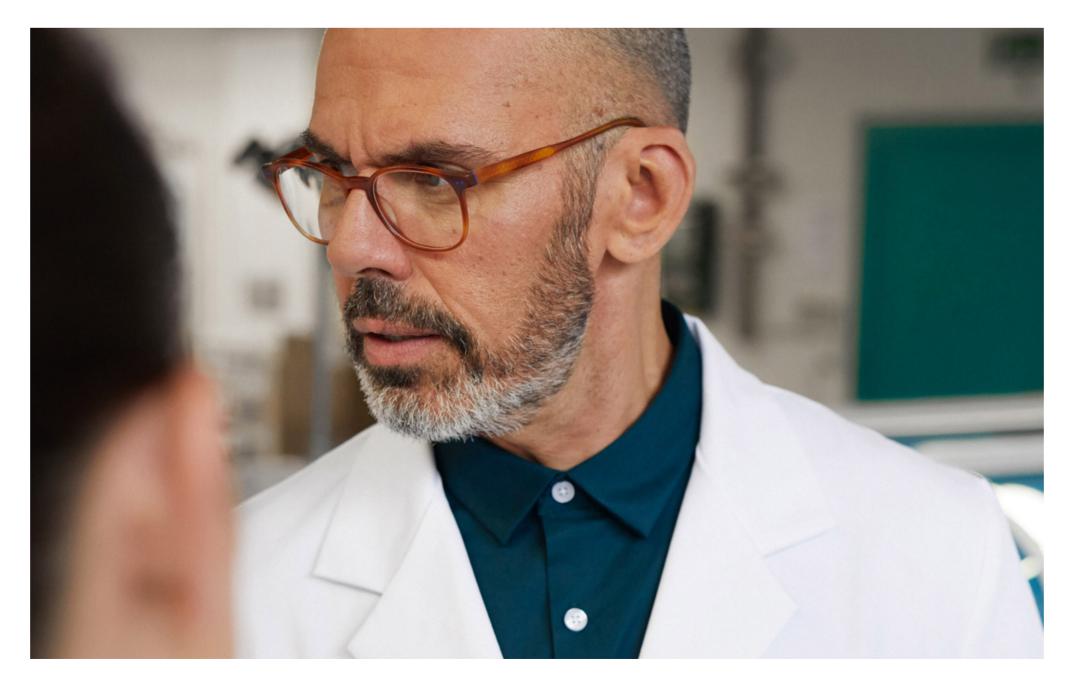
Meeting sustainability goals

Implementing a green purchasing policy as a move towards sustainability

Healthcare laboratories are significant producers of waste.^{6,7} As expectations on corporate responsibility and transparency increase, it is exceedingly important for businesses to implement initiatives to grow sustainably. Not only does this benefit the environment, but can help boost business and long-term performance.^{6,8}

Business incentives for sustainability:

- Improving waste management and costs
- Meeting environmental regulations and avoiding potential future legislative costs to "go green"
- Differentiating your business from competitors to add value
- Achieving an attractive work environment





Meeting sustainability goals

How to overcome this challenge

One key method to achieve sustainability, which can be implemented right away, is to adopt a green purchasing policy⁶. The manufacturers of lab instruments are aware of the importance of good environmental practices, and should be committed to supply ecologically efficient instruments.

When purchasing a new analyzer, consider the 6 following factors that can help mitigate your environmental impact.



Reagent stability

Long onboard stabilities and large pack sizes will significantly decrease the amount of reagent carriers to be produced, shipped, and discarded



Sample and reaction volumes

Small sample and reaction volumes optimize patient blood management and help minimize liquid waste



Solid consumable usage

Intelligent use of plastic consumables, such as reagent carriers, will help minimize solid waste



Supply of reagent in appropriately sized reagent carriers

Smaller regent carriers for low volume tests will avoid unnecessary waste, and require less packaging and refrigeration space



Test consolidation

Consolidating assay technologies on one instrument will save space and resources



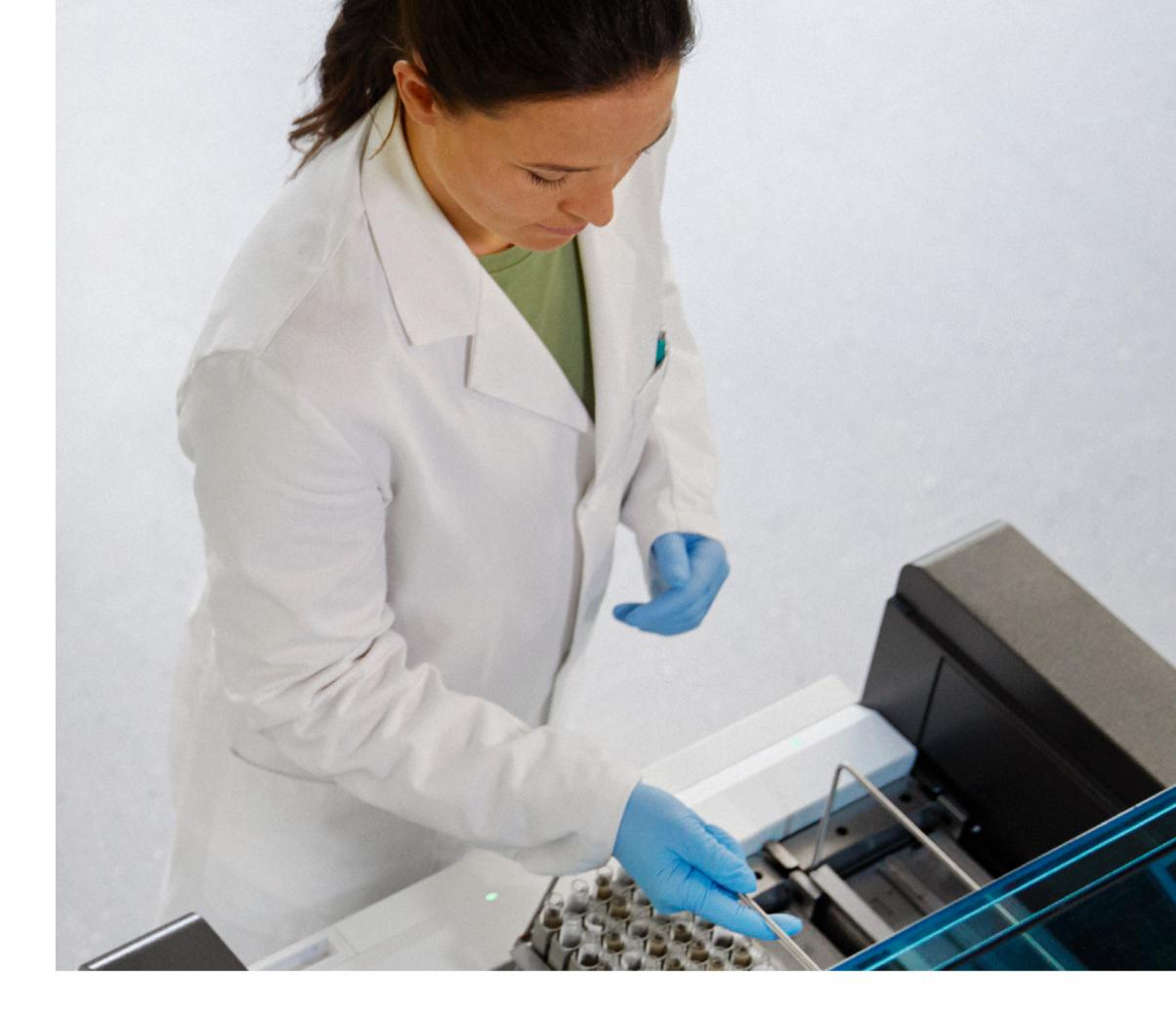
Environmental practices of manufacturer

Give preference to those who strive for sustainability and are environmentally friendly

Time consuming manual steps

Beneficial solution features to help overcome the hidden costs of manual tasks

Tasks requiring staff intervention are time consuming and costly. These include manual jobs such as sample and reagent preparation, calibration, and the exchange of consumables to maintain operation. In addition, severe hidden costs include:



Introduction of test error

60 - 70% of all diagnoses are based on lab tests⁹

 Thus, even low rates of errors introduced through manual interventions translates into significant absolute numbers of occurrences and opportunities for adverse patient outcomes¹⁰

Staff endangerment

- The manual handling of potentially infectious samples exposes staff to biohazards
- Risk of human error is amplified by ever-increasing workloads and reduction in personnel, which can lead to the physical and mental fatigue of staff⁹

Staff disengagement and high turnover

- Employees who work in jobs with scripted, repetitive tasks tend to have increased boredom, stress, and isolation within the workplace¹¹
- As a result, staff disengagement and high turnover may occur¹¹⁻¹⁵

Time consuming manual steps

How to overcome this challenge

When purchasing a new instrument, it is important for lab managers to consider the availability of features that may decrease manual manipulation. These may include:

- ☑ Ready to use reagents
- Automated maintenance
- ☑ Automated calibration
- ✓ Loading of reagents and consumables while analyzer is in operation
- ☑ Integration into lab automation

The potential benefits of minimizing manual tasks:

- ☑ Reduction in test errors
- Decreased potential for biological risks attributable to manual handling
- ☑ Decreased total laboratory costs
- ✓ Improved sample turnaround time
- ✓ Increased sample integrity
- Decreased potential for staff wdisengagement and high employee turnover rates by removing scripted and repetitive tasks
- ✓ Improved efficiency management of reruns and reflex testing with integration to automation



Suboptimal data management

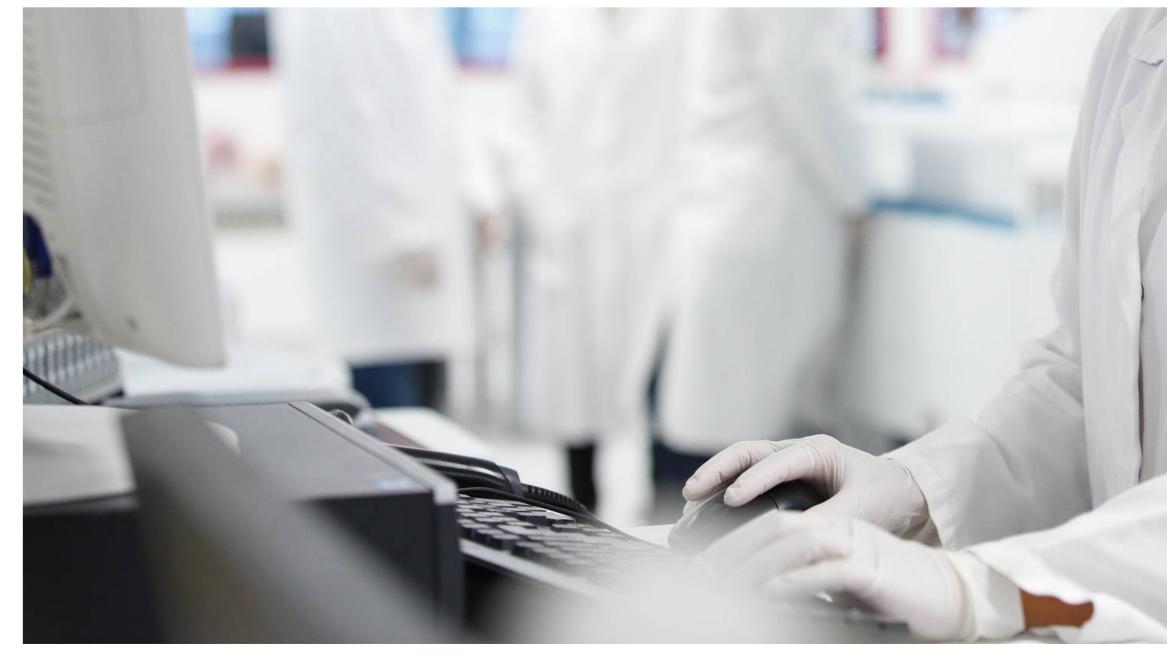
Management
of large data
in current
lab settings
requires an IT
management
solution

Better management of data has been cited as one of the top 5 challenges faced by lab managers.¹ As complex instrumentation has become increasingly automated, data and information have become the main products of analytical labs.¹⁶ Many terabytes of data can be generated in just a few days, requiring labs to have an effective software-based management solution.^{16,17}

Transforming the vast amount of information into actionable healthcare insights that can demonstrate value is another essential reason to optimize data management.

Reasons to implement an effective IT solution^{16,17}

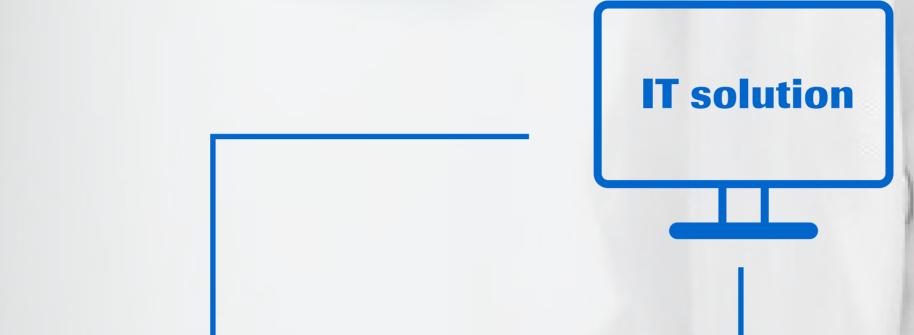
- Manage large and increasing sample throughput and generated data
- Share data with remote collaborators
- Comply with stricter and detailed compliance requirements
- Improve accuracy
- Deal with increased demands for efficiency and documentations, such as delivering results in clear, understandable format for physicians



Suboptimal data management

How to overcome this challenge

From pre- to post-analytics, an effective IT solution (such as a laboratory information system (LIS), or integrated management solution) can help maximize workflow efficiency and increase productivity. 16,17



Pre-analytical

- Sample login
- Validation of sample integrity
- Test assignment
- Sample preparation & method management

Analytical

Data acquisition

Post-analytical

- Result entry
- Data analysis
- Result validation
- Result interpretation Report generation
- Archiving

Additional benefits to lab management

- Invoicing
- Storage of documents (e.g. quality assurance and compliance records)
- Training and certification
- Automation support

Information handling requirements vary greatly between laboratories. When selecting an IT solution for your lab, be clear on the following:

- What workflow and **business functions must** it support to help you improve operations?
- What is the installation process, design and user **interface? Simplicity** and commonality across laboratory disciplines will help ensure success.
- Are the solutions offered by potential partner flexible, modular, and configurable to grow with your lab's need?



Inefficient workflow

7 ways to optimize your workflow to maximize your earnings

Key measurable characteristics for workflow excellence 18,19

How to help overcome this challenge when selecting a new instrument?

Reduce required sample draw volume

Reduce waste (liquid and solid)

Reduce error rate

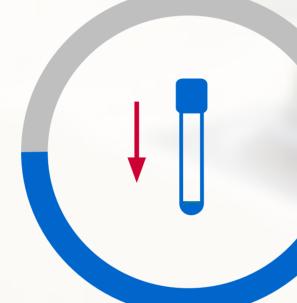
Increase production efficiency

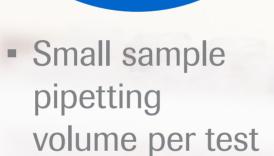
(6)

Increase
full time
equivalent
(FTE)
productivity

Increase productivity per square meter

Increase quality







- Relatively low water usage per test
- Conservative
 use of plastics
 in consumables
 (eg. reagent
 packs and
 pipette tips)
- Small reaction volumes
- High onboard reagent stability and shelf life

- Automated sample integrity check
- Safety features
 to improve test
 reliability (e.g.
 disposable tips
 and assay cups,
 ready to use
 reagents)
- Electronic tagging of reagents and consumables

- Fast and predictable turnaround times
- Smart sample routing
- High system reliability
- High number
 of assays
 may be run
 simultaneously

- Little handson time for maintenance
- Automated maintenance
- Automated calibration
- Connectivity to automation

- High number of reagent positions
- Broad assay menu
- High test consolidation



Trusted
 provider with
 experience
 and dedication
 to research &
 development
 and support

Keeping your staff engaged by implementing time-saving technologies

The top personal goals of managers have been identified as:¹

- Developing staff
- Expanding services provided
- Improving working environment for staff

Two out of three of the goals are focused on staff well-being and ultimately relate to employee engagement (the third goal of expanding services provided will be covered in the next chapter).

It is not surprising that lab managers wish to have high employee engagement. In addition to being an important competitive differentiator during difficult economic times, employee engagement is essential for company success. 15,20

Companies with high employee engagement have:15

- Lower absenteeism
- Lower turnover
- Fewer safety and quality incidents
- Increased customer engagement
- Increased productivity
- Higher profit



Keeping your staff engaged by implementing time-saving technologies

How equipment selection plays a role in fostering a culture of employee engagement

In summary, employee engagement requires leaders to:²¹⁻²³

- Empower staff to discover their full potential
- Detect and encourage the most positive capabilities in people
- Provide development opportunities
- Allow employees to be in a position of influence
- Recognize team for their hard work to create a culture of collaboration

Accomplishing the above requires time. In a lab environment, which faces increasing pressures to process more samples per week, selecting equipment that maximizes staff stay away time is essential.

Freeing-up staff from manual, repetitive tasks can ensure they have the chance to pursue development and training opportunities.

In turn, they will gain the necessary skills to engage in more valuable, fulfilling work and give your organization an important competitive edge.



Exceptional uptime to maximize operational time



Fast turnaround times



Possibility to replace reagents, wash solutions and remove waste while instrument is in use



Automated maintenance functions

10 solution features that increase staff stay away time



Automated adjustment of calibration curves



Ready to use reagents that eliminate preparation time



Capacity to run a large number of high medical value tests on one consolidated system



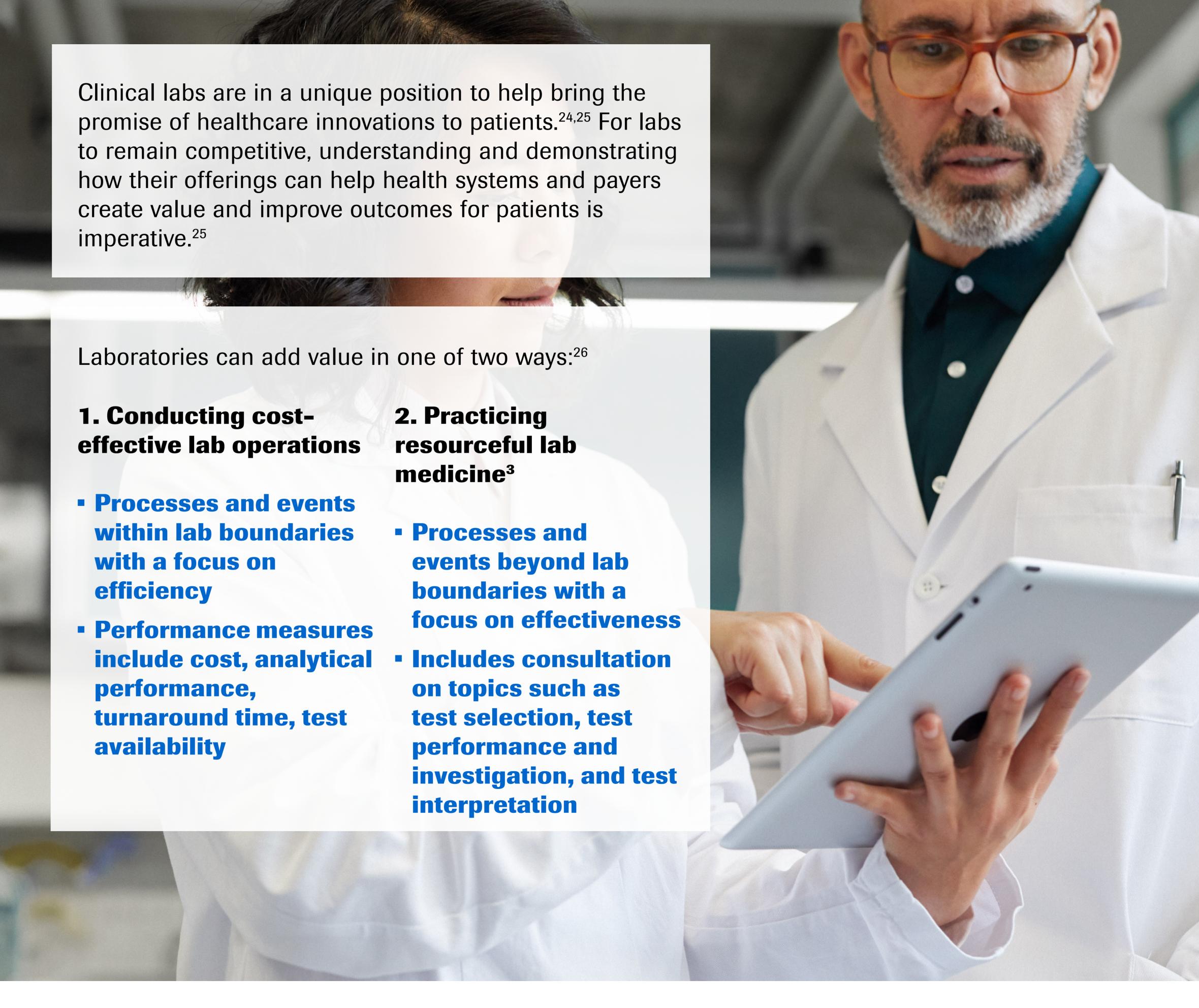
Ability to operate uninterrupted for long stretches of time



Automated sample integrity checks to decrease need for manual error handling

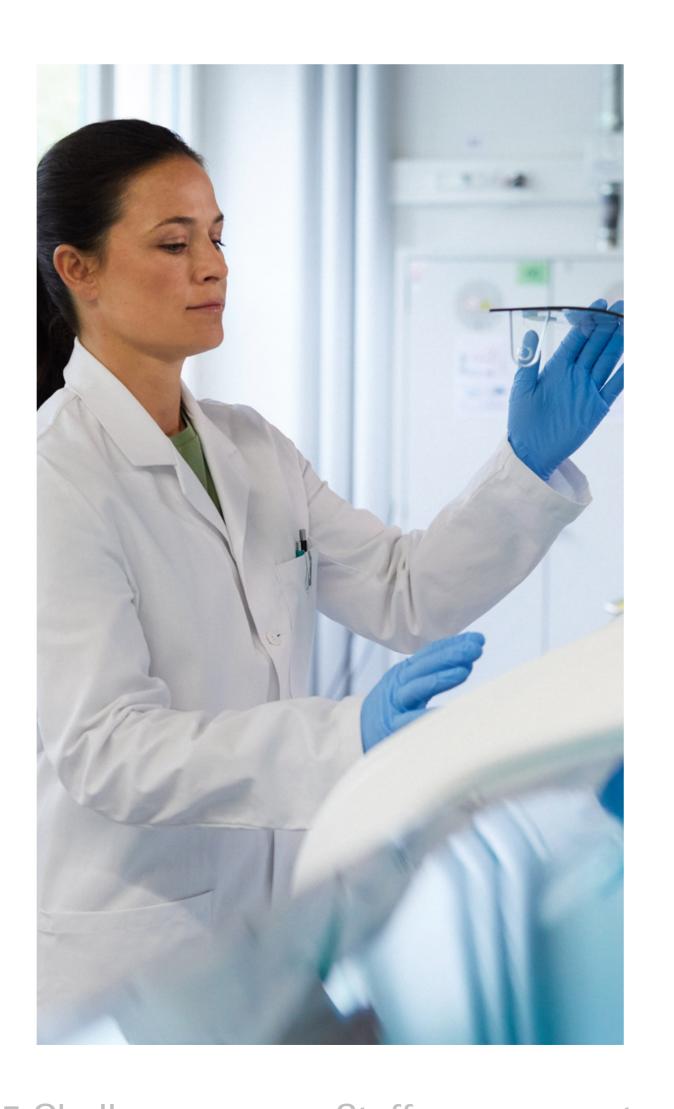


Ability to quickly and efficiently access key information (e.g. assay performance and quality assurance data)



The practice of lab medicine is an area less exploited and where labs can add value.²⁶

Crawford et al. (2017)
proposed this be
accomplished via the
evolution of the clinical
laboratory business model
from "Clinical Lab 1.0"
(transactional) to "Clinical
Lab 2.0" (integrative).²⁴



Clinical Lab 1.0 transactional	Clinical Lab 2.0 integrative
Sick Care Receive test sample Result test sample	 Health Care Population health using lab data Total cost-of-care leveraging lab data Time-to-diagnosis Diagnostic optimization Care optimization Therapeutic optimization Monitoring optimization Screening optimization
 Disease Screening Protocol-driven Scheduled by treating physician Lab is derivative 	 Risk Management Identification of risk Real-time tracking of risk Escalation /De-escalation of acuity
 Wellness Programming Managed by treating physician Lab is derivative 	 Wellness Programming Gaps-in-care closed using lab data Outcomes of program using lab data
	Predictive Analytics - What will happen? When? Why?
 Payment Models Lab is a commodity Value is cost-per-test 	Payment Models ■ Value of lab for total cost-of-care
	Table adapted from Crawford et al. (2017). ²⁴

How to influence the transition to a value-based lab and expand services Laboratory analytics and the active involvement with clinicians are key to expand services and transition to a value-based care model.²⁶ Due to the increasing complexity and number of diagnostic tests available, healthcare professionals are challenged to know and apply the vast wealth of information, which surpasses their human capabilities.^{24,28}

Inappropriate test selection can lead to adverse clinical outcomes for patients and financial consequences to healthcare institutions. ^{26,29-32}
To help address this serious challenge, leading labs have begun to partner with companies that offer health IT solutions. ³⁰⁻³³



- Meaningful insights to physicians concerning test utilization^{30,33}
- Test ordering recommendations³⁰⁻³³
- Improvement in the accuracy and speed of the diagnostic workup^{27,28}

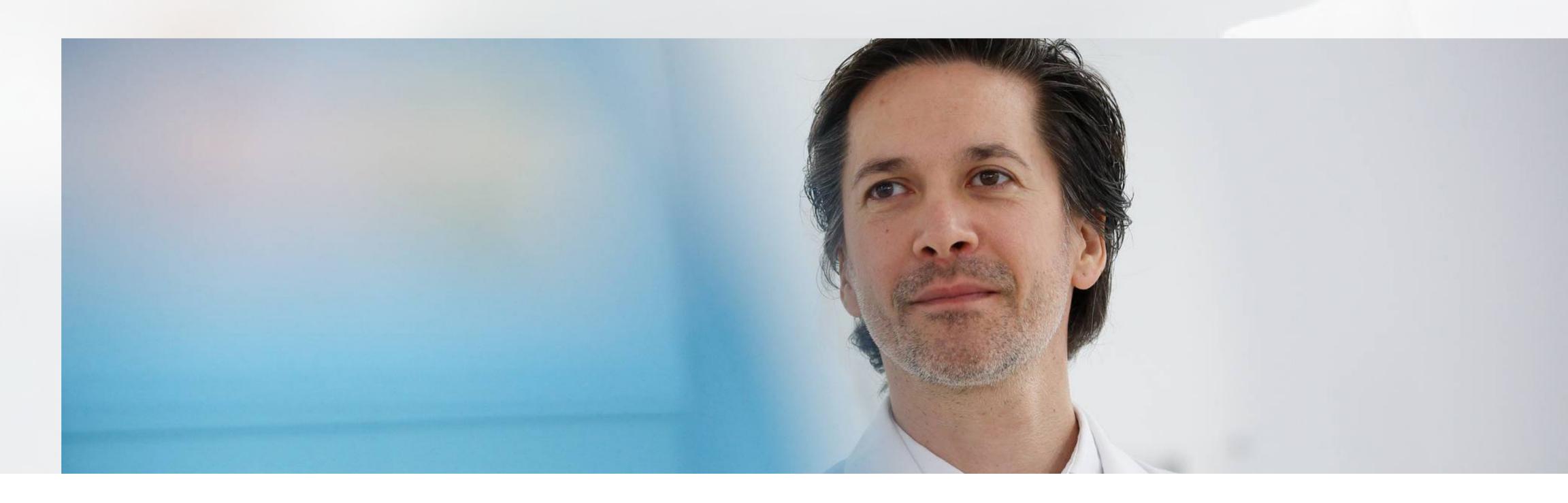
Overall mean rates
of test over- and
underutilization were
recently reported as
20.6% and 44.8%
respectively.29

How to influence the transition to a value-based lab and expand services Over time, with the advancement of analytics and artificial intelligence, clinical labs could further drive better outcomes for patients, providers, and financial stakeholders. For instance, integrating diagnostic, treatment and outcome data from a large data set of patients, may help stratify patients into responding and non-responding subpopulations for a particular treatment.³⁴ This knowledge could bypass costly treatment trial-and-error for future patients.³⁴

Partner with a company that realizes the immense value that big data has and is underway in providing and integrating these tools in their core lab offerings.

Summary:

- Laboratory analytics are key to expand lab services
- Analytics-based insights can help achieve therapeutic optimization as fast as possible
- Over time, analytics and artificial intelligence will drive better outcomes for patients, providers, and financial stakeholders
- Partnering with a company that can provide these tools will ensure a competitive advantage



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References

- Agilent Technologies. (2017). Understanding Key Challenges and Pain Points in the Global Laboratory Market. Survey results accessed September 2018 from: https://www.agilent.com/about/newsroom/infographics/lab-manager/fact-sheet-lab-manager.pdf
- 2. Mahfoud, H., El Barkany, A., El Biyaalil, A. (2016). Preventive maintenance optimization in healthcare domain: Status of research and perspective. J Qual Reliab Eng, Article ID 5314312, 10 pages.
- **3.** Able Services Ltd. (2018). The benefits of preventive maintenance. Article accessed October 2018 from: http://ableserve.com/issue-1/the-benefits-of-preventive-maintenance/
- **4.** Roche Diagnostics International Ltd. (2016). The essential guide to maximizing lab performance with your next analyzer purchase.
- **5.** Ezelle, J., et al. (2008). Guidelines on good clinical laboratory practice: Bridging operations between research and clinical research laboratories. J Pharm Biomed Anal 46, 18–29.
- **6.** Lopez, J.B. and Badrick, T. (2017). Proposals for the mitigation of the environmental impact of clinical laboratories. Clin Biochem Rev 38, 3–11.
- World Health Organization. (2018). Health-care waste. Fact sheet accessed October 2018 from: http://www.who.int/news-room/fact-sheets/detail/health-care-waste
- **8.** Eccles, R.G., Ioannou, I., Serafeim, G. (2012). The impact of corporate sustainability on organizational processes and performance. NBER working paper series accessed October 2018 from: http://www.nber.org/papers/w17950.pd.
- **9.** Agarwal, A. (2014). Quality-improvement measures as effective ways of preventing laboratory errors. Lab Med 45, e80–e88.
- **10.** Plebani M. (2006). Errors in clinical laboratories or errors in laboratory medicine. Clin Chem Lab Med 44, 750–759.
- **11.** Batt, R., and Colvin, A. J. (2011). An employment systems approach to turnover: Human resources practices, quits, dismissals, and performance. Acad Manag J 54, 695-717.
- **12.** Smith, S. (2016). Engaged employees work and play harder. Article accessed October 2018 from: https://www.ehstoday.com/health/engaged-employees-work-and-play-harder

- **13.** Hedges, K. (2018). 8 common causes of workplace demotivation. Article accessed October 2018 from: https://www.forbes.com/sites/work-in-progress/2014/01/20/8-common-causes-of-workplace-demotivation/#4167e51d42c6
- **14.** Cronan, R. (2017). Feeling disconnected at work may lead to disengagement. Article accessed October 2018 from: https://www.businessadministrationinformation.com/work-smarter/feeling-disconnected-at-work-may-lead-to-disengagement
- **15.** Gallup Inc. (2013). Engagement at work: Its effect on performance continues in tough economic times. Q12 meta-analysis summary of findings report accessed October 2018 from: https://www.gallup.com/services/176657/engagement-work-effect-performance-continues-tough-economic-times.aspx
- **16.** Williams, A.J. (2010). Laboratory information managements systems (LIMS). Encyclopedia of Spectroscopy and Spectrometry (2nd edition), 1255-1261.
- **17.** Rose, N. (2018). The growing need for data management solutions in clinical labs. Article accessed October 2018 from: https://www.fiercebiotech.com/sponsored/growing-need-for-data-management-solutions-clinical-labs
- **18.** Covill, L., and Gammie, A. (2015). The LEAN lab: Automation, workflow, and efficiency. Article accessed October 2018 from: https://www.mlo-online.com/the-lean-lab-automation-workflow-and-efficiency.php
- **19.** Proven practices for optimizing a laboratory with automation. Article accessed October 2018 from: http://www.clpmag.com/2017/07/proven-practices-optimizing-laboratory-automation/
- **20.** Dacoco, M.P. (2017). Employee engagement: The use of self-determination theory in unionized laboratory workplace for clinical laboratory scientist in a hospital setting. CLMA KnowledgeLab 2017. Presentation accessed October 2018 from: http://www.clma.org/d/do/3100
- **21.** Llopis, G. (2015.) 6 things wise leaders do to engage their employees. Article accessed October 2018 from: https://www.forbes.com/sites/glennllopis/2015/02/02/6-things-wise-leaders-do-to-engage-their-employees/#2cec642f7f5d
- **22.** ignatelli, A., and Baudoin, C. (2016). 5 tips to boost dismal employee engagement levels. Article accessed from: http://www.labmanager.com/management-tips/2016/03/5-tips-to-boost-dismal-employee-engagement-levels#.W1hdyNlzaUk
- **23.** Rogel, C. (2018). Growth and development opportunities and employee engagement. Article accessed October 2018 from: https://www.decision-wise.com/growth-and-development-opportunities-and-employee-engagement/

- **24.** Crawford, J.M., et al. (2017). Improving American healthcare through "clinical lab 2.0": A project Santa Fe report. Acad Path 4, 1-8.
- **25.** Deloitte Development LLC. (2017). A framework for comprehensive assessment of the value of diagnostic tests. Report accessed October 2018 from: https://www.advamed.org/sites/default/files/resource/advameddiagnosticframeworkreport 09.pdf
- **26.** Schmidt, R.L., and Ashwood, E.R. (2015). Laboratory medicine and value-based health care. Am J Clin Pathol 144, 357-358.
- **27.** Michel, R.L. (2018). Helping medical laboratories add value to health systems, providers, and payers by moving from clinical lab 1.0 to clinical lab 2.0. Article accessed October 2018 from: https://www.darkdaily.com/helping-medical-laboratories-add-value-to-health-systems-providers-and-payers-by-moving-from-clinical-lab-1-0-to-clinical-lab-2-0/
- 28. Committee on Diagnostic Error in Health Care; Board on Health Care Services; Institute of Medicine; The National Academies of Sciences, Engineering, and Medicine; Balogh, E.P., Miller, B.T., Ball, J.R. editors.(2015). Improving Diagnosis in Health Care. Book accessed October 2018 from: https://www.ncbi.nlm.nih.gov/books/NBK338590/Balough
- **29.** Zhi, M., et al. (2013) The landscape of inappropriate laboratory testing: a 15-year meta-analysis. PLoS ONE 8, e78962.
- **30.** Monica, K. (2017). Mayo clinic adds clinical decision support tools to labs. Article accessed October 2018 from: https://ehrintelligence.com/news/mayo-clinic-adds-clinical-decision-support-tools-to-labs
- 31. Conley, D. (2017). Viewics launches diagnostic optimization and labops with livemonitor solutions at the American Association of Clinical Chemistry 2017 conference in San Diego. Article accessed October 2018 from: https://www.businesswire.com/news/home/20170731005976/en/Viewics-Launches-Diagnostic-Optimization-LabOps-LiveMonitor-Solutions
- **32.** Cap today (2016). PLUGS picks Viewics as analytics partner. Article accessed October 2018 from: http://captodayonline.com/plugs-picks-viewics-analytics-partner/
- **33.** Viewics Inc. Company website accessed October 2018 from: https://viewics.com/products/viewics-dx-optimization
- **34.** Kerber, L. (2017). Al and lab data: Enabling decision-making in real time. Article accessed October 2018 from: http://www.pharmexec.com/ai-and-lab-data-enabling-decision-making-real-time

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