The Lab Must Go On

Clinical Laboratory Management in a World Turned Upside Down

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Key Words: Coronavirus; COVID-19; Laboratory operations; Crisis management; Information technology; SARS-CoV-2

ABSTRACT

Objectives: The clinical laboratory community has faced unprecedented challenges in responding to the coronavirus disease 2019 (COVID-19) pandemic. Long-held assumptions about laboratory management have been reconsidered in light of these new circumstances.

Methods: Experience during the first 6 months of the COVID-19 pandemic at a clinical reference laboratory was reviewed in the context of several commonly held management principles to assess their relevance to clinical laboratory operations during a crisis.

Results: Management and operational ideas regarding different modes of communication, physical proximity and interaction, operating under a fixed budget, and maintaining a breadth of laboratory service offerings have been challenged during the COVID-19 pandemic. The importance of putting people first, maintaining collaboration, and providing effective leadership and communication throughout an organization have been highlighted.

Conclusions: The collaborative activities of highly interdependent teams and individuals have helped the clinical laboratory community respond to society’s needs in the COVID-19 crisis. Not all laboratory management principles apply equally well in the course of an international respiratory pandemic. When navigating crises, leaders need to distinguish situational management principles from those that are universal.

Key Points

- The clinical laboratory community has faced unprecedented challenges in responding to the coronavirus disease 2019 (COVID-19) pandemic.
- Not all management principles designed for sustained operations are equally applicable in a crisis setting.
- A focus on people, collaboration, and communication is essential in any clinical laboratory’s response to COVID-19.

The urgent demand for coronavirus disease 2019 (COVID-19) diagnostic testing in the spring of 2020 generated resource and staffing requirements beyond the scale of what clinical laboratories have previously had to face. At the same time, hospital and laboratory budgets were threatened by sharp reductions in income-generating clinical services and associated laboratory testing. This combination of events was disorienting and stressful for the laboratory industry, which has had to make large decisions quickly and based on limited and frequently changing information.

The COVID-19 era has been described by many as a “new normal” in which old management heuristics no longer apply. This perception, however, is not completely accurate, because not all management heuristics are created alike. Some are situational and depend on a particular business context, while others are more universal. Distinguishing between these two sets can free up managers to engage in flexible thinking, not just during crises but also during more gradual shifts in the business landscape. Identifying universal principles
is important for creating a resilient organizational culture.¹

This article describes how ARUP Laboratories (ARUP) adapted its management systems in response to the COVID-19 pandemic, making significant changes in some areas while reinforcing established principles in others. ARUP, a nonprofit enterprise of the University of Utah’s Department of Pathology, is a large clinical reference laboratory that offers over 3,000 diagnostic tests and test combinations to client laboratories in all 50 states. ARUP processes over 60,000 tests per day through the combined efforts of over 4,000 employees. While specific examples may not seem directly transferrable to other laboratories or operational settings, we believe that these principles can apply to both large and small organizations.

Some Rules Were Made to Be (Situationally) Broken

Rule 1: Minimize Meetings and Emails

Meetings are a bane of organizational life, and much has been written about reducing the time waste from meetings.²,³ A corollary principle is the minimization of corporate emails. Over the years, ARUP has undertaken multiple quality improvement projects to minimize both meetings and corporate email messages. The primary goal has been workforce efficiency (ie, reducing the amount of time required to read or listen to corporate communications).

However, in times of transition and uncertainty, there is no substitute for letting the workforce hear directly from leadership. Beginning in March 2020, ARUP introduced a new weekly meeting (in virtual format) to share the most timely and important COVID-19 and corporate information with managers and supervisors. Many standing departmental meetings, including the medical directors meeting, switched from monthly to weekly. This increased frequency allowed for more timely notification of corporate news, as well as operational and policy changes. More important, it allowed emotionally charged information on issues such as salaries and organizational financial health to be conveyed in a sensitive and transparent manner. Also in March 2020, ARUP’s chief executive officer began sending daily emails to the workforce, providing corporate updates, positive highlights of individual department achievements, safety announcements, and employee wellness tips. A video town hall was used to respond to workforce questions. As operations have begun to stabilize and normalize, the frequency of many of these meetings and communications has correspondingly been reduced. As of this writing, COVID-19–specific leadership update emails are occurring weekly.

Rule 2: Manage Physical Spaces to Maximize Social Interaction

Recent trends in corporate interior design have emphasized common spaces where employees can mingle. For example, when designing a new headquarters for the Pixar animated film company, Steve Jobs famously insisted that all of the restrooms be accessible only from the main atrium, so that employees would be forced to walk through public spaces more often.⁴ At ARUP in early February 2020, a senior technical manager taped off chairs on the sides of a large conference room prior to a cross-departmental quality meeting, obliging attendees to sit closer together and be more visible to the presenters. In both these examples, the goal was to increase social interaction among employees and improve collaboration.

Since March 2020, however, COVID-19 safety considerations have forced a very different approach to workplace design and interaction. For ARUP’s approximately 2,500 employees whose jobs require being physically on-site, we have implemented policy changes reinforced by signage throughout our facilities emphasizing physical distancing, face mask requirements, and additional safety measures across a diverse array of settings. The remainder of the workforce, whose positions were compatible with work-from-home (WFH) opportunities, was assigned to do so to minimize the number of individuals working on-site. This included our information technology (IT), client services, business development, and quality divisions. WFH scenarios can vary tremendously and present unique logistical, support, and emotional challenges. Distraction, isolation, and the blurring of work-life balance can be difficult to navigate.

Meetings and other forms of collaboration transitioned from in-person to online formats. Increased communication and collaboration in our company during the crisis have been supported by the use of online tools such as Microsoft Teams and Cisco Webex. For example, the onset of the pandemic and our corresponding rollout of WFH opportunities was associated with corresponding increases in group instant messaging, one-to-one instant messaging, online phone calls, and virtual team meetings. Many employees have reported high satisfaction with working from home, and some departments—including a large portion of the IT division—are likely to continue to do so in a postpandemic future.
We would emphasize, however, that online platforms do not completely compensate for the social value of in-person interaction. Just as most scientific conferences are likely to resume postpandemic, we anticipate that most of our current WFH workforce will eventually revert to some degree of on-campus presence post-COVID-19.

**Rule 3: Laboratory Processes Must Accommodate the Full Clinical Spectrum of Inpatient, Outpatient, and Subspecialty Care**

Most clinical laboratories are generalist in nature, in that they are expected to provide a wide range of testing technologies to support a wide range of clinical end users in different settings. In business operational terms, clinical laboratories are required to be solution shops; most do not have the luxury of being organized as focused factories. This is a major managerial challenge facing laboratory leaders, who in many cases would like to be able to provide more highly customized services to each different clinical department (or physician) but for practical reasons have to provide more standardized services.

This pandemic, however, provided motivation and justification for laboratories to divert resources and attention to a single service line, namely, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) molecular testing. For one thing, our health systems saw significant decreases in routine testing volume. For another, our high-volume automated core laboratory performs chemistry testing for ARUP clients nationwide. At the same time, clinical operations have become dependent on SARS-CoV-2 testing in ways not typically seen. In ARUP's case, we diverted personnel and financial resources toward our Molecular Infectious Disease and Molecular Genetics laboratories to maximize capacity for COVID-19 diagnostic test orders. Additional efforts have supported COVID-19 serology, as well as cytokine testing, in our immunology laboratories. These initiatives have been supported by...
leveraging underused instrumentation and cross-training of individuals who performed similar methods in other areas of the company. As an institution indirectly owned by the State of Utah, ARUP has a special obligation to support regional testing needs in addition to our national customer base. As part of that obligation, ARUP developed COVID-19 specimen collection processes and test ordering software to support regional and occupational efforts.

Such approaches, however, may not be sustainable as routine testing resumes. As a reference laboratory, our organization needs to support its full testing menu, as clinical laboratories and patients depend on esoteric testing services, even during a pandemic. But supporting a full test menu in the absence of significant test volumes is exceedingly challenging, both operationally and financially. For these reasons, some laboratories have discontinued certain types of testing during the pandemic. The unfortunate truth about a crisis is that when one focuses intensely on one area, attention to other areas can be difficult to sustain. Adaptations in management and supervisory coverage can help create space for rapid change while preserving the routine operational activities in other areas. This can help to support continued daily quality across a clinical laboratory.

**Rule 4: Manage Laboratory Budgets Based on Annual Projections of Income vs Expense**

Under normal circumstances, laboratory finances do not change much from year to year. Budgeting is
an annual activity consisting of modest adjustments to the previous year’s budget. This is facilitated by the fact that overall laboratory cash flows tend to be relatively predictable and stable over multiyear periods. Capital budgets for large expenses such as buildings, instruments, and IT projects are likewise typically managed on an annual basis.

In a crisis, however, cash flow becomes an overriding issue, and expenditures need to be vetted based on cash availability rather than annual budgets. For example, in the early COVID-19 crisis, decreases in routine testing (with associated decreases in revenue) were accompanied by increasing demands for COVID-19 diagnostics, often on additional platforms that had to be acquired along with financial commitments for reagent purchases. This was further complicated by not knowing how long these instruments and reagents may be needed.

In our organization, we have adopted a rolling forecast model to allow us to adjust and revisit assumptions over the course of this next fiscal year. Nonemergency categories such as travel, external educational activities, and professional development were indefinitely suspended to preserve cash to support immediate testing needs. We recognize that unlike large reference laboratories, hospital and health system laboratories have far less control over their own budgets and compete against other departments for both operational and capital funding. Similar principles apply, though: preserve cash and available resources where possible, justify expenditures based on immediate and COVID-19-related clinical needs, and adopt a dynamic budget rather than annual budget mind-set when possible.

Some Rules Are There for a Reason

In his book *The Infinite Game*, author and management theorist Simon Sinek\(^5\) distinguishes between finite games such as chess, where both rules of engagement and criteria for success are clear-cut, and infinite games such as business or politics, where the rules seem to continually change. Sinek posits that one key to success in infinite games is to identify universal high-level principles and build them into a lasting culture. Below are rules that we believe to be universal for laboratories.

**Rule 5: People Come First**

The rapid drop in total laboratory test volumes as the COVID-19 pandemic hit the United States was an unnerving event for clinical laboratories. Even in laboratories that never seriously contemplated layoffs or furloughs, it is certain that many frontline workers were worried about this possibility. On top of that, the clinical laboratory workforce is a highly trained resource that cannot be easily or quickly replaced. Given the expectation that test volumes would return, the importance of maintaining and supporting the clinical laboratory workforce has been paramount. ARUP’s guiding principle has been to keep our employee base intact and safe during the pandemic. Success in achieving this goal was in the best interest of our staff, our organization, our families, and our patients, and it has allowed us to quickly restore staffing levels in departments where testing volumes have recovered.

To maintain corporate stability while also protecting jobs, we initially pursued hourly and/or salary reductions across all departments and leadership, offered voluntary leaves of absence to accommodate individuals with away-from-work support obligations or preferences, and distributed clear and frequent communications from our human resources department to help individuals understand programs available through the Coronavirus Aid, Relief, and Economic Security Act and other applicable initiatives. Figure 3 illustrates the overall impact of these initiatives on total number of employees, work hours, and leaves of absence in the first half of 2020 and demonstrates our workforce response to the COVID-19 pandemic.

Our organization is also unique in that we support employee and family health care benefits independently through an in-house medical clinic and wellness center. This allowed us to offer employee and family health care compatible with the staffing strategies outlined above, and it likely facilitated employee willingness to participate in many of these significant changes during the pandemic. Enhancing telemedicine opportunities, in place of in-person clinic visits where feasible, also helped us adapt to the clinical risks inherent to COVID-19 for our staff and clinic employees.

Employee safety has been a top priority for ARUP during the pandemic. Policies and procedures have been continually adjusted, including those involving hand hygiene, personal protective equipment (in particular, mask use), and physical distancing to minimize risk of employee-to-employee transmission. Communication to promote safety practices and express appreciation to the workforce has included signage, emails from leadership, and computer login screen messages, all of which have been frequently refreshed to maintain attention and relevance. Of particular importance during a pandemic are health-centric communications to staff regarding strategies to help promote safety, guidance on what to do if an employee (or their family member) feels ill, and general

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DOI: 10.1093/ajcp/aqaa187

Am J Clin Pathol 2020;XX:1-8

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AJCP / Special article

Figure 3
updates on the status of the pandemic. Our health clinic performs COVID-19 contact tracing directed at on-site and at home contacts. This is conducted in a way that protects employee health information while also communicating necessary guidance to potentially affected teams. Importantly, this keeps employees informed in a way that is supportive and constructive, fostering a dynamic of mutual respect for an otherwise very complicated topic.

**Figure 3** Employee-related metrics by pay period, including total number of employees (A), total pay hours (B), total overtime hours (C), paid time-off hours (D), and moonlighting hours (E). F. Percentage of employees who participated in our voluntary leave of absence program. Data are normalized to the first pay period in February (A-E) or first week in February (F). Note y-axis scale difference in E and F to improve visualization.

**Rule 6: Collaboration Matters**

Collaboration across teams, departments, and divisions has been essential for both decision making and operationalizing decisions in the context of the pandemic. Laboratory operations, research and development, supply chain, finance, human resources, business development, IT, safety, and facilities all play an essential role in this coordinated response, and each is affected by decisions in how the laboratory should respond.
to the crisis. Conflicting departmental priorities can hinder the ability to successfully implement initiatives in a timely manner. The immediate and obvious need to support COVID-19 diagnostic testing has, in some ways, lowered the psychological and logistical barriers that otherwise may resist change in existing processes. It is ultimately the responsibility of leadership to set the strategic direction that is then supported by collaboration across groups and individuals. At ARUP, a collaborative COVID-19 update team consisting of the groups mentioned above has facilitated the development, implementation, and communication of numerous COVID-19–related initiatives, particularly regarding employee health and safety.

Rule 7: IT Matters, Even If You Don’t Think You’re an IT Company

As a backbone of the modern corporate, laboratory, and communication infrastructure, IT has been key to ARUP’s response to the COVID-19 crisis. License limits related to virtual private networks (VPNs) and virtual desktop infrastructure were expanded to allow WFH opportunities across large numbers of employees, particularly in the setting of work-specific software tools or areas that involve protected health information. Figure 4 demonstrates the dramatic increase in weekly VPN connections that have been required to support these WFH employees. ARUP’s call center had previously implemented software and processes in order for a portion of its staff to work remotely, and so it was straightforward to expand this model to the rest of the client service representatives. ARUP’s clinical systems and interface development teams also spearheaded extensive test builds in support of the instrumentation and workflows dedicated to COVID-19 diagnostic testing and at a pace reflecting the urgency that these new offerings required. ARUP’s hardware support and security teams have also had to adapt to support ARUP’s WFH operations. None of this would have been possible without the expertise and dedication of our IT personnel.

Rule 8: Leadership Matters

In a rapidly changing environment, steadiness is paramount in helping employees feel a sense of safety and stability. Our executives, managers, clinical pathologists, PhD clinical laboratory scientists, clinicians, and safety experts have been critically important in helping us set a course to navigate the COVID-19 crisis. For example, early on in the crisis, ARUP’s leadership conducted extensive “what if” evaluations of laboratory operations, safety, IT, specimen handling and transportation, human resources, business development, and regulatory compliance to identify areas of potential risk and propose solutions or alternative options. These reviews were collaborative and led by the leadership and operational management directly connected to affected processes. These leaders were responsible for addressing such risks and for helping guide the subsequent activities in follow-up to what was learned. Our leadership has also been able to maintain an on-site presence in support of laboratory operations and at all levels of the company. All of us are in this pandemic together, and we will get through it together through our collaborative actions and accomplishments. This is a central, consistent, and essential message from leadership.

Rule 9: Communication Matters—With All Stakeholders

When the COVID-19 crisis began to gain widespread attention, it quickly became apparent that our laboratory would need to develop and provide responses to questions that employees and clinical colleagues would have. Given the scope and variety of roles at our own facility (both laboratory and nonlaboratory), a frequently asked questions list was developed and revised as new information was obtained and new scenarios were encountered. Answers were aligned to guidance provided by the Centers for Disease Control and Prevention, the US Department of State travel advisories, the World Health Organization, and existing internal policies and procedures regarding safe handling of respiratory specimens. As we also support the clinical laboratories of our university health system, wherever possible, we aligned our policies and practices to those of our university and hospital to minimize conflicting directions being provided to our staff, who may work in different locations within the larger network.

The effort of our marketing and communications teams was also engaged to supporting increased communications both internally and externally about various topics related to COVID-19.
A COVID-19 Communication Group was established and included representation from our Integrated Marketing and Communication, Market Research, Institute for Learning, and Informatics (Decisions Support and Product Management) teams. The array of educational and communication products has included articles, a new website landing page, podcasts, and material in a free public laboratory test selection support tool (ARUP Consult; https://arupconsult.com). The rapidly changing landscape of information from public health and journal sources has helped support these increased educational opportunities, but it has also created logistical challenges in necessitating frequent updates and changes. The communications team has also been vital for navigating requests for interviews from a wide range of local, national, and international journalists representing newspapers, magazines, television, and radio. Our medical directors and scientists with career expertise in infectious disease have balanced the immediate need to focus on COVID-19 assay development and oversight with the desire to help inform the public through communication opportunities. Executive review of key communications helps to ensure a timely and unified message that incorporates the perspectives of all teams involved in the COVID-19 response.

**Conclusion**

The COVID-19 pandemic has placed remarkable challenges on both clinical laboratories and the entire clinical laboratory profession. Successfully navigating such challenges requires high flexibility in some aspects of management, combined with high consistency in others. It is through the collaborative activities of numerous teams that a clinical laboratory operation can succeed in providing outstanding service to the community at large through such an unprecedented crisis. We are indebted to all clinical laboratorians and staff for the outstanding work that each individual has done and for the collective outcome of these combined efforts in support of public health.

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*Acknowledgments: We thank ARUP staff and leadership, who have worked collectively to develop and implement concepts and programs described throughout this article. We also thank Nathan Alexander, Robert Martin, Robert Meeks, Hillarie Papenfuss, and Tyler Tinling for collecting data for this study.*

**References**

1. Heifetz R, Grashow A, Linsky M. Leadership in a (permanent) crisis. *Harv Bus Rev.* 2009;87:62-69, 153.
2. Rogelberg SG, Scott C, Kello J. The science and fiction of meetings. *MIT Sloan Manag Rev.* 2007;48:18-21.
3. Mankins MC. Stop wasting valuable time. *Harv Bus Rev.* 2004;82:58, 60-65, 136.
4. Meyerson J, Ross P. *Radical Office Design.* New York, NY: Abbeville Press; 2006.
5. Sinek S. *The Infinite Game.* New York, NY: Portfolio/Penguin; 2019.