



# Evolution of Healthcare Laboratory Empowerment

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# Introduction

**Medlab Middle East**, the leading medical laboratory exhibition in the MENA region for more than 20 years organised by Informa Markets, returned to Dubai in January 2022 with disciplines relating to laboratory management, clinical microbiology, molecular & genomics diagnostics, COVID-19, haematology, clinical chemistry, and blood transfusion medicine.

Now in its 21<sup>st</sup> year, the annual medical laboratory meeting brought together exhibitors and attendees from over 140 countries under the theme, '*Laboratory Empowerment through Sustainability and Innovation*', and featured scientific lectures, industry briefings, product demonstrations and networking opportunities.

Mobile molecular testing and diagnosis stations, or "laboratories on wheels", took centre stage this year and offered evaluation on the go, with many demonstrating the capacity to conduct 7,500 tests per day. The tests covered a variety of pathogens, offering a streamlined automated workflow, from pre-extraction to data analysis.

In this report we highlight various perspectives shared during the talks at Medlab Middle East that revealed compelling insights into the recent challenges faced by lab professionals, and the changes required to bolster their abilities in these complex times.

This report was produced in association with Siemens Healthineers, a leading medtech company committed to helping healthcare professionals deliver high-quality care. Siemens Healthineers offers a broad spectrum of immunoassay, chemistry, haematology, molecular, and urinalysis testing solutions, in conjunction with automation, informatics, and services to serve the needs of laboratories of any size.





## Message from Siemens Healthineers

We were more than excited to be participating on the show floor again at Medlab Middle East 2022 and to finally welcome visitors and our valued customers and business partners in-person again to our booth.

We presented our newest products and latest solutions, enabling our customers to deliver high-value care and confidently provide the answers technicians, clinicians and patients expect and we launched some of our brand-new solutions live at the booth for the entire region.

This year's theme, 'Connect with innovation that's changing the face of diagnostics' is a vital task to our company and to the entire industry, with innovation being the driver for advancing human health. We depend on innovation to transform healthcare and to reach the next level in diagnostic precision, laboratory automation and workflow optimisation as well as in service provision.

As an organisation, innovation is part of our DNA and we take great pride in showcasing our strengths in this aspect. Focal points of the transformation call for a patient-focused approach, future-orientation, and to enable access to healthcare for everyone. As a company, we stand united in our purpose: "We pioneer breakthroughs in healthcare. For everyone. Everywhere".

We want to use our innovation potential to transform the way healthcare works and to provide access to high-quality healthcare in areas where it does not exist yet.

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# Navigating uncertainty

## Communication and teamwork

Dr Eiman Ahmed Al Zaabi, Chair of Department, Physician-Laboratory Medicine Services, Sheikh Shakhboub Medical City, Abu Dhabi, UAE, shared insights at the Laboratory Management session of Medlab Middle East 2022 around the subject of organisational change to ensure industry leaders remain resilient and relevant in the midst of challenges such as the COVID-19 outbreak.

The session, *'How can we survive another pandemic: The importance of change management for organisations'*, assessed organisational readiness for change, a skill that was high in demand during the constantly changing landscape of a pandemic.

Acknowledging that most people are not comfortable with change Dr Al Zaabi told the audience: "We often send our staff to attend courses to develop their skills, whether they are managerial skills, statistics, public speaking, writing, meditation to control themselves, risk assessment, etc. But rarely do we ask them to improve their skills in change management."

"We assume that people can implement change and know how to deal with it, as it is the only constant in life. But the reality is that we are not prepared."

At the event, Dr Al Zaabi discussed ways to cultivate change, which involved integrating strong leadership, a sense of teamwork and constant communication to reinforce organisational goals.

## Framing the problem

The COVID-19 pandemic has accelerated the need to be adaptable and flexible, according to Dr Aaron Han, Assistant Chief Medical Officer and Head of Lab, Kings Hospital London Dubai; Adjunct Professor, MBRU School of Medicine; Vice President, Emirates Pathology Society, and Deputy International Commissioner for UAE at the College of American Pathologists.

Lab professionals had encountered issues while keeping up with a new microbial and novel virus, said Dr Han, who spoke on *'Continuing education for laboratory staff: How to prepare the next laboratory managers and directors'*.





Challenges included developing accurate tests, knowing which tests to use, recommending additional testing, and ramping up to scale and dealing with supply chain issues.

Amidst such uncertainty was a need to quickly contextualise the problem.

“The key for lab leadership in the first phase of COVID-19 was really to move the discussion from the unknown, into a framework on which we could gain certainty,” Dr Han explained.

For emphasis, he used the example of Chesley ‘Sully’ Sullenberger, a renowned US air force pilot that safely landed an aircraft in the Hudson after it had lost engine power. Despite being trained to handle various crises, he was never prepared for this incident. But by identifying familiar patterns before him and understanding how to frame the problem, Sullenberger steered the plane towards the best outcome and saving lives.

Similarly, knowing how to validate lab tests and deliver quality in the different phases of testing gave lab professionals a basic framework for evaluating and deploying new tests, from PCR and antibody-antigen to T-cell response assays.

Within months of the pandemic outbreak, lab professionals had successfully sequenced the virus and developed a test that is still the gold standard.

Today, two years on, billions of vaccines have to be delivered worldwide, with much known about the virus.

“At the onset of the pandemic,” Dr Han said, returning to the aviation theme. “We were flying a plane, but really we were building the plane in the air as we were flying.”

None of this was possible without lab professionals collaborating and sharing knowledge.

Dr Han highlighted soft skills as key learning opportunities that include working in teams, and communication generally: skills that cannot be learned through a textbook alone.

“We know that adult learners need to actively participate in their ongoing education. You cannot spoonfeed adults and expect to get results.” These abilities are also not tested in a typical laboratory professional exam.

## Demonstrating transformational leadership

According to **Dr Laila AbdelWareth**, Chair of Pathology and Laboratory Medicine Institute at Cleveland Clinic Abu Dhabi and Deputy Executive Director at National Reference Laboratory, a Mubadala Health partner, emotional intelligence is key to enabling people to achieve better results. This can have a direct impact on improving patient outcomes and quality of care, she said, who spoke on *'Transforming healthcare leadership – What are the skills you need?'*

Defined as the ability to understand and manage your emotions to make a positive impact, emotional intelligence comprises five key elements: self-awareness, self-regulation, empathy, motivation, and social skills.

Each individual has different strengths across these five elements. Some people naturally excel in all and are often described as “people persons”, while others develop different skillsets across the five attributes.

To enhance emotional intelligence, it is important to focus on limbic system training to break old behavioural habits and establish new ones. Primarily the individual must understand their own emotions, and how to regulate them; and then learn to understand where emotions from other people are coming from, and how they can influence them.

In the workplace, this can help support effective communication, conflict management, change management, and negotiation. These are all key skills that leaders today must embody. Studies show that emotionally intelligent leaders are more likely to perform better and exhibit transformational leadership behaviours.

Transformational leadership requires an emotional understanding and connection, as well as an ability to inspire and motivate. As leaders are in place to serve a higher purpose and align employees to buy into a shared vision and goal, having this ability is a very powerful leadership tool for any transformation. This approach is fundamentally different from a traditional transactional leadership that is defined by hierarchy, supervision and control, with a focus on a specific task or goal.





## Investing in talent and training

Technological advances not only in operations but also in education, was a key theme in The Lab Associations' panel discussion, *'The Future of Lab Professionals'*, which addressed the need to attract a new generation of lab scientists who are better equipped with skills such as data science, financial management and work more closely with clinical teams.

Panelist **Prof. Khosrow Adeli**, President, International Federation of Clinical Chemistry, Toronto, Ontario, Canada, said the pandemic has showed the vital importance of labs around the world. "We have to build on the success that lab medicine has had for many decades, but in the last two years the pandemic showed what a critical role lab medicine has in public health and patient care. There is a greater need for investment in lab medicine training," he said.

Prof. Adeli noted the large staffing gaps in North America and Europe, as the industry sees a growing need for lab specialists and leaders. He said promoting the field was key, and making it appear more prestigious, visible and valued was necessary. "In terms of finding new lab leaders, we first have to find the best and brightest by promoting the field of lab medicine. We must attract new young people into the field, followed by building and investing in stronger and better training programmes."

While the industry has good training courses in place, there is a need to update them, considering the rapidly changing field of lab medicine and diagnostics, and the impact of technology. "The addition of AI and many other technologies must be bolstered with better training programmes for new leaders in the field," he said. "Leadership skills also need to be addressed, which I feel are currently missing. Today, there is a bigger focus on technical and practical skills."

The image of lab medicine must also change, he said, if the industry is to attract bright young talent to the field. "In North America lab medicine is one of the lower priority options for medical students to get into when they select a residency programme so ensuring we attract them, showing the value, importance and potential of lab medicine pathology is really important." He noted areas such as financial management, leadership and big data analysis. "As labs are more automated, lab scientists must also act as data analysts, so we need to train them in data science," he said.



Co-panellist **Dr Leonard Valentino**, President & CEO, National Hemophilia Foundation, New York City, New York, USA, noted that it is essential to attract the young generation before they even reach medical school. “We must recruit the brightest and best people we can possibly find.”

As medicine rapidly develops, so must testing, said Dr Valentino. With many new drugs available, tests need to adapt accordingly to be more specific to the drug or product being used. “It requires more complex procedures and changes in the systems and instruments used, hence the cooperation between labs and clinicians is key for people with all types of diseases,” he said. “The two must work hand in hand and communicate regularly.”

In terms of the future of lab medicine, labs should be grounded in the clinical process, explained Dr Valentino. “It’s incumbent on all of us to see where the clinical gaps and needs are. The role of lab professionals at all levels is increasingly important.”

Lab and clinical integration ensure clinical relevance and lab professionals can guide clinicians too. Quality must be maintained for the benefit of patient health, with accuracy and proficiency of testing crucial, said Dr Valentino who also added that labs and clinicians must partner with other organisations and individuals specialised in the area.

### Measuring staffing needs through benchmarks

With the onset of the COVID-19 pandemic, many laboratories opted to redeploy staff from the routine testing departments to assist with the increasing demand for COVID-19 PCR testing. Deciding on the number of staff to recruit and redeploy was conducted in many laboratories in a subjective manner due to the limited availability of staffing benchmarks.

Using a benchmark can assist laboratory management in objectively deciding on the number of staff needed to meet the demand of a forecasted tests volume, according to **Faisal Ibrahim**, Director of Quality Assurance, National Reference Laboratory, a Mubadala Health partner.

Although this is a challenging issue, there are ways to approach the problem methodically through international benchmarks. Implementing a scheme, such as the College of American Pathologists (CAP) Q-Probe Program, enables laboratory teams to be more objective, flexible and scalable in order to accommodate the different testing needs.

The Q-Probe Program was developed based on data and insights collected from a series of five peer-comparison studies which were conducted in 2004, 2010, 2014, 2016, and 2019. The studies assessed the relationship between staffing levels and test volumes in a number of laboratory sections and subsections such as haematology, chemistry, microbiology, transfusion medicine and anatomic pathology.

The studies showed a correlation between higher test volumes and higher productivity ratios in laboratory sections. For each laboratory section, a benchmark was developed showing the optimal relationship between test volume and staffing needs, categorised by low volume, mid volume and high volume, providing guidance for the number of staff required. The program also provided clear instructions on how to calculate staff working hours and total tests volume.

Benchmarking enables a laboratory to determine its position within the industry. Ideally a laboratory wants to be positioned around the median; ranking in the 10th or 90th percentile suggests the laboratory is relatively under or over productive.

There was a recent increase in mergers, acquisitions, and consolidation activities in the Middle East. As any laboratory merges, the management needs to decide on the number of staff to be allocated. Using a benchmark can guide laboratory on the potential staffing requirements.

The benefit of enrolling with an internationally known benchmarking program does not only provide guidance to staffing requirements, but also helps Laboratory Directors address the CAP Program checklist requirement DRA.11300, which requires sufficient personnel to be available to meet the needs of the laboratory. This comes in addition to meeting the requirement by the local licensing bodies to conduct periodic workload analysis.

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# Siemens Healthineers Case Study: A Model of Workflow Optimisation and Staff Utilisation for a Multidisciplinary Lab

## Doing less and accomplishing more

A multicultural population of more than 2.7 million people speaking 40 different languages on the northwest side of Chicago depended on Swedish Hospital for its Level 2 trauma centre, general and open-heart surgeries, two birthing units, in- and outpatient oncology care, mental health services, hospice care, and community outreach programmes.

Yet the independent, mid-sized community hospital was feeling the same operational stresses that were affecting so many other laboratories in the United States at the turn of the 21st century, making the pressure to adapt or perish very substantial. “I had to figure out how I was going to handle all the work with the staff I had,” said **Susan Dawson**, Laboratory Administrative Director at the Swedish Hospital. Facing rising healthcare costs and a technologist shortage that continues today, the multidisciplinary laboratory turned to innovation, and in 2002 began a steady course of investment to simplify operations, improve workflows, and better utilise medically trained and non-technical staff.

Today, its paperless process features computerised physician order entry, positive patient identification during collection, automated check-in, and immediate processing in a continuous flow laboratory where only 2 % of testing is batched.

Combining total lab automation (TLA) with several stand-alone analysers and powered by advanced data management, turnaround time (TAT) from sample receipt to results being released can take as little as 24 minutes for select\* chemistry, immunoassay, haemostasis, and haematology testing for Emergency Department patients.

CAP has consistently ranked the lab among the top 10 % for cost-effectiveness, turnaround times (TAT), and specimen acceptability in peer comparisons from 2000 to 2020. This case study examines how Atellica® Solution, Aptio® Automation, and Atellica® Data Manager have helped simplify operations and enable Swedish Hospital to transform into a model laboratory for workflow optimisation and staff satisfaction.

A powerful combination of diagnostic innovation, advanced datamanagement practices, and total laboratory automation—refined over more than decade—enables the lab to do less but accomplish more.

## The biggest innovation: Automation

“We introduced our biggest innovation in 2002 by bringing Siemens automation into a mid-sized hospital,” continued Dawson. “Because of our size, we were told we could not do it, but we did it anyway. It worked out extremely well, and we have grown from there.”

In 2002, Swedish Hospital brought a first-generation automation solution into the core lab to automate chemistry and immunoassay testing, while urinalysis, haematology, and haemostasis analysis continued to be performed on stand-alone analysers in the 2,700 square-foot area. The five connected analysers met the early volume requirements of a mid-sized hospital lab, while providing the necessary operational redundancy during quality control and maintenance routines. The immediate efficiency gains from the automation track resulted in an average 10-minute TAT improvement for chemistry and immunoassay testing. Moreover, it created excess capacity that was steadily offset by new volume coming from several hospitals that soon closed in the area.

After 14 years, the lab decided to leverage the full benefits of total lab automation (TLA) and replaced its track with Aptio Automation, featuring both pre- and post-analytical processing modules. One-touch automated sample management and testing — from centrifugation and cap removal to sealing, storage, and disposal — reduced labour-intensive, error-prone manual work in the lab.

The lab also used data-driven rules to immediately drive repeat, reflex, and dilution testing for the connected analysers on the Aptio Automation track without the need for reactive manual intervention by lab staff. However, the increased capacity and improved TAT associated with automation had much more serious implications for Dawson's staff.

## The Greatest Impact: Autovalidation

"Bringing in automation meant that we were handling more specimens and more results—and seeing results come faster," continued Dawson. "We had to be able to handle all those results in an efficient way. Our ability to perform autovalidation with Atellica Data Manager has by far had the greatest impact on what our lab is able to do."

Almost immediately, average TAT was reduced by another 10 minutes. All patient results generated in the lab are reviewed in the Atellica Data Manager software based on predetermined criteria established by Dawson and her team. These autoverification rules ensure that all results are evaluated according to accepted industry standards and lab protocols. A result that violates any rule, whether it is related to acceptable ranges, a percentage or absolute delta check value, quality control issues, and/ or instrument flags, is automatically highlighted and held for manual review. Samples may also be automatically reflexed for additional testing.

Autovalidation ensures that results are evaluated consistently across technologists, shifts, instruments, etc., for instruments both on and off the Aptio Automation track. "We use Atellica Data Manager to separate the normal results from the abnormal results, so autovalidation enables us to get our normal results out a little quicker."

That is important considering that approximately 85% of results — more than 9,500 individual test results per day — at Swedish Hospital are autovalidated.

But that is not what Dawson considers the biggest benefit. "Autovalidation has become a true stress reliever for the techs. Not having to worry that we are going to miss an abnormal result is a huge advantage. Bringing the results that need attention to the forefront is just a better use of my techs' time."

She further explained: "Performing validation in the middleware is so much more valuable than at the LIS. It is more powerful because there are more options for what we can do."

When reviewing chemistry results, for example, the lab staff may rerun a test with a dilution and view both results side by side to determine which result to upload.

[Read the full Siemens Healthineers case study.](#)

# THE CENTER



## Lessons from the pandemic

### The success of the UAE's vaccination programme

After a challenging two years as the world endured a pandemic, **Dr Farida Al Hosani**, Official Spokesperson for the Health Sector in the UAE, addressed the audience of what the UAE is doing next and how the pandemic is affecting the healthcare sector. Dr Al Hosani, who is the Executive Director of Infection Diseases Sector, Abu Dhabi Public Health Centre, Abu Dhabi, UAE, spoke at the 'COVID-19 Updates' session.

The UAE's ability to manage the pandemic stems from a years-long investment programme and previous experience. "Dealing with the flu epidemic 10 years ago and MERS-CoV helped us manage COVID-19 as well," she said. "It helped us perform better during the pandemic and use the resources, as well as build a big infrastructure and system, especially in areas such as unified communications and the emergency response system, which required capabilities beyond healthcare and cooperation with sectors such as tourism, aviation, important players in the pandemic era."

Currently, the average number of cases in the UAE is between 2,500 and 3,000, a number similar to Delta, which was experienced during the summer of 2020. But in terms of the burden on hospitals and ICU, Dr Al Hosani said that the UAE is still managing well and is not seeing the same severity of previous waves. The pandemic forced the system to be more flexible, offering new means of treatment from home visits to the use of technology, all key learnings for any future pandemic.

There are many unique things about the management of the virus in the UAE, she said, not least its mass vaccination programme and mass testing being among the highest in the world.

"We have done huge numbers of testing, focusing on early detection and intervention," she said. "It took a lot of financial investment in lab capabilities but it yielded less ICU cases and less deaths."

The country's fatality ratio is at 0.3%, a significantly low figure compared to other countries.

In addition to high vaccination levels, the country boasts a large take-up of the booster shots, helping keep outbreaks mild. "People are immune from previous infection but also the large numbers of vaccinated," she said. "Omicron and other variants do require higher immunity so the booster is more effective. Our strategy incorporates a continuous effort to ensure the population is up-to-date with booster doses."

Communication was a major part of the pandemic management strategy, utilising the likes of social and digital media over traditional media to help keep residents informed and to overcome the vast amount of misinformation which was circulating. In turn, Dr Al Hosani said this resulted in a much higher compliance rate in areas such as social distancing, mask wearing and vaccinating, compared to other countries globally. This complemented the UAE's "dynamic" policy, critical in an ever-changing pandemic environment.

The country has embarked upon a detailed genetic sequencing programme in Abu Dhabi that looks at the new variants emerging and sees the integration of public health, clinical and lab data. "We realised we needed a more systematic programme to understand the virus and the genetic changes in it to help feed into our planning," she said.

While international research is important, local knowledge is critical. "A critical element of our response is research because of the rapid changes we had to deal with. Due to the uniqueness of each country's situation, we cannot rely on external research, so research must go hand in hand with the response. We are still working with universities and hospitals to identify priority response areas and target research which feed on these priorities."

In spite of the country's success, Dr Al Hosani admitted the process has not been easy. "I do not think we have reached our optimal level of preparedness and this may be a global concern, but COVID-19 has helped us develop our capabilities further."

Moving forward, capacity building is a crucial factor in the first wave, where volunteers, students and staff are trained online to use skills they were not equipped with. "We must build on this and invest in this to ensure we are ready for any future challenge," she said.

Greater self-reliance must be in place for the likes of medicines and PPE as the country moves beyond the pandemic. The last two years showed the vulnerabilities of not only the UAE, but many countries in relying on access to vital medical equipment from other countries amidst mass border closures.





**Prof. Basel Al Ramadi**, Professor and Chair, Medical Microbiology & Immunology, CMHS, United Arab Emirates University, Al Ain, UAE, agreed that vaccines had been key in the UAE's success in moving through the pandemic as successfully as it has, and hailed the success of the vaccination programme that drastically reduced deaths and hospitalisations.

For the first time, data is showing that there is a decoupling between case numbers and the rate of hospitalisation or mortality. While numbers have risen, deaths and hospitalisations have not.

According to Prof. Al Ramadi, this is largely due to having a large vaccinated population, compared to a year, or even six months ago.

"As we continue to effectively vaccinate the population, you will see that the vaccines work and the protection even against the Omicron is there," he said.

The data we have now proves the effectiveness of various types of vaccines. "The solutions may vary from one another, but when effectively boosted, vaccinated individuals feel a difference in their susceptibility to the infection," he explained.

### **The course of infectious diseases in the Middle East**

Reminding attendees that COVID-19 is not the only challenge to the region, **Dr Ziad Memish**, Senior Infectious Disease Consultant and Director of Research & Innovation at King Saud Medical City, Riyadh, Saudi Arabia, spoke about the major concerns facing the Middle East's healthcare sector today. He noted that travel is creating an impact on the movement of high-risk diseases, in addition to the consequences of urbanisation and the influence of animals in disease transmission. "First, there are changes in the population movement, with a lot of travel and urbanisation," he said in a keynote speech at Medlab Middle East 2022.

There are many emerging infectious diseases, noted Dr Memish, aided by the likes of major events such as Hajj, the mass displacement of population due to war, and religious pilgrimage in areas such as Iraq and Iran. "We have huge variability in the availability of healthcare in the region and a huge disparity of rich and poor," he added. Malnutrition and starvation remain an additional challenge.

He highlighted some of the major phenomena that occurred in the region over the last few years, from yellow fever in Sudan to MERS in Saudi Arabia. Polio, measles and diphtheria are indeed preventable, but remain a challenge with large outbreaks in Syria, followed by Ebola. "The testing capacity is very poor," he said - just 5 % to 10 %. He noted a similar story in Yemen, which has gone through three outbreaks of cholera between 2016 and 2018.

He noted the success of the polio vaccine, the efficacy of which is between 60 % to 80 %. However, due to reasons such as conflict, the take-up of the measles, BCG and the polio vaccines are on the decline. The associated diseases are now reappearing in clinics, which suggests a reemergence. Similar patterns can be seen with diphtheria, reemerging in countries such as Yemen, where 95 % of the population has still not received a single dose of the vaccine. "This is why you are seeing all these diseases reemerge again," he explained.

## Conclusion

To conclude, the following were highlighted as key opportunities and challenges by the speakers named in this report:

- The COVID-19 pandemic demonstrated a need for lab professionals to work differently. Communication and teamwork are essential to navigating uncertainty, while transformational leadership is a powerful tool to make these happen, facilitating effective conflict management, change management and negotiation.
- The right training is also key to enabling communication and teamwork: soft skills and leadership skills are not tested in a typical laboratory professional exam. Training in data science would also prove invaluable: lab sciences will increasingly become data analysts as more labs are automated.
- An example of uncertainty is that posed by the rise of other infectious diseases, owing to reasons such as conflict and declining take-up of relevant vaccines.

## About the report

*The Evolution of Healthcare: Laboratory Empowerment* is the latest report in a series looking at the latest trends shaping healthcare, based on opinions voiced by healthcare leaders at Informa Markets' Healthcare events.

Prevalent insights were drawn by an expert Informa Markets team from commentary during Medlab Middle East 2022, an event brought by the organisers of Arab Health, Africa Health and FIME.

From 24-27 January 2022, healthcare professionals participated at the event to impart advanced knowledge and skills as clinical laboratories continue to transform and progress post-pandemic. The commentary from their sessions was analysed and distilled to form the key insights shared in this report.

## Previous reports

### 2022

- The Evolution of Healthcare - Sharing and Caring

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- The Evolution of Healthcare – Unleashing Innovation in Africa
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