How to achieve Precision in the Diagnosis?

Executive and clinical lessons out of COVID-19

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Executive summary

COVID-19 spotlighted four key factors that limit diagnostic precision: low-quality data, non-comprehensive data "snapshots," non-actionable information, and a siloed approach all limit the ability to make precise, data-driven diagnoses.

But these factors are not unique to COVID-19; they affect medicine across the board, delaying time to treatment and compromising the quality of care that patients receive. Here, we take a closer look at these limiting factors and describe four ways to overcome them:

◆ Improve data quality
◆ Increase access to longitudinal patient data
◆ Deliver actionable insights (not just raw data)
◆ Build an enterprise-wide culture around precision diagnosis

By taking these steps, healthcare providers can improve diagnostic precision and deliver personalized care, thus expanding precision medicine to benefit more patients.

## The value of precision diagnosis

Accurate and timely identification and communication of a patient's health problem is a vital part of precision medicine.[1] Precision diagnostics are vital in making sure that every patient receives the right treatment at the right time.[2]

We are at a time of great opportunity to improve diagnostic precision. Diagnostic tools and procedures can identify important subcategories and guide development of tailored treatment plans that can improve
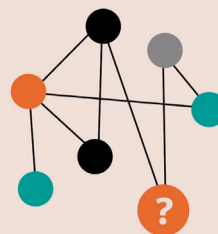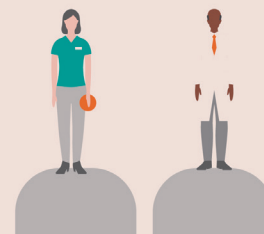
Challenges:
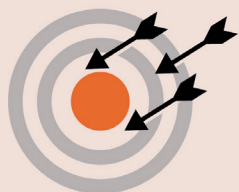
1. Low-quality, inaccurate, or incomplete data/test results
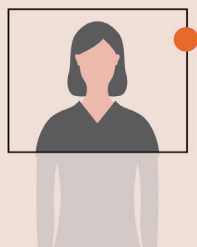
2. Diagnostic data that misses the "big picture"

3. Diagnostic information that is too complex or specialized to be actionable

4. Siloed and departmentalized diagnoses

medical outcomes for the patient. With more therapies available now than ever (there are more than 20,000 FDA-approved drugs on the US market, for example[3]), clinicians have an unprecedented opportunity to achieve better outcomes through personalized treatment plans. In order to realize that vision there are some key challenges to precision diagnosis that must be addressed.

While this paper presents the challenges to precision diagnosis through the lens of COVID-19, it's important to remember that they apply to every medical specialty. On the positive side, the authors believe that the remedies proposed here also apply to the practice of medicine in general. Diagnostic precision is a key pillar of precision medicine – indeed, it is impossible to practice precision medicine without precision in diagnosis. Thus, enhancing diagnostic precision is essential to expanding precision medicine.
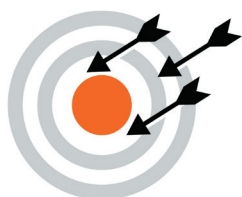
Challenge 1: Inaccurate or incomplete data or test results

There are factors relating to the available tests and the SARS-CoV-2 virus itself that limit diagnostic precision. The window period for polymerase chain reaction (PCR) can lead to false negatives in infected patients who aren't shedding ample virus yet. Some hospitals and clinics don't have reliable access to test kits and reagents, meaning that some

infected patients won't receive timely care, and may become critically ill. And in some countries, reimbursement issues and lack of contact tracing infrastructure limit government agencies' ability to accurately assess the scope of the pandemic and take necessary mitigation measures.


Solution 1: Improve data quality

PCR testing and antibody (serologic) testing for the SARS-CoV-2 each have their limitations. But together, these two tests can paint a more detailed picture of the state of the pandemic than either alone. So while improving the accuracy of tests is a worthwhile goal, coordinating and correlating results of different testing methodologies will lead to even greater precision in diagnosing individual cases and assessing regional outbreaks.

Additionally, data should transition from non-structured or qualitative into structured or quantifiable data sets. Regarding COVID-19 testing, antibody titers provide a good example. Accurate antibody titers are a potentially important path to help characterize the immune response in patients exposed to SARS-CoV-2 virus or vaccine.

Improving data quality goes beyond higher resolution imaging or more sensitive antibody tests. It is a commitment to strategic use of testing coupled with integration and analysis of data.
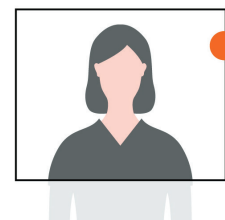
Challenge 2: Missing the big picture

For clinicians, diagnostic data is frequently a snapshot of a specific factor or system at one point in time. In diagnosing COVID-19 at the outset of the pandemic, key information from patients' medical and travel history wasn't always available to clinicians, delaying or preventing an accurate diagnosis of COVID-19.
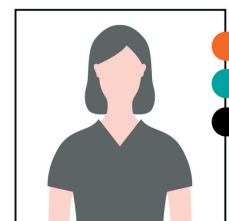

Solution 2: Increase access to longitudinal patient data

A. Develop a comprehensive view of the patient: A longitudinal understanding of the patient as a person in the context of their community helps healthcare providers narrow the range of possibilities and pursue differential diagnoses. As mentioned above, having access to a patient's complete medical history, and relevant travel history, are important factors that can affect clinical suspicion and influence case disposition.

B. Make comprehensive data available and accessible at point of decision: Making comprehensive contextual data, and data from sources like remote patient monitoring (RPM) ▶

instruments, smartwatches, and contact tracing available at the point of diagnosis can improve the speed and accuracy of diagnosis in both acute and chronic disease, enabling timely development of personalized treatment plans.
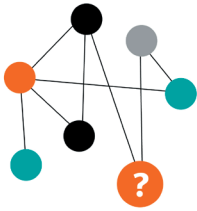
## Challenge 3: Overly complex or specialized data

Medical science is working hard to improve our understanding of the complexities of COVID-19. Chest imaging can be valuable to diagnosis and also assessment of the severity and prognosis of the disease. But interpretation of chest images is a specialized task, and far from settled knowledge as the data from new COVID-19 cases continues to refine our understanding of the disease. Clinicians at the point of diagnosis need access to the *insights* gleaned from the vast and pool of complex imaging data, not just the data itself.
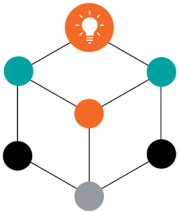
Solution 3: Deliver actionable insights

Decision support systems powered by artificial intelligence (AI) have become a reality in recent years. Such tools can help radiologists identify suspicious areas or even suggest diagnoses that could be considered, based on analysis of a large number of similar cases. Clinical decision support tools that integrate multiple data sources can accelerate development of an accurate and complete diagnosis.

In managing COVID-19 or other pandemics, actionable insights on a large scale can help health agencies proactively identify emerging high-risk populations. By working closely with these communities, health agencies can develop mitigation strategies that will work in specific cultural contexts.
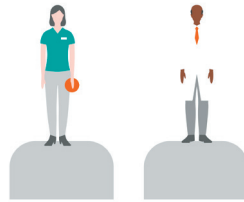
Challenge 4: Departmental silos hinder an integrated approach

Lack of enterprise-wide integration and cooperation is a problem endemic to many provider organizations. In one recent survey, only 19% of organizations report being fully equipped to make enterprise-wide data-driven decisions.[4]

This challenge is acutely important when it comes to diagnosing illness, which is often a siloed department-level undertaking rather than a data-driven, patient-centered systemic process.

Solution 4: Create an enterprise-wide culture around precision diagnosis

Precision diagnosis depends on access to cross-departmental data and insights. Buy-in at every level of the organization is essential to prevent silos from hindering precision diagnosis.

Executive- and enterprise-level engagement has accelerated the development of integrated diagnosis and treatment pathways for patients with COVID-19. Cases can now be stratified and treated with a high degree of precision, leading to improvements in outcomes. The lessons learned from COVID-19 can and should be applied to other fields of medicine.

Conclusions

The diagnostic challenges presented by COVID-19 apply more broadly to medicine in general. Integrated, precise, data-driven diagnosis is vital for the health of patients, and for the health of healthcare organizations tasked with diagnosing and treating those patients.

Key actions to help improve diagnostic precision include:

1. Generate accurate high-quality (especially quantitative) data.
2. Capture and provide access to comprehensive and longitudinal patient data.
3. Use technology to turn large and complex data sets into actionable clinical insights.

4. Build an organizational culture around data-driven, cross-departmental precision diagnosis.

The ongoing digitalization of medicine makes these goals attainable. Healthcare leaders must embrace a more integrated approach to diagnosis, and help their care teams develop personalized treatment plans to optimize clinical outcomes for their patients. JoPM

Dr. Luis Lasalvia has been invited as keynote speaker, panelist, and moderator at about 500 events and conferences around the world. He has been leading numerous teams, and as thought leader has authored close to 50 articles and peer-reviewed papers in prestigious publications, and submitted multiple patents in Europe and the U.S. Dr. Lasalvia's unique experience and knowhow in technology, medicine and business is inspiring the delivery of concrete high value. He's developing and advising new ventures, including more than 30 large programs in the U.S. and other multiple countries in Europe and Latin America. Dr. Lasalvia lives in New York and is a Medical Doctor from University of the Republic in Montevideo. He holds a Master's degree in International Business from Pompeu Fabra University in Barcelona, and Postgraduate degrees in Business Administration and in Marketing. This is combined with his Executive education in the fields of Entrepreneurship, Risk Management and Innovation at The Wharton School of Business in Phyladelphia, New York University in NYC, and Harvard Business School in Boston.

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Suggested Reading
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