

# CLIN

Clinical  
Laboratory  
News

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EARLIER DETECTION  
OF KIDNEY DISEASE

# 90%

Patients identified as  
high risk for CKD referred  
to nephrologist

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## A NEW WAVE OF Global Efforts to Improve Patient Outcomes



## A NEW WAVE OF Global Efforts to Improve Patient Outcomes

BY KIMBERLY SCOTT

Clinical laboratory professionals are collaborating inside and outside their institutions like never before to make a difference in improving patient outcomes worldwide, from significantly shortening the time a chest pain patient spends in the emergency department (ED) during the COVID-19 pandemic, to identifying kidney disease in indigenous communities early enough to slow the progression of disease, to reducing catastrophic adverse events in patients with hemorrhagic shock.

AACC, Abbott, and other leading healthcare organizations this year continued special recognition for a number of interdisciplinary teams through the UNIVANTS Healthcare of Excellence program. Teams are judged on initiatives that achieve measurable, innovative impact within healthcare systems. Approximately 180 applications were initiated and three top-performing teams were selected as the top global winners in 2020 based on key performance indicators, unity of the team, and process attributes of the initiative. Several other finalist teams were recognized with distinction or achievement, with the highest award scores within a region designated a classification of “best in area.” Below CLN highlights the five global and two best-in-region winners for 2020. AACC will keep the spotlight on these unique award-winning achievements with special supplements on other exceptional teams in 2021.

### Reducing Risk in the COVID-19 Era Through a New Chest Pain Pathway


Patients with chest pain and other symptoms of a possible heart attack have historically represented the most common cause of hospital admissions in New Zealand – about 10% -15%. In preparing for the impact of the COVID-19 pandemic early in 2020, clinicians and laboratorians at Christchurch Hospital in Canterbury, part of Canterbury District Health Board, aimed to minimize the number of tests performed and consequently the amount of time spent in the ED. A secondary goal was to reduce the number of patients admitted to the hospital.

To tackle the challenge, a multidisciplinary project team formed that incorporated the ED, cardiology, the hospital laboratory, a separate community laboratory, primary care, community nursing, and health management. The team analyzed laboratory cardiac troponin results, clinical risk, and final patient outcomes to determine if it was possible to design and subsequently implement a new pathway for patient care that could reduce the number of patients requiring two cardiac troponin tests while in the ED. They projected that reducing the number of patients needing two troponin tests could also cut the amount of time spent in the ED and, importantly, minimize the potential exposure to SARS-CoV-2, the virus that causes COVID-19.

The team, co-led by Martin Than, MD, an emergency medicine specialist, developed and implemented a new chest pain pathway through which approximately 70% of low risk chest pain patients in the ED received one troponin test while at the hospital and then were discharged home, usually with orders for a follow-up troponin test done in the community the next day. The team also created a patient streaming process so that patients determined to be at high clinical risk were assessed directly by the cardiology team without an extensive emergency medicine physician evaluation, thus reducing duplication of care.

“In the past, a patient with chest pain would be in the ED for up to six hours,” explained Than. “Waiting for and then actioning the results of the second cardiac troponin test really takes time, and they often are moved somewhere else in the hospital, which potentially increases their risk of exposure to the [SARS-CoV-2] virus. If they are admitted overnight, they can have physical contact with up to 30 staff members, but with one troponin test, we can get that number down to three people.”

The clinical laboratory played a crucial role in developing and implementing the chest pain protocol along with other departments in the hospital, explained Christopher Florkowski, MD, a consultant in chemical pathology.



**Reducing Risk With a New Chest Pain Pathway**  
CANTERBURY DISTRICT HEALTH BOARD, NEW ZEALAND

<b>45%</b>	<b>55%</b>
Increase in number of patients with chest pain safely sent home within 2 hours	Increase in patients assessed using only a single troponin result in the ED

## Detecting Kidney Disease Earlier

SEVEN OAKS GENERAL HOSPITAL, WINNIPEG, CANADA

**30 MINS**

Time at clinic for screening  
test, education, and treatment  
plan per patient

**22%**

Number of First Nations  
children with at least one  
CKD risk factor



“The relationships that we’ve built over the years between the clinical laboratory, physicians in the ED, cardiology, and other services have been absolutely pivotal to this initiative,” Florkowski said. “Chest pain is a very common admission, and with the advent of troponin tests, we needed to best define how to interpret test results in full clinical context and in relation to clinical outcomes. There was an increased incentive to develop accelerated diagnostic pathways to facilitate safe early discharge from the ED. We started working on accelerated pathways more than 10 years ago, and with the passage of time, we have been able to define and constantly refine better pre-test probability scores for the ED environment. With newer and better troponin assays, we have also been able to identify more chest pain patients at lower risk for adverse outcomes.”

Following implementation of the chest pain pathway early in the pandemic, there was a 45% increase in the total number of patients presenting with chest pain who were safely sent home within 2 hours and a 35% increase in the number of patients sent home within 3 hours of presentation. Overall, there was a 55% increase in patients being assessed using only a single troponin result in the ED, and, consequently, fewer patients required multiple troponin results to rule out heart attacks. This streamlined diagnosis (ruling in and ruling out heart attacks) was achieved without any clinically significant increase in major adverse cardiac events post implementation, reinforcing overall quality – paired speed with safety – of the clinical pathways. For these reasons and more, the chest pain pathway and team were selected as one of the three global winners in the 2020 UNIVANTS Healthcare of Excellence program.

Than and Florkowski hope to share the chest pain pathway with other hospitals throughout the world so that it can be adopted even in a post-pandemic environment. In addition, they plan to use the collaborative model to streamline other patient care pathways.

“This is not a single event,” Florkowski said. “This is a work in progress – COVID-19 just gave an extra emphasis. We want to share this as widely as possible.”

### Early Identification of Kidney Disease in Indigenous Communities

Indigenous groups in Canada endure disproportionately high rates of chronic kidney disease (CKD), diabetes, and hypertension. Often marginalized from mainstream healthcare services geographically, economically, or culturally, many of these individuals lack the preventive health benefits associated with continuity of care. This barrier can result in delayed detection

and treatment of disease, which then leads to an increase risk of adverse outcomes.

A team of professionals in Winnipeg got creative to search for progress in this unique situation. The Chronic Disease Innovation Centre at Seven Oaks General Hospital and University of Manitoba developed a comprehensive screening, triage, and treatment initiative designed to bring preventive kidney care to rural and remote indigenous communities across Canada. The initiative, dubbed Kidney Check, employs point-of-care testing (POCT) to identify CKD, diabetes, and hypertension in individuals ages 10 and up regardless of pre-existing risk factors.

Using portable diagnostic equipment, a Kidney Check health team travels to remote communities to screen for cardiovascular disease, diabetes, and CKD. Screening is performed at community sites, such as nursing centers or schools. Immediately following screening, clients are triaged according to their individualized kidney failure risk prediction scores calculated by an iPad application and offered additional resources accordingly.

The Kidney Check initiative uses a locally developed algorithm that predicts the risk of kidney failure in 2 to 5 years.

**“Many indigenous people in Canada live in northern or very remote locations... there is also a lot of poverty. We linked up with laboratory and indigenous clinicians to develop a better way to screen these communities for kidney disease.”**

—PAUL KOMENDA, MD

**This team crafted a strategy in which they added HbA1c testing to all eligible requests from general practitioners for patients without known diabetes. To improve monitoring of known diabetes, HbA1c and other key biomarkers – such as lipid markers and urinary albumin – were added to GP requests in accordance with guideline recommendations.**



“Many indigenous people in Canada live in northern or very remote locations,” explained Paul Komenda, MD, a nephrologist, professor of medicine at the University of Manitoba, and research director at the Chronic Disease Innovation Centre. “In some cases, they live in fly-in only communities, without access to roads, so they have reduced access to ongoing preventive care. There is also a lot of poverty in those communities. We linked up with laboratory physicians and indigenous clinicians to develop a better way to screen these communities for kidney disease.”

Since launching, the Kidney Check initiative has reached 5,891 indigenous adults in 11 communities, of which 1,700 (22.4%) opted in for screening and became more aware of their kidney disease risk. All patients screened and identified at risk for cardiovascular disease, diabetes, or CKD were provided education and counseling and subsequently linked to appropriate care.

What the team found was significant. Almost 22% of First Nations children had at least one risk factor for CKD. More than 10% of those children had an albumin-to-creatinine ratio of more than 3 mg/mmol, and 6.2% had an estimated glomerular filtration rate less than 90 ml/min/1.72 m<sup>2</sup>, suggestive of early kidney disease.

Based on the calculated risk for each individual (low, medium, and high), the program developed personalized kidney health plans for 343 patients. A year and a half since the initial screening, 90% of

patients identified as high risk have been seen by a nephrologist, and a number of them continue to be regularly monitored.

In addition to improving patient outcomes, the initiative is expected to have a significant impact on healthcare costs through the reduced need for dialysis. In Manitoba, the cost of dialysis runs \$60,000 to \$80,000 per year. In remote Northern Manitoba, the cost is as high as \$200,000 per year. Identifying kidney disease at an earlier stage when lifestyle factors can have an impact on progression ultimately saves the healthcare system money.

“We had a lot of partners on this project,” Komenda emphasized. “There was a close collaboration of indigenous health specialists, nephrology clinical specialists, lab medicine specialists to run the point-of-care testing, app developers, patient partners, and funding through CANSOLVE CKD, a pan-Canadian patient-oriented kidney research network. All of those ingredients go into the fact that we can go into these rural and remote underserved populations and mass screen in a very easy and efficient way, provide them instant results on their risk of kidney disease, and give them educational materials and a treatment plan, all within a 30-minute window.”

Building on the success of the initial Kidney Check screening, the initiative has since expanded to four additional provinces across Canada. Komenda expects the initiative to be scaled up in underserved communities in other countries as well. “We are all very excited about the possibilities that this can be used in vulnerable communities around the world,” he said.

#### **Early Diagnosis and Improved Management of Patients With Diabetes**

Diabetes mellitus is a significant global health problem and a leading cause of mortality worldwide. Direct healthcare costs and the loss of labor productivity are extremely high, in part due to complications related to delayed diagnosis and inadequate monitoring and treatment. Recognizing that significant opportunities exist for earlier detection, targeted treatment, and improved monitoring to minimize costs of diabetes-related

complications and improve quality of life, the Hospital Universitari Sant Joan d'Alacant in Alicante, Spain, in 2016 developed an automated strategy for improving detection of undiagnosed diabetes and prediabetes while also ensuring routine monitoring of patients with known diabetes.

This team crafted a strategy in which they added HbA1c testing to all eligible requests from general practitioners (GP) for patients without known diabetes. To improve monitoring of known diabetes, HbA1c and other key biomarkers—such as lipid markers and urinary albumin—were added to GP requests in accordance with guideline recommendations, explained Maria Salinas, PhD, head of the hospital laboratory.

In patients between 45 and 75 years of age, HbA1c was added to every GP request for complete blood count (CBC) when predefined inclusion criteria were met (no known diabetes, glucose between 5.6 and 6.9 mmol/L, no HbA1c requests in last 3 years). Patients 25 to 45 years of age had HbA1c tests with every GP request for CBC when lipids and fasting glucose were elevated.

Controlling and monitoring lipid and urinary albumin levels is also critical for optimizing treatment plans, Salinas noted. Of tests from patients with diabetes, 14.4% had these biomarkers automatically added to order sets; 21% had lipid tests with pathological values, and 17.6% had urine albumin values above 30 mg/G. In these cases, GPs were alerted to re-review their patients' care plans and take the appropriate steps.

Through this initiative, which is a global winner, the hospital laboratory was able to identify 229 patients with undiagnosed diabetes. In addition, 3,337 patients were diagnosed with prediabetes. Collectively, the total test costs were €2,730 over 84 months for patients 45-75 and €309 for patients 25-45 over 36 months.

"The cost of doing an HbA1c is very low in Spain, so this is a cost-effective way of identifying people with diabetes," Salinas said. "We know the prognosis of the disease improves when cases are diagnosed earlier. We are improving the quality of life of these patients by identifying them early and getting them on treatment plans."

Between 2016 and 2019, the number of patients with HbA1c under 8% improved significantly, thus reflecting improved diabetic control in patients treated at the institution, Salinas said. Diabetes guidelines recommend that for diabetic patients HbA1c levels should stay below 8%. In addition, appropriate monitoring of patients with diabetes helps avoid unnecessary repetition of hospital resources, including laboratory testing requests and associated phlebotomies, she noted. In this case, additional testing was avoided in 14.4% of cases (4,355 out of 30,216) between July 2016 and July 2020.

Salinas believes this initiative is highly scalable and could easily be implemented by other hospitals. "The use of algorithms and HbA1c in clinical care is not unique," she said. "However, the strategic implementation of our automated test algorithms into clinical care is unique. Our algorithm was developed to automatically add HbA1c testing to primary care requests in patients at risk for diabetes and to ensure monitoring of glycemic control in patients twice a year."

### Reducing Catastrophic Adverse Events in Patients With Hemorrhagic Shock

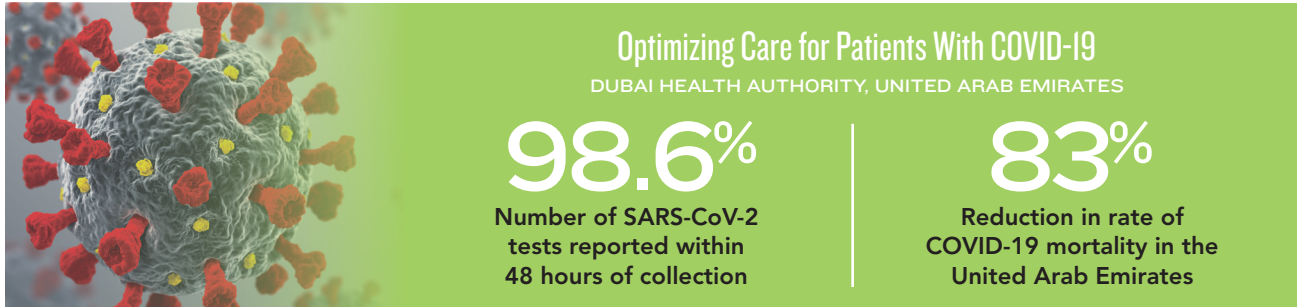
Between 2013 and 2015, 29.1% of all catastrophic adverse events reported at the Hospital Israelita Albert Einstein in São Paulo, Brazil, were related to bleeding management failure and hemorrhagic shock. It is estimated that the median time from the onset of hemorrhagic shock to death is 2 hours. The ability to provide lifesaving treatment is heavily dependent on the ability to recognize risk early, but challenges often exist in the identification of hemorrhagic shock, especially when the source of bleeding is unknown. There are subtle clinical indicators of shock, but they must be acted on rapidly to be effective.

The integrated clinical care team at Hospital Israelita Albert Einstein set out to reduce the number of catastrophic adverse events related to hemorrhagic shock by reducing barriers for risk identification, as well as enhancing the management of patients with severe bleeding, according to João Guerra, MD, PhD, medical head of hematology at the clinical



laboratory. Among the challenges that had to be addressed were logistical and procedural changes, activation of dedicated resources, systematic multidisciplinary alerts, and accelerated turnaround for critical tests and faster decision-making.

The team made strategic changes to enable comprehensive, patient-centric protocols for urgent patients, including establishing a new "code yellow" that enables identification of patients whose vital signs indicate risk of decompensating, Guerra said. When code yellows are activated, a rapid response team is triggered for enhanced vital sign monitoring. If a patient continues to decompensate, a "code H" alert is called. Code H alerts are based on validated criteria for



hemodynamic instability, triggering a cascade of actions across multidisciplinary health professionals through automated alerts. This includes immediate ordering of blood and blood components through a massive transfusion protocol with a 15-minute response time.

The laboratory completes the testing panel for code H within 30 minutes, enabling activation of imaging teams within 1 hour of the exam. Vascular intervention occurs within 30 minutes, and the ICU and operating room are put on stand-by. All procedures and tests are overseen by an on-call code H team that is in operation 24 hours a day, 7 days a week.

The clinical laboratory played a critical role both in developing and carrying out the code H protocol, Guerra emphasized. “The clinical laboratory team introduced concepts of precision medicine and value-based medicine for rapid and accurate diagnosis through point-of-care testing and hemostatic and therapeutic drugs for efficient treatment,” Guerra said. “In addition, we created a code H application, which guides the protocol step-by-step with algorithms and flowcharts developed with the help of artificial intelligence. The lab team was directly involved with both the coordination and validation of the point-of-care testing and with the development of the app.”

The project was implemented in May 2016, and after 2 years, there was not only a significant improvement in indicators, but also a reduced length of stay in the ICU, reduction in use of blood components, and better cost-effectiveness when compared to a control group. Moreover, the development and implementation of a rapid response team enabled the hospital to mitigate catastrophic adverse events in 88.5% of code yellow patients, Guerra said. In addition, the average time to transfusion for

decompensating critical patients with active bleeding (code H patients) was reduced by 1.25 hours (from 1.30 hours to 15 minutes).

Perhaps most significantly, mortality related to bleeding management failure dropped from 29.3% the 3 years prior to implementation of code H to 4.3% in the 4 years post-implementation.

Although clinicians initially were skeptical of the initiative, once the results started coming, they got on board. In the first 6 months of the project, the team trained more than 150 emergency room doctors, intensive care specialists, and anesthesiologists, as well as some 400 nurses and 50 clinical pharmacists.

“The results speak for themselves,” Guerra said. “Patients are receiving better and safer care; clinicians are more confident with better training and work with the adequate coordination of efforts and actions; health administrators do not have to deal with catastrophic adverse events related to failure in the management of patients with severe hemorrhagic diseases; and payers are, at the end of the day, happy.”

The Code H initiative placed as a UNIVANTS finalist with distinction and received the highest award scores for the Latin America and Caribbean region.

### Optimizing Patient Care Through COVID-19 Public-Private Partnership

To combat the COVID-19 pandemic, the Dubai Health Authority (DHA), the government healthcare provider, engaged private laboratories to increase testing capacity and boost access to SARS-CoV-2 testing. Once DHA began partnering with private laboratories, competition between the public and private laboratories disappeared, the price of testing dropped, and individuals had greater access to testing,

according to Rana Nabulsi, MD, a consultant in healthcare quality for DHA.

“This collaboration is unusual,” Nabulsi explained. “During the early days of the COVID-19 pandemic, there was huge competition between the public and private sectors on obtaining COVID-19 testing supplies. The DHA public laboratory was not able to procure adequate extraction and [polymerase chain reaction] kits as the process of purchasing in the public sector takes much longer. Private laboratories were more efficient in obtaining COVID-19 supplies. The partnership allowed us to unify logistics and the supply chain and facilitate data sharing.”

DHA initially contracted with eight private laboratories to handle testing that exceeded the public lab’s capacity; that number is now up to 17 private laboratories. The contracts with the private labs were conditioned on 24- to 48-hour result turnaround. In addition, the DHA team ensured that the laboratory information systems (LIS) of the private labs were interfaced with the DHA LIS, which in turn was integrated with the public health system. This offered the public health system the data it needed for prompt contact tracing and isolation of infected individuals.

According to Nabulsi, 98.6% of all SARS-CoV-2 test results were provided back to physicians and patients within 48 hours of collection, enabling actionable next steps for infected patients while mitigating risk for transmission to others. At its highest level, the COVID-19 mortality rate in the United Arab Emirates (UAE) was 1 death per million people; that rate subsequently dropped to 0.17 deaths per million, a reduction of approximately 83%. Nabulsi credits the public-private partnership with this reduction in mortality.

“The partnership enabled increased testing capacity and facilitated access to COVID-19 testing for symptomatic patients and their contacts,” she said. “In addition, providing rapid polymerase chain reaction (PCR) within two hours at all hospital emergency departments had a great impact on early triage of patients. By using both routine PCR and rapid PCR, the transmission of the virus, the hospitalization rate, and mortality rate all were reduced.

The pathology department at DHA played a crucial role in improving quality of testing, regulating private laboratories with DHA’s rigorous testing guidelines, mandating rapid turnaround time, conducting inspections, and mandating monthly interlaboratory comparison programs. In addition, the DHA pathology department was able to negotiate with private laboratories for reduced prices for SARS-CoV-2 testing. All these efforts reduced healthcare costs, and those saved resources were put toward mass screening programs.

While DHA initially covered the testing and treatment costs for the pandemic, insurance companies eventually begin covering clients and beneficiaries with the same negotiated testing prices. The UAE’s streamlined SARS-CoV-2 testing initiative placed as a finalist with distinction and received the highest award scores for the Middle East and Africa.

### Optimizing Patient Care

Whether helping identify CKD early enough to effect substantive change or improving diagnosis and treatment of patients with diabetes, clinical laboratories around the world are making a real difference in improving quality of life and patient outcomes.

The initiatives highlighted herein are just a few of the many projects in which laboratories are playing a critical role in transforming healthcare delivery. To learn about other UNIVANTS winners, go to [www.univantshce.com](http://www.univantshce.com).

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## UNIVANTS 2020 TEAMS RECOGNIZED IN THIS ISSUE

The UNIVANTS of Healthcare Excellence Award recognizes teams who collaborate across disciplines to transform healthcare delivery and patient care. Now in its second year, the program is recognizing teams from all regions of the globe.

For more details on these and other teams recognized this year, visit [www.univantshce.com](http://www.univantshce.com).

### TOP GLOBAL AND AREA WINNERS

#### Reducing Patient Risk and Enhancing Care Through the Development and Implementation of a New Chest Pain Pathway, Expedited by and for the COVID-19 Era

Canterbury District Health Board, New Zealand | Best of Asia Pacific

- › Martin Than
- › Jacques Loubser
- › John Pickering
- › Chris Florkowski
- › Sally Aldous

#### Kidney Check: The Next Generation of Surveillance for Hypertension, Diabetes, and Chronic Kidney Disease

Chronic Disease Innovation Centre, Seven Oaks General Hospital, Winnipeg, Canada | Best of North America

- › Paul Komenda
- › Barry Lavalley
- › Abdul Razaq Sokoro
- › Binh Nguyen
- › Adeera Levin

#### Early Diagnosis and Improved Management of Patients With Diabetes Through Strategic and Automated Test Algorithms via Primary Care

Hospital Universitari Sant Joan d’Alacant, Alicante, Spain | Best of Europe

- › Maria Salinas
- › Emilio Flores
- › Beatriz Massa
- › Maite López-Garrigós
- › Francisco J. Pomares-Gómez

### RECOGNITION OF DISTINCTION – BEST IN AREA WINNERS

#### Reducing Catastrophic Adverse Events in Patients With Hemorrhagic Shock Through Early Recognition of Risk and System-Wide Automatic Alerts

Hospital Israelita Albert Einstein, São Paulo, Brazil | Best of Latin America and Caribbean

- › João Carlos de Campos Guerra
- › Priscilla Bento Matos Cruz Derogis
- › Michele Jaures
- › Roseny dos Reis Rodrigues
- › Carlos Eduardo dos Santos Ferreira

#### Novel Collaborative Approach Among Public and Private Sectors for Streamlined SARS-CoV-2 Testing Towards Optimized Patient Outcome During Covid-19 Pandemic

Dubai Health Authority, Dubai, United Arab Emirates | Best of Middle East and Africa

- › Rana Nabulsi
- › Hussain Al Samt
- › Mohammed Daoud
- › Hanan Al Suwaidi
- › Laila Al Dabal

## The Next Generation of Kidney Surveillance for Improved Population Wellness

CHRONIC DISEASE INNOVATION CENTRE,  
SEVEN OAKS GENERAL HOSPITAL

## Automated Test Algorithms for Early Diagnosis of Diabetes

HOSPITAL UNIVERSITARI SANT JOAN D'ALACANT

## New Chest Pain Pathway Reducing Patient Risk and Enhancing Care

CHRISTCHURCH



# TOP TEAMS AROUND THE WORLD ARE ACHIEVING HEALTHCARE EXCELLENCE

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### AREA AWARD WINNING BEST PRACTICES



Chronic Disease Innovation Centre,  
Seven Oaks General Hospital

NORTH AMERICA



Hospital Israelita Albert Einstein

LATIN AMERICA



Canterbury District Health Board

ASIA PACIFIC



Hospital Universitari  
Sant Joan d'Alacant

EUROPE



Dubai Health Authority

MIDDLE EAST



IN PARTNERSHIP WITH

