

UC San Diego Health



JOURNEY TO HIGH RELIABILITY  
THROUGH TECHNOLOGY AND  
PROCESS IMPROVEMENT

*A 5-Year Retrospective*

# Table of Contents

<b>COVID-19 Pandemic Response</b>	<b>2</b>
CA Notify Exposure Notification System	4
Vaccination Superstations: Front-line COVID-19 Defense at UC San Diego Health	4
Using Data Dashboards to Track COVID-19	5
Connecting Patients and Providers: Telehealth at UC San Diego Health	6
<b>Patient Experience</b>	<b>8</b>
An Epic Migration: Aligning Student Health Records	10
Employee Records: An Epic Transition	11
MYUCSDChart App	12
Technology Support for New Facilities	12
<b>Caregiver Experience</b>	<b>14</b>
Enabling Patient and Provider Connections Through Technology	17
Improving Pharmacy Operations Through Willow Ambulatory	17
Shiley Eye Institute: Transitioning to Kaleidoscope	17
Sprinting to Support Providers	18
<b>Service Quality</b>	<b>20</b>
Oracle Cloud Collaboration	22
Bringing Technology to Patients and Providers: Ubar	22
Using Data to Drive Decisions: Tableau for Enterprise Analytics	24
Slicer Dicer	24
Measuring Quality and Safety: A Journey to High Reliability	26
Implementing a New Path: UC Path at UC San Diego Health	27
<b>Innovation</b>	<b>28</b>
Using Technology to Track Population Health	30
Harnessing Data for Research and Patient Safety	30
Health Hack-a-thon	31
Leading Change Through Strategic Planning	31
Center for Health Innovation	32
Innovations in Clinical Research	33
<b>Partnership &amp; Collaboration</b>	<b>34</b>
Partnering to Improve Patient Care: Affiliate Epic Community Connect Programs	36
An Epic Partnership: UC San Diego Health and UC Irvine Health	36
Implementing Technology to Improve Medical Education	38
Observational Medical Outcomes Partnership (OMOP) & UC Data Warehouse	39
Select Publications and Awards	40

## Reflecting on Our Accomplishments

As I reflect on our journey together over the last five years, I could not be more proud of our teams in Information Services and Quality & Patient Safety for the continued focus on high reliability and a willingness to “break things better.” This innovative spirit has permeated the organization, inoculated our culture, and resulted in regional and national recognition. From the opening of Jacobs Medical Center to the global COVID-19 pandemic, our teams have been challenged in ways we never imagined. This retrospective celebrates the work of these amazing teams and highlights the many accomplishments we have achieved together across UC San Diego, the University of California Health, and with our regional partners.

As I begin my new roles as Chief Medical Officer and Chief Digital Officer, I am excited about our continued journey together to serve our providers, staff, and patients, as a highly reliable, learning health system.

In gratitude,  
Chris



*Members of the UC San Diego Health leadership team from left to right: Brendan Kremer, Chief Operating Officer; Patty Maysent, Chief Executive Officer; Chad VanDenBerg, Chief Quality and Patient Safety Officer; Christopher Longhurst, Chief Medical Officer and Chief Digital Officer.*

### **Christopher Longhurst, MD, MS**

Chief Information Officer, UC San Diego Health (2015 – 2021)  
Associate Chief Medical Officer for Quality & Patient Safety (2018 - 2021)  
Chief Medical Officer & Chief Digital Officer (2021 – current)

# COVID-19 Pandemic Response

**The unprecedented challenges** presented by the COVID-19 pandemic called for novel technology solutions. The Information Services and Quality & Patient Safety teams at UC San Diego Health met the challenges presented by the pandemic through the innovative use of technology and teams aimed at supporting our organization.





# COVID-19 Pandemic Response



## CA Notify Exposure Notification System

During the global pandemic, Google and Apple partnered to develop technology that would notify users if they had been exposed to people who tested positive for COVID-19. The UC San Diego Health Information Services (IS) team led a pilot program to implement the exposure notification system (ENS) tool at the UC San Diego campus. With the pilot program a success, the [CA Notify ENS tool](#) was expanded to six other schools in the University of California system and was adopted statewide across California in early December 2020.

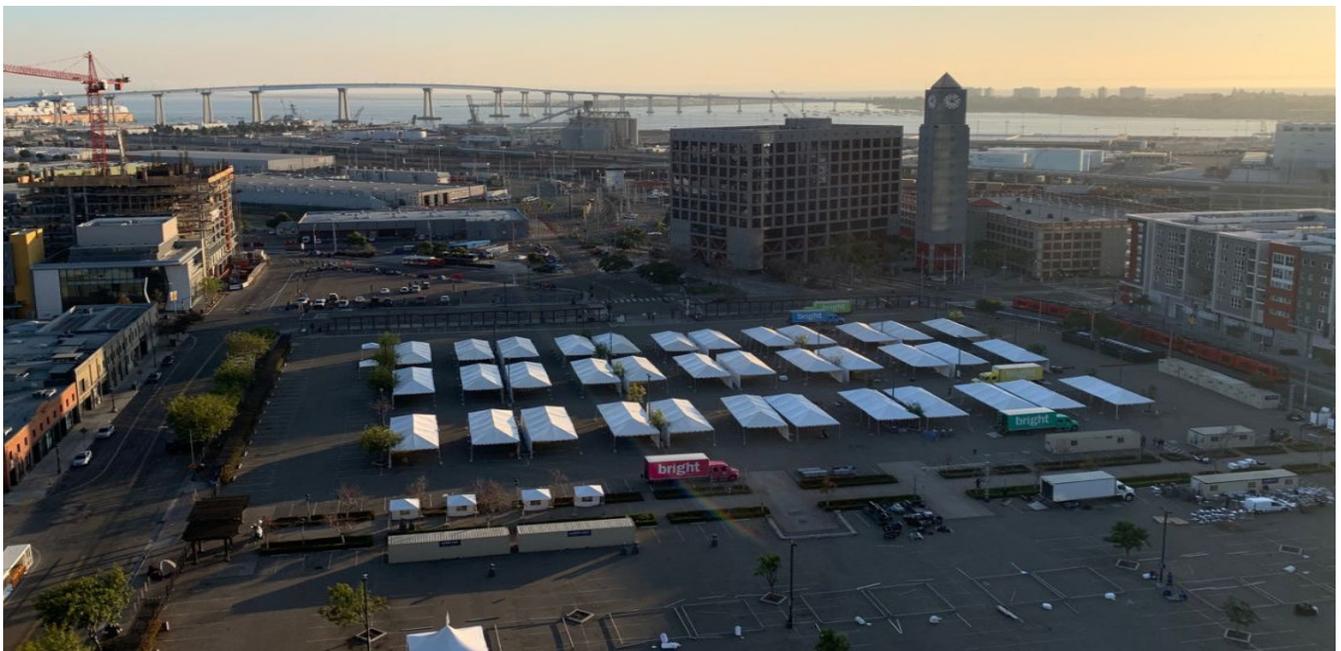
The statewide launch of CA Notify was a culmination of months of iterative design, testing, and implementation work by the IS team. Due to the integral role UC San Diego Health played in executing the pilot program for CA Notify, the California Department of Public Health contracted with UC San Diego Health to implement and support the ENS throughout the state of California. In anticipation of a fast-tracked state-wide launch, the team stood up a high-volume call center in seven days, re-designed and hosted the CA Notify website, architected and managed the system's analytics environment, and supported an evidence-based marketing campaign.

By spring 2021, over 12 million Californians (one quarter of the adult population) downloaded the CA Notify ENS, the best adoption rate in the nation.

## Vaccination Superstations: Front-line COVID-19 Defense at UC San Diego Health

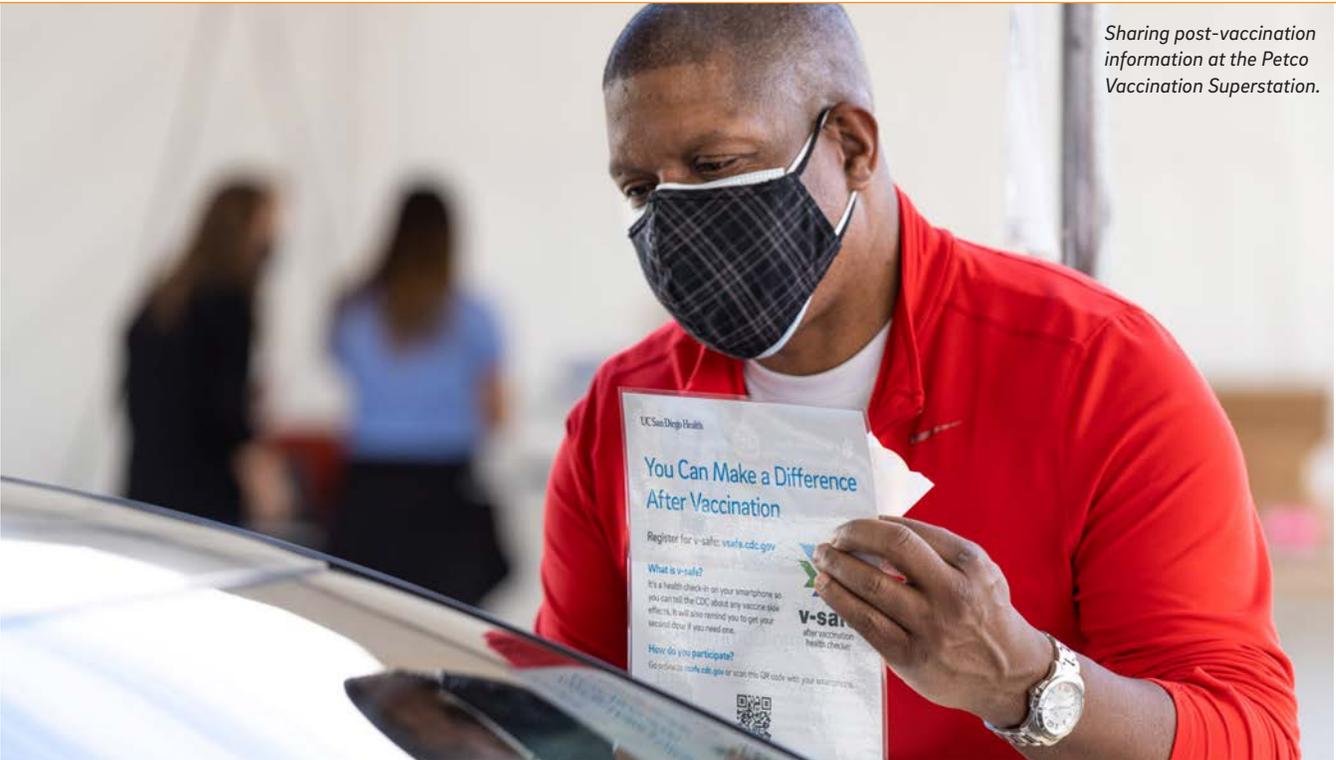
In January 2021, UC San Diego Health partnered with the County of San Diego to set up a drive-thru vaccination superstation adjacent to Petco Park, the home of the San Diego Padres. To quickly stand up a facility capable of vaccinating thousands of San Diegans a day, the UC San Diego IS team quickly sprang into action. The IS team worked to ensure that the 280,000 square foot site with 42 vaccination tents was wired and ready to go before the first patient arrived to be vaccinated.

With only five days between the approval of the Petco Superstation plan and when it was set to open, team members rushed to order, deliver, and install the equipment that would be the technical backbone of the site. During that short time, the team successfully set up 77 WOW (Ergotron) stations, 85 laptops, 85 anti-microbial keyboards/mice, 20 Wi-Fi hotspots, and many



An overview of the Petco Superstation, a 280,000 square foot site with 42 drive-thru vaccination tents. Thousands of people were vaccinated each day the site was open.

Sharing post-vaccination information at the Petco Vaccination Superstation.



complementary accessories such as printers, VoIP phones, and a language interpretation computer.

The team succeeded in getting the site ready in time for opening, although their work was far from over. Each day the site is open, IS technical support personnel were present to troubleshoot any technical problems and ensure a smooth workflow. In addition, the Epic (electronic health record) trainers and analysts played a key role in this project by providing daily training and at-the-elbow support to new volunteers at the superstation. In the course of the 11 weeks, they provided over 3000 hours of support for more than 15,000 registered volunteers.

Following the success of the Petco Superstation, UC San Diego Health opened an additional vaccination station on the UC San Diego campus. The IS team once again stepped up to quickly set up the technology to ready the campus site. This rollout also included pioneering Epic Rover technology for more efficient patient throughput. It allowed scribes and vaccinators to chart the immunization administration on a hand-held device and scan barcodes to reduce data entry errors. Several EMR team members

---

## FOLLOWING THE SUCCESS OF THE PETCO SUPERSTATION, UC SAN DIEGO HEALTH OPENED AN ADDITIONAL VACCINATION STATION ON THE UC SAN DIEGO CAMPUS.

---

collaborated to ensure a smooth transition and hands-on training for the vaccination staff on this new tool. The campus vaccination station at the RIMAC arena in the North UC San Diego campus area operated until May 2021 to vaccinate UC San Diego staff and UC San Diego Health patients.

### RESEARCH HIGHLIGHTS

**Rapid Implementation of a Vaccination Superstation**

<https://jamanetwork.com/journals/jama/fullarticle/2776038>



## COVID-19 Pandemic Response



*Celebrating 100,000 vaccines given at the Petco Park Vaccination Superstation.*

### Using Data Dashboards to Track COVID-19

When the global COVID-19 pandemic began in early 2020, it quickly became clear that tracking data around infection rates, emergency department visits, and hospitalizations would be critical to providing leaders at UC San Diego and UC San Diego Health with the knowledge they needed to make informed decisions about employee and student health as well as patient care. With the guidance of the UC San Diego Health executive team, Enterprise Reporting Director Jennifer Holland and her team in Information Services created customized COVID-19 dashboards using Tableau software that provided a daily snapshot of key metrics related to operational readiness. The dashboards functioned as the source of truth for

Health and UC San Diego campus leadership, helping organize the abundance of data being collected related to the pandemic. To support organizational readiness, the dashboards are sent to all health employees daily, serving as a unifying and transparent dataset across the organization.

The COVID-19 dashboards were created to be agile and could quickly be changed based on feedback from leadership and the evolving needs of the pandemic. The dashboards were an integral component of the Incident Command Center and UC San Diego's Return to Learn program, helping monitor the positivity rates of students on and off campus

Since the initial dashboards were developed, the data featured evolved to include COVID-19 vaccine availability, vaccination rates and appointments, student testing compliance, symptom screening for employees, vaccination equity, and contact tracing.

With each new dashboard iteration, the data included helped leaders make crucial decisions for campus and academic medical center operations. The dashboards

### RESEARCH HIGHLIGHTS

**Medical Undistancing Through  
Telemedicine: A Model  
Enabling Rapid Telemedicine  
Deployment in an Academic  
Health Center During the  
COVID-19 Pandemic**

<https://pubmed.ncbi.nlm.nih.gov/33030985/>



have also been leveraged to strategize how to bring the vaccine to underserved communities in the San Diego region and led to the creation of mobile vaccination stations deployed to those communities.

### Connecting Patients and Providers: Telehealth at UC San Diego Health

Telehealth, a means of connecting providers with patients through video visits, has been a tool used by UC San Diego Health for over a decade. However, once the global COVID-19 pandemic began there was a rapid increase in the need for telehealth technology. The UC San Diego Health Information Services (IS) team, led by Brittany Partridge, Virtual Care Technical Lead, quickly responded to ensure that providers and patients could easily access telehealth services. Brittany and her team set up a command center to oversee the rapid scaling of telehealth services.

Over just a few days, the IS team at an internal command center ensured the telehealth technology could be quickly scaled to provide over 1,200 telehealth visits a day. During that time, the team trained over 600 providers and enabled video visits in over 390 departments. The scaling to 1,200 visits a day was a 1000% increase over the previous telehealth visit volume. To accomplish this large telehealth expansion, the team immediately

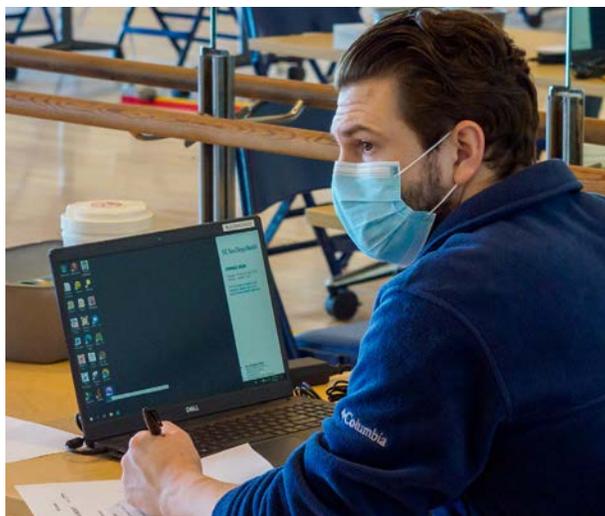
deployed the hardware (Apple iPads) needed for telehealth visits. Team members hand delivered or arranged pickup of over 150 iPads to providers in just a few days.

Realizing that patients would also need assistance, the IS team helped patients become proficient with telehealth technology. Medical students and clinical volunteers, led by Director of International Clinical Program Operations Stacy Holberg, made hundreds of outreach calls to patients to ensure they were comfortable using the technology. The call center hours for MyUCSDChart, the platform used to conduct video visits, were also extended to allow patients to get additional help. To increase accessibility to the diverse populations served by UC San Diego health, the team translated technology tip sheets in other languages and interpreters were added to video visits so that patients with a primary language other than English could participate. In addition, the team enabled multi-provider visits where more than one provider could be present during a video visit. This provided a continued learning experience for medical students and residents who could still shadow providers during a time when all visits were remote. Paul Guthart, member of the Epic Training Team, ensured that consistent training on Telehealth visit workflows and technology was available to all newly hired providers by creating an eLearning video. This video illustrates the Telehealth visit experience from both provider and patient perspectives and has become an important part of onboarding training at UC San Diego.

The implementation of telehealth to nearly all UC San Diego Health providers has been successful with providers and patients using the technology every day. The IS team continues to evaluate the program, sharing best practices and optimizing workflow for providers and offering technical support to patients. The rapid scaling of telehealth services was a response to the pandemic, but the ability for patients and providers to connect virtually is here to stay.



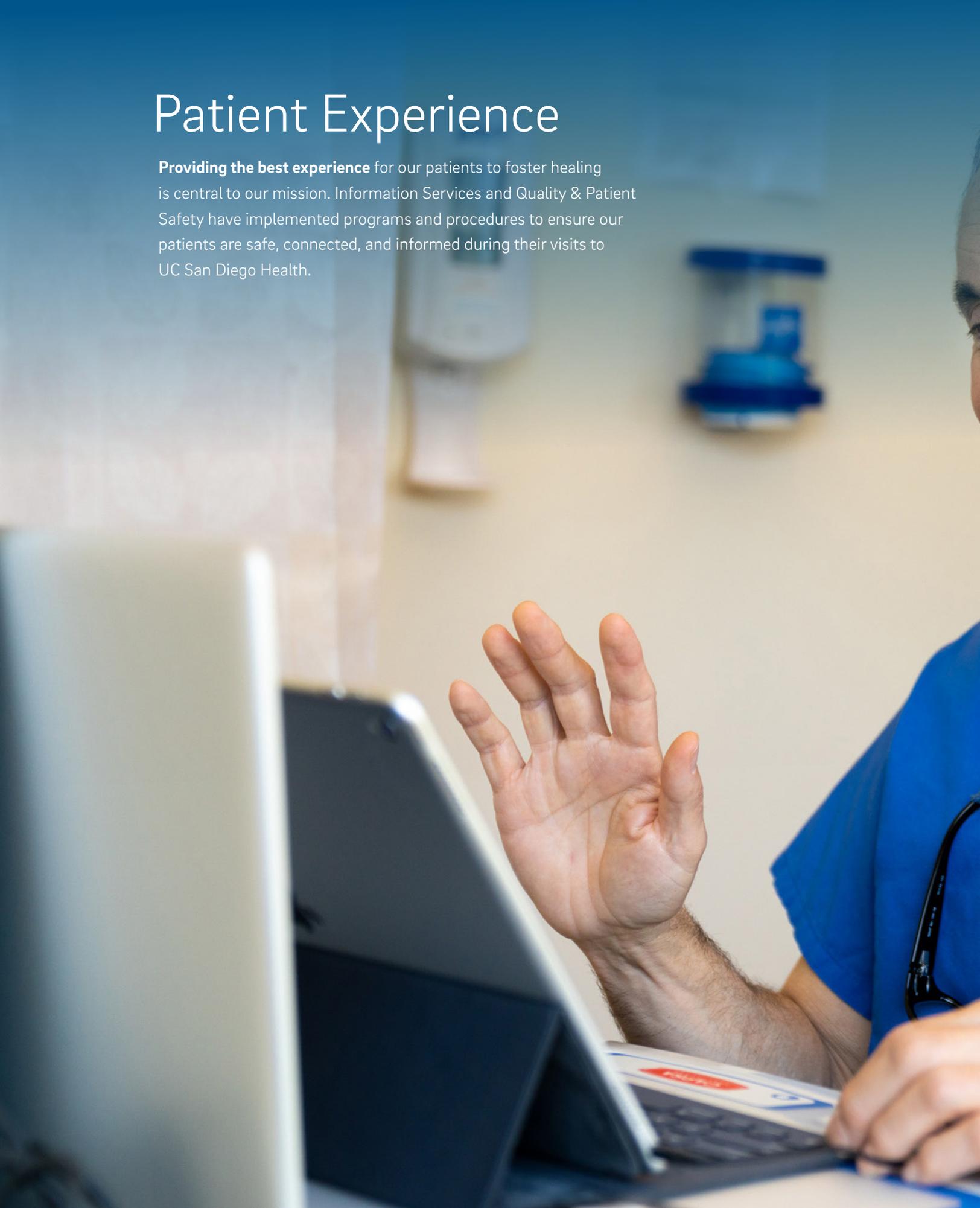
**Josh Glandorf**  
Interim Chief Information Officer



*RIMAC preparations.*

# Patient Experience

**Providing the best experience** for our patients to foster healing is central to our mission. Information Services and Quality & Patient Safety have implemented programs and procedures to ensure our patients are safe, connected, and informed during their visits to UC San Diego Health.





*Dr. Joseph Califano uses telehealth technology to connect with patients.*



*Information Services team members Ariane Kerestesy, Kyle Ficklin-Badaloni, and Eric Boyd.*

### **An Epic Migration: Aligning Student Health Records**

The UC San Diego Health Information Services (IS) team continually strives to use technology to better serve the needs of patients and improve processes for clinicians and patient care providers. Using this approach, the IS team responded to a request from UC San Diego Chancellor Pradeep Khosla to bring UC San Diego students' health records onto the health system's Epic electronic health record (EHR) platform, becoming the first of the UC campuses to leverage their health system's Epic capabilities in this way.

Prior to August 2019, UC San Diego's Student Health Services (SHS) and Counseling and Psychological

Services (CAPS) used a separate EHR system. Their move to the health system's Epic EHR platform provided students with better continuity of care should they need to access services in the health system. In addition, the robust Epic EHR provided features and functionality to make getting care and administering care easier for students and providers alike. For example, students

#### **RESEARCH HIGHLIGHTS**

##### **Student Health Records**

<https://pubmed.ncbi.nlm.nih.gov/33180683/>



can request appointments online, send messages to providers, view test results, request prescription refills, and schedule online telehealth video visits.

The use of Epic for UC San Diego student health records provided an unforeseen benefit when the COVID-19 pandemic hit the U.S. in March 2020. Leaders at UC San Diego recognized a need to keep students who remained on campus safe during the pandemic, while also charting a path for off-campus students to safely return. After consulting with a variety of experts, UC San Diego launched "Return to Learn" in May 2020. A key component of that plan was to make COVID-19 testing readily available to the 5,000 students who remained on campus. Because student health records were already integrated into the UC San Diego Health Epic EHR system, scheduling tests, getting results, and tracking infections was much easier, thus keeping students healthy and enabling the entire student body to return to campus in the fall of 2021.

## Employee Health Records: An Epic Transition

The COVID-19 pandemic became the catalyst for a project that had long been discussed at UC San Diego Health – the transition of employee health data to the Epic electronic health record (EHR) system. Moving the employee health organization to Epic allowed employee health records to be stored in a secure, consolidated location.

The implementation of the project began in the spring of 2020 and was first leveraged as a way for employees to schedule and receive results of COVID-19 tests online. By using Epic for employee health records, UC San Diego Health was able to test employees efficiently and effectively for COVID-19. It also enabled the health system to track COVID-19 positivity rates for employees, providing critical information that guided decision-making by leadership.

## Bringing student health and Well-Being onto a health system EHR: the benefits of integration in the COVID-19 era

J. Jeffery Reeves, MD<sup>a</sup> , Christopher A. Longhurst, MD, MS<sup>b</sup>, Stacie J. San Miguel, MD<sup>c</sup>, Reina Juarez, PhD<sup>d</sup>, Joseph Behymer, MD<sup>c</sup>, Kevin M. Ramotar, PsyD<sup>d</sup>, Patricia Maysent, MPH, MBA<sup>e</sup>, Angela L. Scioscia, MD<sup>f</sup>, and Marlene Millen, MD<sup>b</sup>

<sup>a</sup>Department of Surgery, University of California, San Diego, La Jolla, California, USA; <sup>b</sup>Department of Medicine, Division of Biomedical Informatics, University of California, San Diego, La Jolla, California, USA; <sup>c</sup>Student Health Services, University of California, San Diego, La Jolla, California, USA; <sup>d</sup>Counseling and Psychological Services, University of California, San Diego, La Jolla, California, USA; <sup>e</sup>University of California, San Diego Health, Office of the CEO, La Jolla, California, USA; <sup>f</sup>Student Health and Well-Being, University of California, San Diego, La Jolla, California, USA

### ABSTRACT

**Objective:** To detail the implementation, benefits and challenges of onboarding campus-based health services onto a health system's electronic health record.

**Participants:** UC San Diego Student Health and Well-Being offers medical services to over 39,000 students. UC San Diego Health is an academic medical center.

**Methods:** 20 workstreams and 9 electronic modules, systems, or interfaces were converted to new electronic systems.

**Results:** 36,023 student-patient medical records were created. EHR-integration increased security while creating visibility to 19,700 shared patient visits and records from 236 health systems across the country over 6 months. Benefits for the COVID-19 response included access to screening tools, decision support, telehealth, patient alerting system, reporting and analytics, COVID-19 dashboard, and increased testing capabilities.

**Conclusion:** Integration of an interoperable EHR between neighboring campus-based health services and an affiliated academic medical center can streamline case management, improve quality and safety, and increase access to valuable health resources in times of need. Pertinent examples during the COVID-19 pandemic included uninterrupted and safe provision of clinical services through access to existing telehealth platforms and increased testing capacity.

### ARTICLE HISTORY

Received 6 July 2020  
Revised 8 September 2020  
Accepted 18 October 2020

### KEYWORDS

Clinical informatics;  
electronic health record;  
data-sharing; student  
health; telehealth

## Patient Experience

The move to Epic for employee health records also provided a way to quickly schedule employees for the flu vaccine in the fall of 2020. Employees were able to self-schedule flu vaccinations and could choose from an array of options such as peer-to-peer, drive-up stations, or small satellite clinics. Using Epic to schedule employee flu vaccination was also a way to test the system for use when the COVID-19 vaccine became available. When the vaccine did become available to employees in December 2020, the use of Epic for employees made it easy for employees to schedule their COVID-19 vaccine.

The effort to transition employee health records to Epic was a truly collaborative effort, with team members from the Center for Occupational & Environmental Medicine (COEM), ambulatory, revenue cycle, cadence, Health Information Management (HIM), MyChart, Web, ancillary applications, reporting, enterprise systems, data integration, population health, security, training team, regulatory, compliance, and project management all working together in harmony to make the employee health record transition successful.



### MyUCSDChart App

Recognizing the need for mobile access to electronic health records (EHRs), the members of the IS team worked with their counterparts at UC Irvine to develop the MyUCSDChart app that enables patients to access their EHRs on Apple and Android Devices. First deployed in May of 2018, a more customized and enhanced version of the MyUCSDHealth

app was launched in September 2018.

The MyUCSDChart app has been a key piece of technology for UC San Diego Health patients, who can use the app to schedule in-person and video visits, reserve a time for urgent and express care visits, communicate with their providers,

---

## THE IS TEAM CONTINUALLY STRIVES TO USE TECHNOLOGY TO BETTER SERVE THE NEEDS OF OUR PATIENTS AND IMPROVE PROCESSES.

---

request prescription refills, receive reminders for immunizations and other preventive care, view test results, complete pre-visit forms and electronic check-in, and pay their bills or co-pay.

Once the COVID-19 pandemic began, the app became pivotal in providing telehealth visits, allowing patients continued access to the quality care provided by UC San Diego Health.

### Technology Support for New Facilities

As UC San Diego Health continues to grow, the technology needs of patients and facilities have expanded as well. When Jacobs Medical Center at UC San Diego Health opened in late 2016, it was the culmination of many months of technology planning by the Information Services (IS) department. The 245-bed medical and surgical specialty hospital required the integration of advanced imaging and surgical technologies with comforting environmental elements designed to enhance the healing experience for patients.

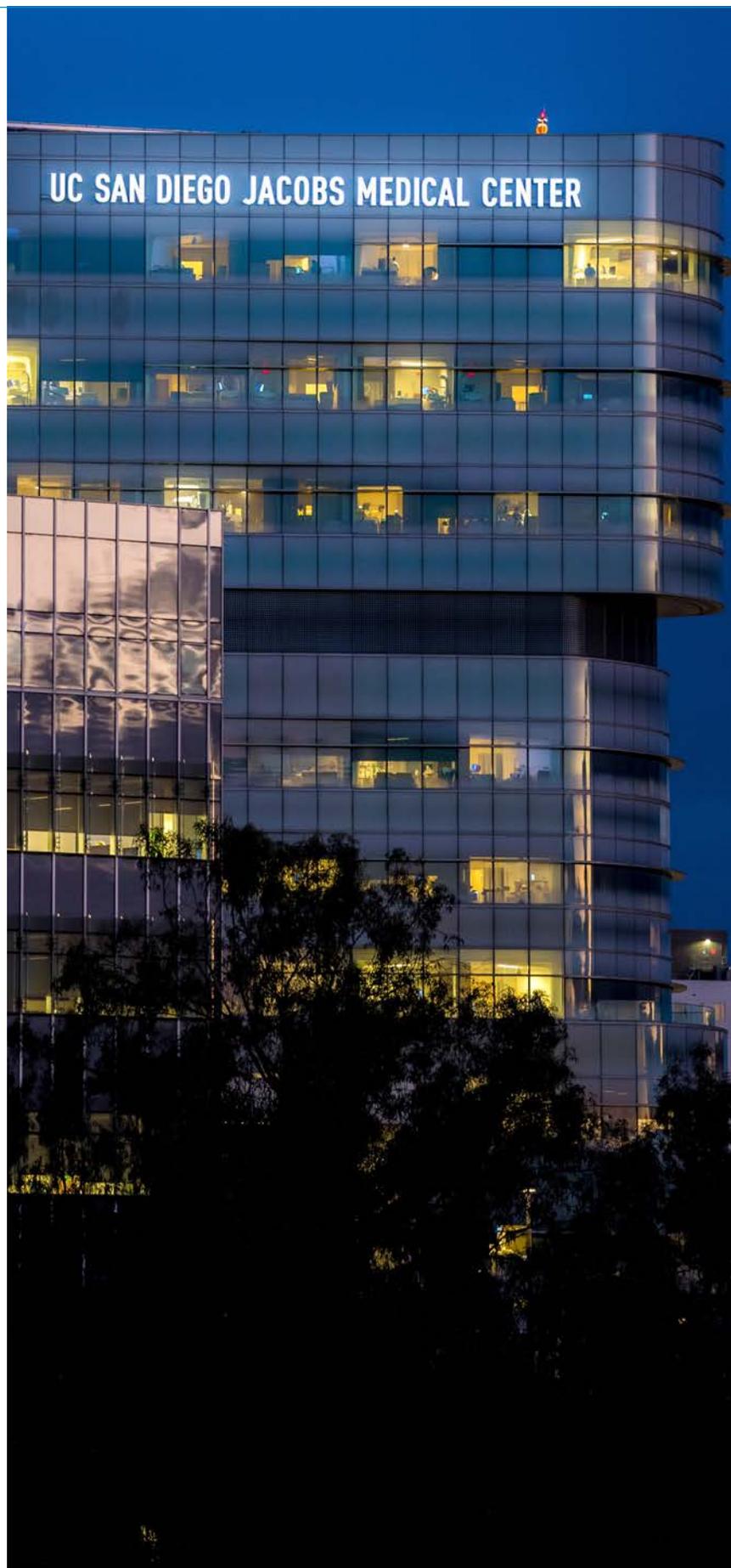
The Jacobs Medical Center opening was an “all hands-on deck” effort by the IS team, which provided leadership and a wide range of support in areas including clinical applications, servers, telecommunications, and imaging. Field technicians were also onsite to immediately address issues that arose. The IS team's work ensured there was a state-of-the-art technology infrastructure when the facility opened.

For Jacobs Medical Center patient room technology, the IS team took an innovative approach by coupling electronic health records (EHR) and room controls with mobile devices. Every patient room was equipped with iPads that control lights, blinds, temperature, and entertainment, as well as providing access to a patient's records and their care team.

While preparing to open the Koman Family Outpatient Pavilion in 2018, the IS team faced new challenges. The pavilion offers an array of integrated outpatient services including clinical care and translational medicine. Connecting the various clinics within the facility meant implementing new technologies. Adding to the challenge was that every new technology needed a security review before being used. Anything that had an Internet Protocol (IP), from fridges to phone systems, needed to be vetted for security. The IS team led the security review for all equipment and technologies, which was a time-consuming effort, but necessary to ensure technology security. The IS team also worked on decommissioning older equipment and moving equipment from other departments and buildings to the new facility.

For each step of the project, the IS team kept the needs of patients and providers in mind. During the selection of new technology carts, the IS team held a "cart festival" where team members and providers could assess each cart and determine which type of cart would best suit their needs. To ensure a great patient experience, the team brought in the medical teams and fake patients for a test run of equipment, information systems, and connectivity before the facility opened.

Although the opening of Jacobs Medical Center and Koman Family Outpatient Pavilion was a massive endeavor, the two new facilities expanded inpatient and outpatient care options by providing the latest technologies and therapies. Patients now have many more options for receiving the best care at UC San Diego Health.



UC San Diego Health Chief Medical Information Officers Dr. Marlene Millen, Dr. Brian Clay, and Dr. Amy Sitapati.



# Caregiver Experience

**Our teams in Information Services and Quality & Patient Safety support** the work of our providers by delivering the technology and tools they need to thrive. From facilitating new ways to connect with patients to maximizing the efficiency of electronic health records, our efforts are focused on easing the technology challenges faced by providers.





*Brittany Partridge displays an iPhone used by UC San Diego Health clinicians.*

# Caregiver Experience

## Enabling Patient and Provider Connections Through Technology

At UC San Diego Health, the focus on patient wellbeing goes beyond medical care. Leaders in the Information Services (IS) department leverage technology to enhance the experience of patients at clinics and hospitals.

This focus on patient wellbeing can be seen in the use of iPads in the inpatient rooms at Jacobs Medical Center. When Jacobs Medical Center opened in 2016, the IS team deployed iPads to each single occupancy room in the medical center. The iPads control the thermostat, blinds and television in the room and contain entertainment apps for patients to enjoy during their stay. These iPads can also be used by patients to access their MyUCSDChart account, via MyChart Bedside, where they can view their care team, see a list of their medications, scheduled care, education materials, and more.

UC San Diego Health IS team members have also worked to ensure that patient care providers have the technology they need to quickly communicate while in clinic. In 2019, IS deployed more than 700 iPhones installed with a mobile app called Rover that provides secure access to the health system's Epic electronic health record (EHR). Providers can use Rover on the iPhones to contact each other, receive alerts, review medications, and even perform wound imaging.

Following the successful launch of the iPhones in clinical settings, IS has received requests from areas across the health system to implement iPhone use. The IS team continues to deploy and support iPhones across the organization, with nearly 1000 iPhones put into service during the first half of 2021.

## Improving Pharmacy Operations Through Willow Ambulatory

Prior to 2019, UC San Diego Health used a variety of software systems in ambulatory pharmacy operations. The Department of Pharmacy and Information Services (IS) team recognized the opportunity to bring the discharge

and community pharmacies onto the Epic electronic health record (EHR), ensuring a seamless and integrated prescription experience for patients and clinicians. Pharmacy stakeholders and analysts on the IS team implemented Epic Willow Ambulatory software for UC San Diego Health pharmacies in February 2019, which had an immediate impact in both operational continuity and budget savings.

The new fully integrated system was embraced and appreciated by clinicians, pharmacists, and pharmacy staff who found it more efficient and easier to use than the prior software systems. With the Epic Willow Ambulatory software clinicians could quickly see if there were any insurance issues with therapies or medications prescribed while patients were still in the hospital. Pharmacists could also view notes and other important information from doctors in a patient's profile.

The initial budget reduction of transitioning the pharmacies to Epic Willow Ambulatory was \$58,000, with additional savings realized as the project progressed. Currently, there is an annual savings of \$120,000 with the use of Epic software by health system pharmacies.

After the successful implementation of the Epic Willow Ambulatory at UC San Diego Health pharmacies, the IS team provided guidance and assistance to the University of California Irvine (UCI) Health in implementing the same software. UCI has also realized cost savings and improved efficiency after deploying the software.

## Shiley Eye Institute: Transitioning to Kaleidoscope

With the majority of clinical specialties live on Epic, it was determined that the Shiley Eye Institute at UC San Diego Health would benefit from a transition to an updated electronic health record (EHR) system. The decision was made to transition the institute to the health system's



**John Torello**  
Chief Technology Officer

# Caregiver Experience



Epic EHR ophthalmology module, Kaleidoscope. Given the complexity of the Shiley Eye Institute’s workflows and extremely high patient volumes, the transition was approached by the Information Services (IS) team thoughtfully and over multiple phases.

Epic’s Kaleidoscope module for ophthalmology works well for managing patient data and billing but does not adequately provide the specialized imaging capabilities needed by ophthalmologists. Bringing Epic Kaleidoscope to the Shiley Eye Institute meant the IS team needed to ensure that the Zeiss Forum ophthalmology imaging technology used at the institute would work in concert with the EHR. Fortunately, the team had previous experience implementing Kaleidoscope through their partnership with UC Irvine. The UC Irvine Gavin Herbert Eye Institute had transitioned to Epic Kaleidoscope in 2017, so the IS team brought the knowledge learned from that experience to the UC San Diego implementation.

The success of Epic Kaleidoscope for the Shiley Eye Institute quickly became apparent considering patient visit volumes were maintained and charge capture by providers was improved. With Epic Kaleidoscope, charge capture is more efficient and providers are able to more accurately collect revenue. In fact, in some cases the institute was able to increase revenue even though patient volume stayed the consistent.

## RESEARCH HIGHLIGHTS

**Multicenter Analysis of Electronic Health Record Use among Ophthalmologists**  
<https://pubmed.ncbi.nlm.nih.gov/32525047/>



## Sprinting to Support Providers

Medical providers often face challenges in using technology to accompany patient care. Entering information into a patient’s electronic health record (EHR) is time consuming. Providers can feel that they are spending more time on record keeping than assisting patients, leading to EHR fatigue. To address this issue, the UC San Diego Health Information Services and the Transformational Health Team lead a joint effort to help optimize the use of EHRs by medical providers called the Sprint project.

In early 2020, the Sprint project began with Internal Medicine to support providers by increasing efficiency and reducing fatigue with the Epic EHR system used at UC San Diego Health. Objectives for the Sprint project included an increase in provider scores in engagement, EHR usability ranking, and efficiency.

During each project, the Sprint team begins with a review of possible issues the providers are having and schedules one-on-one custom training with providers. The custom training gives providers key tips on EHRs and workflow updates. If providers identify specific workflow issues related to EHRs, the Sprint team members work with analysts to review and find solutions.

The Sprint team can track the amount of time providers use the system before and after Sprint training. The data demonstrates that the Sprint project has successfully helped providers significantly decrease their time using EHRs by enabling them to become more efficient and maintain that efficiency over time.

Because the Sprint team spends a significant amount of time with at each clinic or group, typically six to eight weeks, the team prioritizes launching the Sprint project to the areas that have the lowest efficiency scores. An executive team reviews and selects the areas where the Sprint team will be deployed next. The Sprint project has been utilized by a quarter of providers at UC San Diego Health to date and the rollout of the project continues to increase EHR efficiency for the entire health system.



*Stroke Team  
Coordinators, left  
to right: Michelle  
Deligencia, Teneille  
Geib, and Rose Fritts*

# Service Quality

We aim to provide the highest level of quality for our providers, faculty, and staff at all times. Over the past five years we have implemented initiatives and new technologies that enable easier and faster support for our clients.





*Clinical Quality Improvement team.  
Left to right: La Shelle Smith, Kristin  
Bray, DeLee Glasser, Ashley Gambhir,  
Ana Lucas, Michelle Deligencia, and  
Nick Hilbert.*

## Service Quality



Information Services team members offering support for Cloud Computing.

### Oracle Cloud Collaboration

In an effort to unify the financial systems across the UC San Diego campus and at UC San Diego Health, the Information Services (IS) team worked with their campus IT counterparts to bring a single financial system to the entire organization. The Oracle Financial Cloud / General Ledger initiative was a collaborative UC San Diego-wide initiative to implement a single General Ledger and Financial Information System across campus, UC San Diego Health and the UC San Diego Foundation. This was accomplished by replacing the campus mainframe general ledger (IFIS) and the health mainframe general ledger (DBS) and consolidating to a single cloud-based system by Oracle.

This complex Oracle Financial Cloud (OFC) project involved close coordination across many teams from both UC San Diego Health and campus. Additionally, collaboration was required between UC San Diego and the UC Path Center in Riverside due to the significant integration requirements between OFC and UC Path PeopleSoft. UC San Diego successfully implemented the OFC in July 2020, allowing increased collaboration and standardization of UC San Diego financial systems.

### Bringing Technology to Patients and Providers: UBar

UBar was created in 2019 to provide one-on-one mobile support of UC San Diego Health technology tools to patients and providers. Kyle Ficklin-Badaloni, Clinical Applications Professional and UBar ambassador, is available in-person at various UC San Diego Health locations providing walk up assistance to patients and providers.

The UBar ambassador assists patients with signing up for the MyChart patient portal and providers with downloading mobile applications such as Haiku or Canto, which are part of the Epic electronic health record system.

These services offer time savings for patients and providers alike. Kyle also created QR codes that can be scanned by a smartphone to assist with downloading apps. Prior to using the QR codes, configuring apps like Haiku or Canto could take 6 minutes or more. Now it only takes 30 seconds.

During the global COVID-19 pandemic UBar support pivoted to create QR codes to help assist patients (at all UC locations) in downloading the CA Notify Exposure Notification System, employee COVID testing, and COEM. UBar QR codes have been scanned over 45,000 times! UBar ambassadors also delivered iPads to providers to facilitate telehealth visits.



Post-pandemic, UBar is looking to expand the number of ambassadors at UC San Diego Health medical facilities to support an expanded number of patients and providers.



*Kyle Ficklin-Badaloni  
with PMO student  
workers Zhanming  
(Zammy) Wang and  
Rachel Kunowski.*

### Using Data to Drive Decisions: Tableau for Enterprise Analytics

UC San Diego Health has a plethora of data across the enterprise, but prior to 2018 there was not a unified system to manage, access, and utilize the data for patient care or operations. That changed when Tableau was implemented as the enterprise analytics tool across UC San Diego Health in 2018. Analysts create unique dashboards that enable UC San Diego Health leadership with information critical to manage patient care and track overall health system operations. The dashboards are geared to showcase key performance indicators (KPI) and operational views that help various departments with many dashboards containing real-time data.

The use of Tableau in the health system was guided by the UC San Diego Health Enterprise Analytics Steering Committee which assesses organizational needs and makes recommendations on how the software can best support organizational goals. The steering committee provides strategic direction and oversight for the overall data and analytics program including aligning resources, processes and toolsets across the enterprise to support clinical care, operations, research, strategy, education, and innovation. To ensure data privacy, the committee also created policies on who can share data, what data they can share, and what the process is for sharing data ensuring strong data governance for metrics and reports.

To help support the use of Tableau across the enterprise, a subcommittee was established to provide training to team members interested in developing within Tableau. The subcommittee is comprised of analytics point people inside and outside of Information Services who have access to Tableau and hold office hours, help to train users and can work directly with departments to assess needs. There are now over 100 Tableau developers at UC San Diego Health who have been properly trained to use the software.

In addition, Alanna Andrews, Enterprise Analytics analyst, focused her Lean Six Sigma Black Belt project on developing an eLearning module for Tableau. In less than 15 minutes, this course covers important Tableau reporting basics ranging from PHI best practices to auto-populating filters and ensures that Tableau training is consistent and easily accessible to anyone. To find out more, search for "UCSDH-Tableau User Training" (06HSMVBCE0001) on the UC Learning Center.

Since the implementation of Tableau, it has become the gold standard of data analytics software at UC San Diego Health, averaging over 16,000 views per month. The rapid adoption of the software also provided an unforeseen benefit when the COVID-19 global pandemic began. Dashboards created in Tableau were used by organization leaders to closely track hospital admissions, COVID-positive test results, COVID vaccination rates and local infection rates. This data was then used to prioritize pandemic response across the organization.

The use of Tableau continues to evolve based on departmental and organizational needs. Data analytics in clinical research, population health, patient safety, and by affiliated physician groups continue to be used to ensure patients receive optimal care and clinicians have information crucial to making informed decisions.

### Slicer Dicer

In the spring of 2017, the Information Services (IS) Enterprise Analytics team implemented a new tool in the Epic electronic health record (EHR) system that providers and researchers can use to investigate health trends among patient populations. The SlicerDicer is a self-service, hypothesis testing tool within Epic that allows users to explore population data. When using SlicerDicer, users can investigate a hunch and then quickly refine or reformulate their searches to better understand their patient populations.



## Service Quality



*Top Right: The Infection Prevention-Clinical Epidemiology Unit. Bottom row from left to right: Debbie Wightman, Jessica Alicdan, Frank Myers, Dr. Randy Taplitz, Palak Patel, and Michelle Morris. Top row from left to right: Catherine Foley, Dr. Francesca Torriani, Dr. Shira Abeles, and Clancey Collins.*

Implementing SlicerDicer empowered providers and researchers to explore their own theories about trends in the patient population and reduced the amount of requests sent to the IS analytics team. SlicerDicer takes longitudinal patient data documented in Epic and allows users to identify trends in a specific set of patients or across the entire health system. To protect patient privacy, the SlicerDicer provides a high-level overview of trends without patient level details. With the spring 2021 addition of population health to SlicerDicer, users can also include geographic data in their SlicerDicer metrics, providing a snapshot of how location effects patients. The new population health data in SlicerDicer can uncover geography-based patient trends and help target populations for interventions if needed.

### **Measuring Quality and Safety: A Journey to High Reliability**

In recent years, UC San Diego Health has received stellar hospital ratings by Vizient, CMS, *U.S. News & World Report*, and Leapfrog, the leading organizations that rank and rate hospitals. These rankings and ratings are a culmination of a coordinated effort across UC San Diego Health to deliver the safest care of the highest quality and reflect mile markers on our journey to high reliability.

To closely monitor quality and safety measures, the Quality Public Profile Committee was formed to make

recommendations on improvement areas and to oversee the collection, analysis, and submission of data by which the health system is measured. The committee has broad representation including members from each UC San Diego Health Institute, physicians, APPs, and administrative leaders and is chaired by Chad VanDenBerg, Chief Quality & Patient Safety Officer and former CIO Chris Longhurst, MD, now Chief Medical Officer & Chief Digital Officer at UC San Diego Health. Peter Chu, Project Manager, Quality & Patient Safety, helped organize and facilitate the committee's work. The committee was initially formed to focus efforts specific to the *U.S. News & World Report* rankings but quickly moved into guiding efforts across each of the hospital ranking and rating agencies.

The committee worked closely with the UC San Diego Health Information Services (IS) and Quality Analytics teams to develop dashboards in Tableau that are used to track safety measures, including mortality, readmissions, infections, and experience. These dashboards allow deeper transparency into quality and safety metrics and provide the committee with essential and actionable information.

The organizational focus on quality and safety, guided by the Quality Public Profile Committee, has helped



*An Information Services town hall meeting.*

the health system make improvements that lead to significant gains in the hospital ratings. Since the fall of 2019, UC San Diego Health has attained and sustained "A" safety grades from Leapfrog, which reflect highly reliable safety structures, processes, and outcomes, for both its Hillcrest and La Jolla hospitals. This "A" rating was a significant improvement from the "C" grades the hospitals received in 2017. Similarly, UC San Diego Health regained its #1 in San Diego ranking by *U.S. News & World Report* in 2020 after losing this designation in 2017. By focusing on quality and patient safety and by using data analytics to guide organizational priorities, UC San Diego Health is once again publicly recognized for the outstanding care that it provides to its community through these accolades. The most important aspect of the efforts to focus on quality and safety is the improved outcomes for patients. It is patients that inspire UC San Diego Health to remain committed to the journey to high reliability.

### Implementing a New Path: UC Path at UC San Diego Health

Beginning in 2017, the University of California Office of the President (UCOP) began implementing UC Path, a UC-wide initiative to migrate every campus to a single human resource management and payroll system.

UC San Diego went live with UC Path (Payroll, Academic Personnel, Timekeeping, and Human Resources) in June 2020 after months of work and preparation.



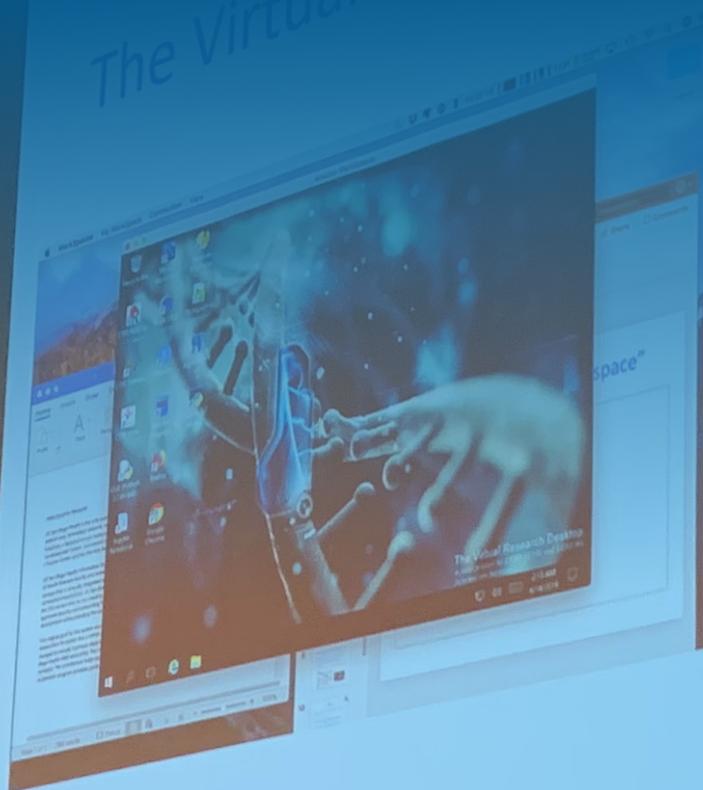
**Chad VanDenBerg**  
Chief Quality and Patient Safety Officer

Collaboration was key to getting the project implemented at UC San Diego. Many teams from both UC San Diego and UC San Diego Health worked in tandem to move the campus and academic health system from multiple human resources software systems to UC Path. Internal coordination between the Information Services, finance, payroll, and human resources teams helped convert over 12,000 health system employees to UC Path. Significant collaboration with UCOP, the UC Path Center in Riverside, and Huron also made the project possible.

The implementation of UC Path at UC San Diego and UC San Diego Health has enabled all UC locations to standardize business processes and allowed UC San Diego Health to modernize the systems supporting their business operations.



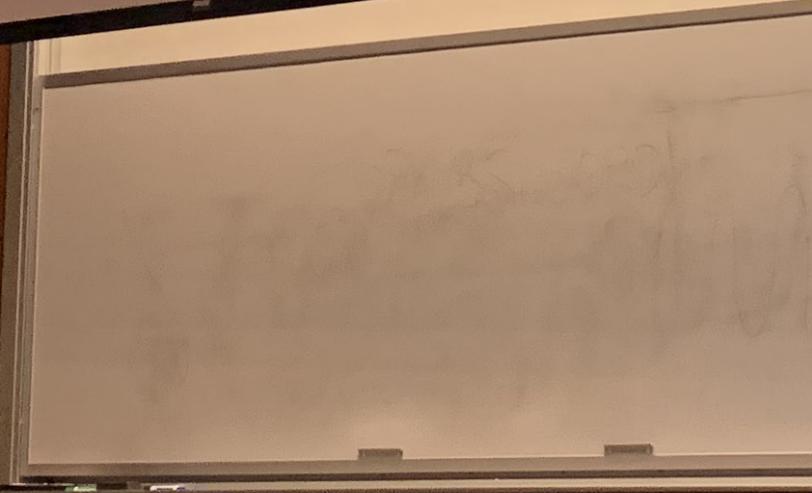
# The Virtual Research Desktop



- A virtual research desktop
- Highly secure – quarantined from the Internet
- Closely monitored
- Multiple analysis tools
  - SAS
  - R Studio
  - Python
  - MatLib
- Connects to clinical research systems
  - eVelos (CTMS)
  - REDCap
  - Tableau for Research
  - “Data Commons”

UC San Diego

EXIT



# Innovation

**Information Services and Quality & Patient Safety are at the forefront** of using technology to address current needs while planning for the future. Through programs designed to foster innovation, we are working to bring the next generation of health tech to UC San Diego Health today.

Health



*Dr. Michael Hogarth presents information on the virtual research desktop at Health Data Day 2019.*

### Using Technology to Track Population Health

The UC San Diego Health Information Services (IS) team has continued to mature a number of innovative and cutting edge tools that serve as best in class in population health informatics. These products are based on the core infrastructure of population health registries that serve to provide the grouping backbone that make determining the right care for patients scalable and efficient. The IS team has experience and expertise that is unparalleled. In the past five years, the team has enhanced existing registries, improved architecture infrastructure, and scaled tools outside of the service area. There are currently 161 active registries containing 7,515 metrics that include 11 million duplicated lives. These include 36 chronic disease registries, 21 managed care registries, 17 wellness registries, and many more. A few of the most notable registries have included “Get with the Guidelines” stroke registry that streamlines national reporting, homelessness in the past year, COVID-19 registries, and emergent general surgery.

Population health has a suite of tools that enhance workflows, knowledge, and ultimately care delivery to patients. These include the artificial intelligence, SlicerDicer, digital health, social determinants of health, and the social deprivation index. UC San Diego Health in the past five years has matured beyond typical risk scores such as atherosclerotic cardiovascular disease (ASCVD) and introduced a number of cloud computing models that provide predictive analytics such as risk of no show, unplanned re-admission, remaining length of stay, and deterioration index to name a few. In digital health, working with the UC San Diego Health Population Health Services Organization, 1627 patients have a digital experience with tele-retinal exams, digital health coaching, integrated glucometer data, and integrated home blood pressure cuffs. Additionally, the SlicerDicer models have moved beyond the base patient model to include other data models such as births, surgeries and invasive procedures, and visits. These provide real time ad hoc reporting opportunities to quickly identify cohort and volume estimates. There are now 860

users with 4,853 active SlicerDicer query sessions. At a patient level, collection of social determinants of health continue to be scaled. These practices now have active standards in primary care to screen all patients for depression, alcohol use, and tobacco use. Related to tools that identify contextual structural barriers to care, the social deprivation index called healthy places index has also been incorporated. This maps local census block information for every patient that is active at UC San Diego Health. Using population health tools has helped providers better identify at-risk patients and provides insight into the challenges patients face in obtaining care.

### Harnessing Data for Research and Patient Safety

When the inaugural Health Data Day was held at the UC San Diego School of Medicine campus in 2018, it was an innovative opportunity to educate UC San Diego faculty, staff, and students about the wealth of data available for research at UC San Diego Health. With over 20 billion clinical data observations available to researchers, Health Data Day provided essential information on how to access and analyze the data and provided instruction on the regulatory and institutional policies that govern data access and safeguard patient privacy and data security.

Health Data Day was organized by the Information Services (IS) team at UC San Diego Health. The goal of the event was to more deeply engage the UC San Diego community in clinical research and quality improvement by demonstrating the available data and data-extraction tools. Topics covered during the 2018 and 2019 events included using the SlicerDicer tool in Epic, the health system's electronic health record, using the UC Data Warehouse for research, block chain, wearable technologies, artificial intelligence and machine learning, and privacy and compliance.

Although Health Data Day 2020 did not take place due to the global COVID-19 pandemic, the event will continue with the goal of showcasing available health data and data tools to the UC San Diego community in the future.

## Health Hack-a-thon

In 2017, UC San Diego Health sponsored the first UC Health Hack, a two day hack-a-thon that brought UC San Diego students, researchers, physicians, and industry professionals together to tackle pressing issues in global health and medicine. The hack-a-thon event was organized by Information Services' Andrew Greaves, Enterprise Cloud Architect, and Tracy Magee, Clinical Systems Manager, with sponsorship also provided by partner health organizations Rady Children's Hospital-San Diego, UC Irvine Health, and Amazon Web Services.

UC Health Hack engaged students from across the UC campus and in the community to solve real-world problems. Participants were given a general healthcare problem to consider, like home healthcare, and were challenged to create innovative solutions to the issue. With the guidance of mentors and healthcare experts, participants used technology to present viable solutions to the problem.

After two days spent on developing projects, participants presented their ideas to a panel of experts who chose the winning teams. Prizes ranged from \$5,000 for the first place team to \$1,000 for third.

The UC Health Hack has become an annual event, with another successful hack-a-thon being held in 2019 and a virtual event taking place in 2021.

## Leading Change Through Strategic Planning

The relationship between patient care and technology has become ever more symbiotic and complex. Similarly, UC San Diego Health's need for the technical expertise and strategic partnership Information Services (IS) can provide has significantly increased. How best to support the health system and be good stewards of finite IS resources and capacity presents a unique challenge. But, the thoughtful and organized approach brought to UC San Diego Health by PMO Director Nicole May and her team has made the organization's strategic technology planning and prioritization process easier and more transparent. When Nicole joined the IS department

in 2018, there were multiple processes for requesting projects and budget items with little cohesive planning, resulting in what seemed like constantly shifting priorities and heroic efforts to execute projects. Nicole and her team

established a structured intake and assessment process that enables leadership to predict needs and plan for them, while allowing for flexible decision-making as priorities change. Now, strategic portfolio management occurs year-round enabled by detailed portfolio analysis, project surveillance, results tracking, and governance. In addition, IS engages leadership from across the health system to participate in an annual planning process where stakeholders present project ideas and participants are invited to provide feedback and ultimately vote on the projects IS will undertake each fiscal year. Through this process and the ongoing project governance system established by the PMO, IS is a valued and trusted partner that is tightly aligned with organizational goals.

The adoption of this new strategic planning process was useful when the COVID-19 pandemic began. UC San Diego Health leaders were able to quickly shift strategic priorities to address the pandemic while having a clear picture of how these changes would impact other technical work.



**Nicole May**  
PMO Director



*The first UC Health Hack.*



CMIO Dr. Marlene Millen.

The new strategic planning and project management process has been so successful at UC San Diego Health that Nicole and the PMO team are training project offices at other University of California campuses in their methods. Named "PM Lite" the process has been implemented at several campuses and is becoming the standard across the UCs.

## Center for Health Innovation

The [Center for Health Innovation](#) at UC San Diego, launched in September 2021, aims to develop, test and commercialize technologies that make a real, measurable difference in the lives of patients.

Initial projects for the new center will focus on refining the virtual visit experience for patients with technologies like wearable sensors that can monitor chronic conditions. The goal is to focus on older adults, high-risk patients with diabetes and hypertension and patients in hard-to-reach geographies.

The Center for Health Innovation is partnering with and modeled after the University Health Network's (UHN) Techna Institute, jointly located within the organization's hospital sites and at the University of Toronto. Techna Institute, in partnership with others, has designed innovative products now used in hospitals in clinics. UC San Diego Health and TECHNA Institute first collaborated on CA Notify, a smartphone-based system built on Google-Apple exposure notification technology, to help quell the SARS-CoV-2 surge. It is estimated that 1 in 3 California residents over the age of 18 now uses CA Notify.

The new center will be located on the La Jolla campus of UC San Diego. Collaborators will include



the UC San Diego Design Lab, Qualcomm Institute, and Jacobs School of Engineering. Center for Health Innovation website: [healthinnovation.ucsd.edu](http://healthinnovation.ucsd.edu)

### Innovations in Clinical Research

Translating medical discoveries and innovations to the bedside is a complex process. Technology is a key component of translational medicine and the Information Services (IS) team at UC San Diego Health provides technical expertise and leadership to support clinical research and implementation.

Leading the strategy and support for translational medicine is Michael Hogarth, MD, Chief Clinical Research Information Officer for UC San Diego Health. Since joining UC San Diego Health in 2018, Hogarth has led projects to leverage cloud computing to improve research security, optimize the use of electronic health records (EHRs), and build the next generation of clinical research infrastructure.

Under the leadership of Dr. Hogarth, UC San Diego has become a trailblazer in building a secure clinical research cloud environment. Dr. Hogarth worked with IS Enterprise Cloud Architect Andrew Greaves, and Amazon Web Services (AWS), a cloud-based host for a suite of research tools, to create the UC San Diego Health Secure Clinical Research Cloud on AWS. The research cloud is a state-of-the-art secure computing environment where research can take place without access to or from the internet. This enables researchers to work on a virtual research desktop and perform computation on sensitive data such as protected health information from the electronic health record (EHR) protected by some of the most sophisticated and robust cybersecurity protection available.

The AWS cloud space is also used to leverage the health system's data and examine it for research, quality, and safety. One area where AWS is being used to improve patient outcomes is in sepsis prevention. AWS uses machine learning to predict when sepsis is likely to occur in

a patient, which allows the care team to enact sepsis prevention measures.

Using AWS to track potential infections became especially important during the COVID-19 pandemic. As Director of Biomedical Informatics at the Altman Clinical and Translation Research Institute (ACTRI), Dr. Hogarth learned of an artificial intelligence (AI) algorithm that had been developed by Albert Hsiao, MD, of the UC San Diego School of Medicine, to assist clinicians in detecting atypical pneumonia, a type of pneumonia common in COVID-19. Trained with 22,000 notations by human radiologists, the algorithm overlays X-rays with color-coded maps that indicate pneumonia probability. Facilitated by UC San Diego Health's Clinical Research IT team, Dr. Hsiao's AI method has been deployed across UC San Diego Health in a clinical research study that allows any physician or radiologist to get an initial estimate regarding a patient's likelihood of having pneumonia within minutes, at point-of-care. With this information, the patient care team can quickly decide if a patient should stay in the hospital for supportive care or could be sent home and monitored if signs of pneumonia are not detected.

Moving forward, Dr. Hogarth will continue to use AWS to enhance clinical research capabilities, from developing a self-serve research environment to optimizing AWS workspaces.



**Marlowe McCray**  
Director of Finance, Information Services

### RESEARCH HIGHLIGHTS

**Deployment of Artificial Intelligence for Radiographic Diagnosis of COVID-19 Pneumonia in the Emergency Department** <https://pubmed.ncbi.nlm.nih.gov/33392549/>





# Partnerships & Collaboration

**Working with partners is critical to achieving the information technology goals** of UC San Diego Health. Our partnerships and collaborations allow us to expand our impact across the enterprise and beyond.

## Partnership & Collaboration



*Dr. Longhurst with the team from North Coast Family Medical Group, affiliate members of the Epic Community Connect program.*

### **Partnering to Improve Patient Care: Affiliate Epic Community Connect Program**

Recognizing the power of working together to better serve patients, UC San Diego Health Information Services (IS) and Population Health Services Organization (PHSO) collaboratively launched the Affiliate Epic Community Connect program in 2015. The Affiliated Network is a collection of individual physicians and practices that have partnered to improve patient care and reduce overall healthcare costs. The first affiliate was implemented in February 2016 with 28 providers. Since that first implementation, the program has grown significantly by adding providers of different size, specialty, and location to support the UC San Diego Health-PHSO mission. With the implementation of an orthopedic practice in June 2021, the provider count increased to about 300, a growth rate of over 1000% since the program's launch.

The affiliate expansion program is managed by the Practice Affiliations and Community Connect (PACC) team. This program is strategically tied to the mission of the UC San Diego Health PHSO as the team implements and supports Epic EMR for Accountable Care Organization (ACO)/Clinically Integrated Network (CIN) affiliates using the Epic Community

Connect application platform and best practices. Through the sharing of a common EMR, PHSO affiliated practices can improve overall patient care and reduce healthcare costs for PHSO's managed populations.

The implementation of strategically affiliated practices on the UC San Diego Health Epic Community Connect platform provides many benefits for the affiliate and the PHSO. The affiliate benefits from a best in class EMR that enhances its patient engagement, practice management, patient care, quality, and revenue cycle tools. During the COVID-19 pandemic, primary care affiliates were able to leverage telehealth workflows in Epic to keep patients engaged through televisits which were up to 90% of their encounters at the peak of the pandemic. Overall, the number of affiliate telehealth visits grew 168% year over year, and most of the affiliates have >60% of their patients on MyChart as of September 2021.

For PHSO, the program has resulted in improved quality metrics and reduced costs for shared patients in the UC San Diego Health Accountable Care Organization as well as collaboration on new insurance products for the community. For payment year 2020, the average ACO affiliate cost per beneficiary per year was 24% below the CMS benchmark. The program has allowed PHSO to expand their provider network by adding new affiliate practices based on location and specialty. Existing affiliated practices have leveraged Epic to optimize their operations and continue to grow by acquiring or adding new locations and specialties to support their business objectives while enhancing the PHSO geographical coverage. The partnership between the PHSO and affiliated practices continues to prosper as increased benefits are realized by both partners.

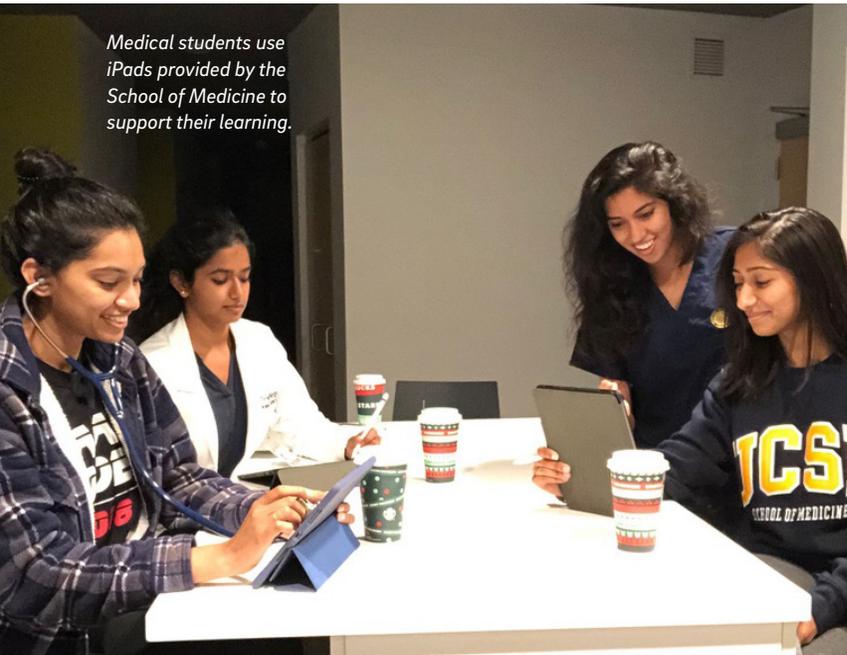
### **An "Epic" Partnership: UC San Diego Health and UC Irvine Health**

In 2017, UC Irvine Health and UC San Diego Health entered an "Epic" partnership where the both health

A pre-pandemic PMO group meeting.



## Partnership & Collaboration



*Medical students use iPads provided by the School of Medicine to support their learning.*

systems began sharing an instance of the cloud-based Epic electronic health record (EHR) system.

The partnership was a first-of-its-kind collaboration within UC Health and was the first time Epic has been shared by two academic medical systems in the U.S.

The groundbreaking collaboration aligned the strategic goals of UC Health to share services and generate efficiencies across campuses through shared implementation and maintenance of technology platforms. The sharing of Epic and supporting systems allowed the health systems to align clinical pathways and practices to harness the brainpower of both organizations.

Because the Epic EHR from both UCI Health and UC San Diego Health are integrated, the population served by healthcare providers using the system was doubled. The shared instance of Epic among the two health systems has provided improved coordination of patient care among physicians, including practice affiliates. Patients in San Diego, Riverside, Imperial, and Orange counties are offered integrated care by the combination of the two organizations. This alignment

also provides unique opportunities for innovation, scholarship, and population health research.

The Epic shared environment between UC San Diego Health and UC Irvine Health is a part of a larger collaboration between the health systems on technology licensing, support, and implementation. This partnership is unique among the University of California health systems and has laid the groundwork for future UC-wide collaborations.

### Implementing Technology to Improve Medical Education

Assessing and implementing educational technology for medical students is a challenge, but one that Lina Lander, ScD, is ideally suited to tackle. When Dr. Lander joined UC San Diego Health in 2017, she brought her years of experience as a professor and her expertise in technology to her role as Associate Dean, Education Technology, Innovation and Assessment. Her dual expertise helps bridge the space between technology and the needs of students in the School of Medicine (SOM), where she is an Associate Professor at the Department of Family Medicine.

Tasked with modernizing technology infrastructure at SOM, Dr. Lander quickly assessed that several technology systems being used at the School of Medicine could be improved to better serve the needs of faculty and students. She led the effort to phase out legacy systems and upgrade to more modern technology solutions. To improve the faculty workflows, Dr. Lander's team moved the SOM to MedHub, software that provides a central source of evaluations and scheduling data for medical trainees.

As a former Apple Inc. Development Executive, Dr. Lander focused on improving student experience. This involved replacing an outdated online learning management system with Canvas to organize all course materials and easily share them with students.

With SOM and SSPPS leadership support and in collaboration with student leaders, Dr. Lander launched an iPad learning initiative (named "Triton MedTech") for students, which provides first and second year medical students and first, second, and third year pharmacy students with iPads to support their learning. This program provides an equitable environment for student learning and ensures that all students have access to the best technology for learning. The iPad program has also enabled students to save money by using digital textbooks.

Dr. Lander also wanted to provide stronger community connections using digital tools. For major SOM events, such as the white coat ceremony (where medical students receive their first white coats), Match Day (where students are matched with resident programs), and graduation, Dr. Lander worked with the UC San Diego Health Information Services A/V team to livestream these events. That way, friends and family from across the globe could virtually attend these events and share important milestones with students.

---

**"I APPRECIATE THE SUPPORT OF THE ENTIRE IS TEAM IN OUR EFFORTS TO IMPLEMENT TECHNOLOGY MODERNIZATION AT THE SCHOOL OF MEDICINE."**

*—DR. LANDER*

---

The rapid improvements led by Dr. Lander took on a new significance when the COVID-19 global pandemic began. With little time to prepare, medical education at UC San Diego became fully remote in the spring of 2020. The technology put in place prior to the pandemic enabled a smooth transition to remote and hybrid education. The prior use of live-streaming for events was beneficial when medical education had to continue in a hybrid fashion. As Dr. Lander

frequently states, "SOM is a truly special place, and it is an honor and a privilege to use technology to enable medical education and support our outstanding students, staff, and faculty."

### **Observational Medical Outcomes Partnership (OMOP) & UC Data Warehouse**

In 2016, UC San Diego Health established a local health system Observational Medical Outcomes Partnership (OMOP) database to align with industry data standards and enable cross UC analytics. OMOP's Common Data Model (CDM) enables the consistent capture of information among different institutions. The CDM standardized the format and content of observational data so that applications, tools, and research methods can be applied across multiple datasets. Locally, UC San Diego Health utilizes OMOP for its state Quality Incentive Pool (QIP) reporting.

The OMOP CDM became the framework for the UC Data Warehouse (UCDW), a project of the University of California Office of the President that is a centralized data repository for all University of California academic health systems. This consolidation and standardization of data across UC Health organizations supports operational and research initiatives by expanding the information available to the University of California system.

At UC San Diego Health, analysts use the information in the UCDW to develop dashboards that track quality measures and create custom dashboards for special projects. Operations are enabled to work on cross-UC Leveraging Scale for Value programs, improving care for patients and realizing cost savings. During the COVID-19 pandemic, the analytics team created daily dashboards to locally track the pandemic. That same data was then available to other analysts and researchers across the UC system. The UCDW data was especially helpful for tracking COVID-19 metrics in the San Diego region and across California, providing medical system leadership and public health officials with information vital to making informed decisions on addressing the pandemic.

## Select Publications

### 2021

Baxter SL, Gali HE, Mehta MC, Rudkin SE, Bartlett J, Brandt JD, Sun CQ, Millen M, Longhurst CA; **Multicenter Analysis of Electronic Health Record Use among Ophthalmologists**; *Ophthalmology*; 2021. <https://pubmed.ncbi.nlm.nih.gov/32525047/>

Keehner J, Horton LE, Pfeffer MA, Longhurst CA, Schooley RT, Currier JS, Abeles SR, Torriani FJ; **SARS-CoV-2 Infection after Vaccination in Health Care Workers in California**; *The New England Journal Of Medicine*; 2021. <https://pubmed.ncbi.nlm.nih.gov/33755376/>

Longhurst CA, Kremer B, Maysent PS; **Rapid Implementation of a Vaccination Superstation**; *JAMA*; 2021 <https://pubmed.ncbi.nlm.nih.gov/33507206/>

Maggio LA, Dameff C, Kanter SL, Woods B, Tully J.; **Cybersecurity Challenges and the Academic Health Center: An Interactive Tabletop Simulation for Executives**; *Acad Med*; 2021. <https://pubmed.ncbi.nlm.nih.gov/33239532/>

Meyer BC, Friedman LS, Payne K, Moore L, Cressler J, Holberg S, Partridge B, Prince B, Sylwestrzak M, Jenusaitis M, Kremer B, Kane CJ, Sitapati A, Clay B, Millen M, Longhurst C.; **Medical Undistancing Through Telemedicine: A Model Enabling Rapid Telemedicine Deployment in an Academic Health Center During the COVID-19 Pandemic**; *Telemed J E Health*; 2021. <https://pubmed.ncbi.nlm.nih.gov/33030985/>

Tai-Seale M, Rosen R, Ruo B, Hogarth M, Longhurst CA, Lander L, Walker AL, Stults CD, Chan A, Mazor K, Garber L, Millen M; **Implementation of Patient Engagement Tools in Electronic Health Records to Enhance Patient-Centered Communication: Protocol for Feasibility Evaluation and Preliminary Results**; *JMIR Res Protoc*; 2021. <https://pubmed.ncbi.nlm.nih.gov/34435960/>

Tresenriter M, Holdaway J, Killeen J, Chan T, Dameff C.; **The Implementation of an Emergency Medicine Telehealth System During a Pandemic**; *J Emerg Med*; 2021. <https://pubmed.ncbi.nlm.nih.gov/33423835/>

### 2020

Baxter SL, Gali HE, Chiang MF, Hribar MR, Ohno-Machado L, El-Kareh R, Huang AE, Chen HE, Camp AS, Kikkawa DO, Korn BS, Lee JE, Longhurst CA, Millen M.; **Promoting Quality Face-to-Face Communication during Ophthalmology Encounters in the Electronic Health Record Era**; *Appl Clin Inform*; 2020. <https://pubmed.ncbi.nlm.nih.gov/32074650/>

Carlile M, Hurt B, Hsiao A, Hogarth M, Longhurst CA, Dameff C.; **Deployment of Artificial Intelligence for Radiographic Diagnosis of COVID-19 Pneumonia in the Emergency Department**; *J Am Coll Emerg Physicians Open*; 2020. <https://pubmed.ncbi.nlm.nih.gov/33392549/>

Dameff C, Farah J, Killeen J, Chan T.; **Cyber Disaster Medicine: A New Frontier for Emergency Medicine**; *Ann Emerg Med*; 2020. <https://pubmed.ncbi.nlm.nih.gov/31959537/>

Reeves JJ, Hollandsworth HM, Torriani FJ, Taplitz R, Abeles S, Tai-Seale M, Millen M, Clay BJ, Longhurst CA; **Rapid Response to COVID-19: Health Informatics Support for Outbreak Management in an Academic Health System**; *Journal Of The American Medical Informatics Association*; *JAMIA*; 2020. <https://pubmed.ncbi.nlm.nih.gov/32208481/>

Reeves JJ, Longhurst CA, San Miguel SJ, Juarez R, Behymer J, Ramotar KM, Maysent P, Scioscia AL, Millen M; **Bringing Student Health and Well-Being onto a Health System EHR: the Benefits of Integration in the COVID-19 Era**; *J Am Coll Health*; 2020. <https://pubmed.ncbi.nlm.nih.gov/33180683/>

Sitapati AM, Berkovich B, Arellano AM, Scioscia A, Friedman LS, Millen M, Maysent P, Tai-Seale M, Longhurst CA; **A Case Study of the 1115 Waiver Using Population Health Informatics to Address Disparities**; *JAMIA Open*; 2020. <https://pubmed.ncbi.nlm.nih.gov/32734157/>

Tully J, Selzer J, Phillips JP, O'Connor P, Dameff C.; Tully J, Selzer J, Phillips JP, O'Connor P, Dameff C. **Healthcare Challenges in the Era of Cybersecurity**; *Health Secur*; 2020; PMID: 32559153. <https://pubmed.ncbi.nlm.nih.gov/32559153/>

### 2019

Dameff C, Pfeffer MA, Longhurst CA; **Cybersecurity Implications for Hospital Quality**; *Health Serv Res*; 2019. <https://pubmed.ncbi.nlm.nih.gov/31506957/>

Dameff C, Clay B, Longhurst CA; **Personal Health Records: More Promising in the Smartphone Era?**; *JAMA*; 2019. <https://pubmed.ncbi.nlm.nih.gov/30633300/>

Gali HE, Baxter SL, Lander L, Huang AE, Millen M, El-Kareh R, Nudleman E, Chao DL, Robbins SL, Heichel CWD, Camp AS, Korn BS, Lee JE, Kikkawa DO, Longhurst CA, Chiang MF, Hribar MR, Ohno-Machado L.; **Impact of Electronic Health Record Implementation on Ophthalmology Trainee Time Expenditures**; *J Acad Ophthalmol*; 2019. <https://pubmed.ncbi.nlm.nih.gov/33954272/>

Tai-Seale M, Downing NL, Jones VG, Milani RV, Zhao B, Clay B, Sharp CD, Chan AS, and Longhurst CA; **Technology-Enabled Consumer Engagement: Promising Practices At Four Health Care Delivery Organizations**; *Health Affairs*; 2019 <https://www.healthaffairs.org/doi/10.1377/hlthaff.2018.05027>

### 2018

Downing NL, Bates DW, Longhurst CA; **Physician Burnout in the Electronic Health Record Era: Are We Ignoring the Real Cause?**; *Annals Of Internal Medicine*; 2018. <https://pubmed.ncbi.nlm.nih.gov/29801050/>

### 2017

Shaikh U, Afsar-Manesh N, Amin A, Clay B, Ranji S; **Using an Online Quiz-Based Reinforcement System to Teach Healthcare Quality and Patient Safety and Care Transitions at the University of California**; *Int J Qual Health Care*; 2017. <https://pubmed.ncbi.nlm.nih.gov/28992149/>

Sitapati A, Kim H, Berkovich B, Marmor R, Singh S, El-Kareh R, Clay B, Ohno-Machado, L; **Integrated Precision Medicine: the Role of Electronic Health Records in Delivering Personalized Treatment**; *Interdiscip Rev Syst Biol Med*; 2017. <https://pubmed.ncbi.nlm.nih.gov/28207198/>

## Information Services and Quality & Patient Safety Awards

### 2021

[College of Healthcare Information Management Executives \(CHIME\)](#)  
"Most Wired" Ambulatory and Acute Categories

#### [Larry L. Sautter Award \(UCOP ITS\)](#)

Golden Awards for Innovation in Information Technology  
Silver Awards for Innovation in Information Technology

### 2020

[College of Healthcare Information Management Executives \(CHIME\)](#)  
"Most Wired" Ambulatory and Acute Categories

#### [Larry L. Sautter Award \(UCOP ITS\)](#)

Golden Awards for Innovation in Information Technology

### 2019

[College of Healthcare Information Management Executives \(CHIME\)](#)  
"Most Wired" Ambulatory Category

### 2018

[College of Healthcare Information Management Executives \(CHIME\)](#)  
"Most Wired"

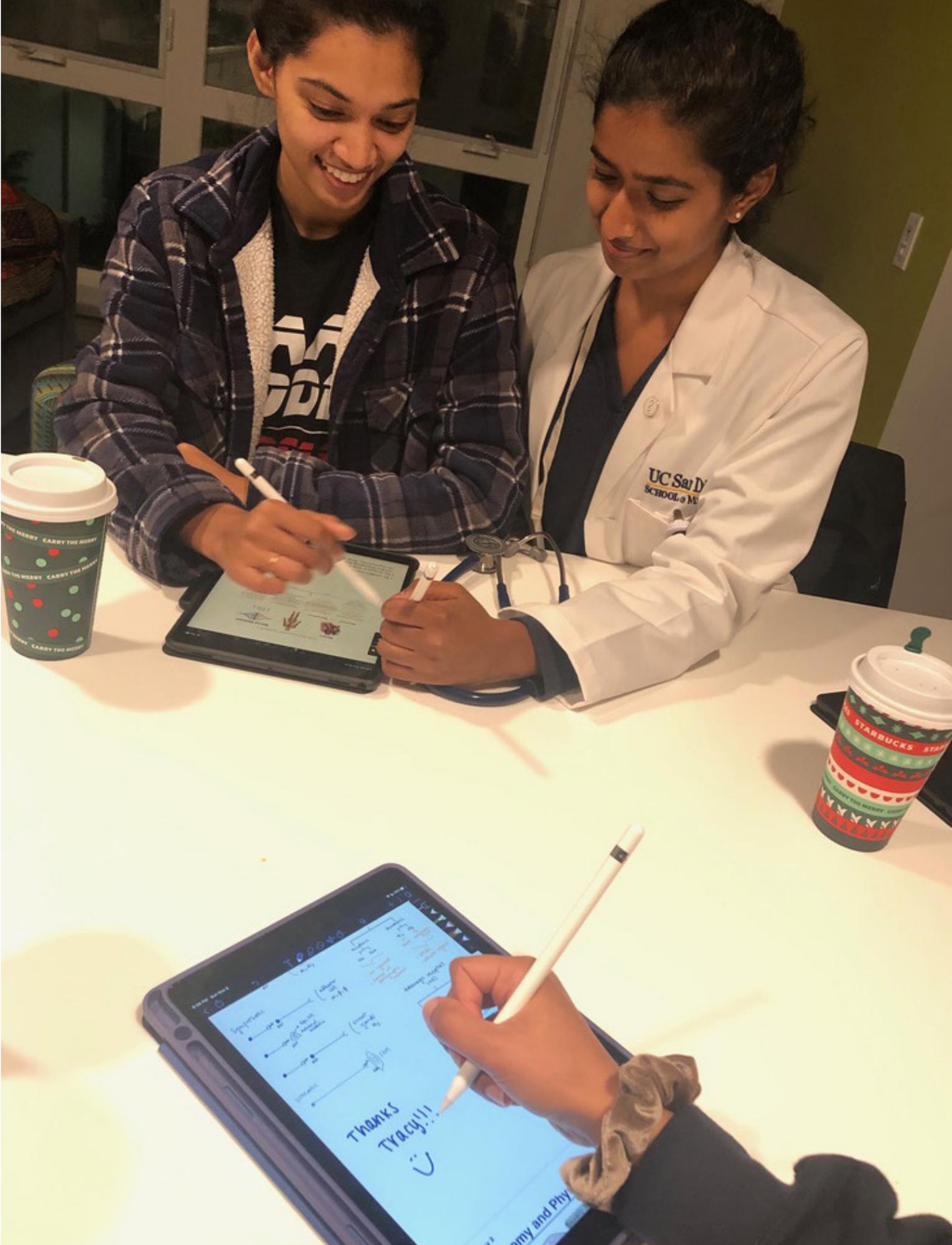
#### [Larry L. Sautter Award \(UCOP ITS\)](#)

Golden Awards for Innovation in Information Technology

### 2017

#### [Larry L. Sautter Award \(UCOP ITS\)](#)

Golden Awards for Innovation in Information Technology



# JOURNEY TO HIGH RELIABILITY THROUGH TECHNOLOGY AND PROCESS IMPROVEMENT

**UC San Diego Health**

**Information Services and Quality & Patient Safety**

9560 Towne Centre Drive

San Diego, CA 92121

