UNIVERSITY OF CALIFORNIA UCHealth

Annual Report

Center for Data-driven Insights and Innovation

(CDI2)



June 2020

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Introduction

With strategic direction from UC Health, the University of California, with 19 health professional schools and 6 health centers, has taken a collaborative approach to building the pre-eminent data-driven learning healthcare system that improves the human condition. This approach has continued under the new leadership of UC Health, Dr. Carrie L. Byington, who joined as the Executive Vice President on October 31, 2019. The Center for Data-driven Insights and Innovation (**CDI2**), established in January 2018, is a cornerstone of this collaborative approach.

The primary function of CDI2 is building and maintaining the data analytics capabilities and technical infrastructure for the UC Health Data Warehouse (UCHDW), a unique data asset created to enhance operational improvements, promote quality patient care, and enable the next generation of clinical research. Using electronic health records (EHR) from the six health centers within the University of California, this system-level asset also includes claims data from the UC self-funded health plans (SFHP), as well as from external sources including Vizient and the California Office of Statewide Planning and Development (OSHPD).

The UCHDW currently contains data on nearly 6 million patients seen at a UC facility since 2012. These patients received care from nearly 100,000 health care providers in over 200 million encounters, with nearly 200 million procedures, more than half a billion medication orders, and with over 2 billion vital signs measurements and test results. Over 600,000 of these patients receive primary care through UC Health.

As the coronavirus pandemic emerged this year, CDI2 found itself uniquely positioned to leverage the UCHDW to provide critical reporting and analysis to senior leaders throughout UC Health. As described in the following pages, CDI2 was able to track and report out on a daily basis through dashboards a number of metrics across the system ranging from the number of patients who tested positive for SARS-CoV-2, to inpatient census counts, all broken out by location and key demographics. CDI2 provided these daily dashboards to UC Health leadership as well as state and federal public health authorities. CDI2 was also able to facilitate research efforts across UC by making a research dataset – comprised of UC Health patients tested for SARS-CoV-2 – available to researchers at each UC Health location. As this report goes to print, the work on SARS-CoV-2/COVID-19 (COVID-19) pandemic continues to evolve, including analytic efforts around patient antibody testing and the growing number of telehealth visits.

In addition to its COVID-19 work, CDI2 has continued its ongoing aim of supporting teams across UC Health, including Quality and Population Health (QPH) and Leveraging Scale for Value (LSfV). CDI2 has also taken significant steps in advancing clinical research projects across the UC system, through enabling access to a deidentified dataset and beginning development of a data science environment to enable analytics for this data. Finally, as CDI2 data analytics capabilities have grown over the past year, CDI2 has similarly grown its health data governance capabilities to ensure that any use of UC patient data is done in a safe, respectful, and responsible manner.

In this second annual report you will see CDI2's successes over the past year including its contribution to fighting the coronavirus pandemic, ongoing projects and collaborations, and the Center's vision for the future. None of this would be possible without numerous collaborations across the UC Health System and the support of the UC Health Centers.

Executive Summary

Over the past year, the Center for Data-driven Insights and Innovation (CDI2) has continued to use systemwide clinical data in a safe and respectful way to improve clinical and business operations, support research efforts, and generate efficiencies of scale. Of particular significance, CDI2 coordinated with its many partners across the UC Health ecosystem to aid in the UC's response to the COVID-19 pandemic. Key accomplishments this year include:

COVID-19 Response. As the COVID-19 pandemic emerged, CDI2 immediately pivoted to support UC Health's response to the public health emergency, including:

- coordinating with local UC Health IT teams to develop dashboards that reflect evolving systemwide data about testing, inpatient census, discharge status, and other metrics;
- supporting the UC medical centers' efforts to obtain targeted funds from the CARES Act Provider Relief Fund;
- coordinating with UC Biomedical Research Acceleration, Integration, & Development (UC BRAID) to create a COVID-19 patient research limited dataset (UC CORDS); and
- collaborating with the systemwide telehealth working group to unify and synthesize data around visit volume to present a clear picture of the changing landscape in ambulatory care.

Ongoing Partnerships and Projects. CDI2 has continued to support quality of care, supply chain, quality population health, and research support across the UC system, including:

Systemwide Operational Partnerships

- CDI2 has continued to support UC Care's efforts to study variation and establish baselines for quality of care, utilization, and cost by purchasing and installing the Milliman MedInsight Analytic Tools across the UCHDW; and
- CDI2 has provided the Leveraging Scale for Value (LSFV) team with data about the costs of surgical implants categorized by utilization, surgeon, and procedure, thereby enabling the LSFV team to inform UC surgeon communities about trends and outlier utilization to improve patient care.

Quality and Population Health (QPH)

- CDI2 has expanded its collaboration with the QPH group to reduce drug spend by highlighting a number of brand name drugs being used in multiple therapeutic areas, resulting in a cumulative savings to date of $1,700,000 since the inception of the project; and
- For the UC Way Diabetes Initiative, CDI2 has created comparative dashboards showing variation among the 7 identified target measures, a critical step toward driving meaningful impact on clinical outcomes and reducing costs of care across the system.

Research Support.

- Building upon the UC Health Data Explorer, a cohort discovery tool designed to help support preparation of clinical research grants by allowing researchers to search a legally deidentified version of the UCHDW. In June 2020, CDI2 debuted a secure cloud-based data science environment called Data Discovery that provides researchers with tools that enable them to query and analyze this deidentified data;
- CDI2 has applied for and received a number of grants which help to support its work, including a grant from the Robert Wood Johnson Foundation (RWJF) to utilize the UCHDW to respond to important clinical queries around policy and care management for COVID-19.

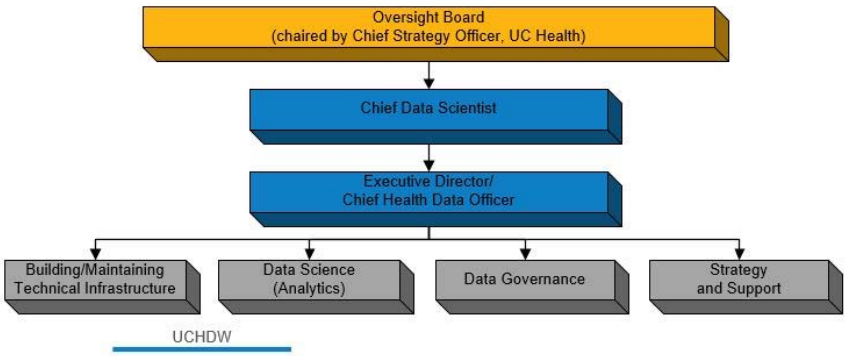
Data Governance. UC Health released the Health Data Governance Report from the President's Ad Hoc Task Force on Health Data Governance. This Report outlines a set of process recommendations and principles regarding how the University should approach collaborations that may involve the sharing of health data.

Key Accomplishments

CDI2 Team

The Center for Data-driven Insights and Innovation is led by Dr. Atul Butte, the Chief Data Scientist at UC Health. In the past year, CDI2 hired a Chief Health Data Officer/Executive Director and Program Manager, and added a Data Scientist to the UCHDW analytics team. CDI2 also appointed a Chief Information Security Officer to handle cybersecurity risk management. These new roles have broadly increased the capabilities of CDI2 by expanding its ability to engage a wide range of campus stakeholders. In addition, these roles enable CDI2 to move forward with systemwide health data governance work to provide support to the Chancellors regarding the question of whether and under what terms to proceed with high-risk or multi-campus projects involving the disclosure of heath data to outside parties. This work will be critical moving forward, particularly with respect to data related to the ongoing efforts for the COVID-19 pandemic.

As depicted in the chart below, work in the areas of data governance, strategy, and support will complement the data science and technical infrastructure work at the heart of CDI2. CDI2 reports on a quarterly basis to an Oversight Board with representation from each campus. Since our last annual report, there have been a few changes to the Oversight Board. In particular, the Board is currently chaired by the Chief Strategy Officer of UC Health, and new members include a representative from Ethics, Compliance, and Audit Services (ECAS), and a representative from a non-health campus. The full current membership of the Oversight Board is shown in appendix 1.



COVID-19 – Responding to the Pandemic

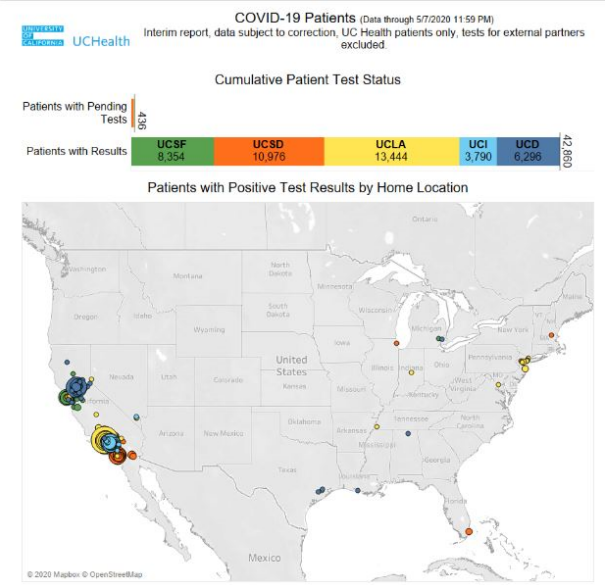
As the coronavirus pandemic emerged, CDI2 immediately pivoted to help UC Health respond to the public health emergency with both operational support and the promotion of systemwide research efforts.

Data Analytics and Dashboard Development

First, from the earliest days of the SARS-CoV-2/COVID-19 (COVID-19) outbreak, CDI2 began leveraging the UCHDW to provide ongoing data analytics and reporting about the pandemic to UC Health leadership. This reporting has grown to include updates to many others in the UC Health community, as well as to state and federal public health officials.

With a great deal of coordinated hard work between CDI2 and the UC Health IT teams, CDI2 began tracking the number of patients tested for SARS-CoV-2 throughout the system as soon as the appropriate diagnostic codes became available. The first dashboard, developed in mid-March, showed the number of SARS-CoV-2 tests performed at each campus. This dashboard required harmonizing the results across more than twenty different ways to order this test, in Epic, across 5 academic health centers. Within days, CDI2 developed additional dashboards showing the total number of patients tested, the number of patients whose tests were positive, and basic demographic statistics for these patients such as gender and age, all broken out by campus. CDI2 also developed a map that showed the geographic location of patients with positive tests, a

dynamic graphic that allowed users to zoom in and locate patient counts by particular geographic location. This map depicts the growth of the positive tests over time.

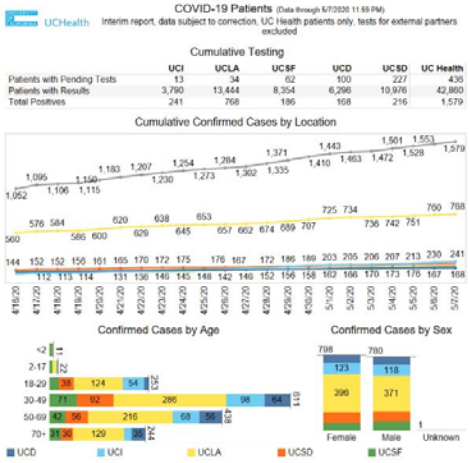


CDI2 also developed a dashboard that reflects the number of patients with positive SARS-CoV-2 tests who have been admitted as inpatients to the hospital. The dashboard shows the total inpatient counts each day, with color shades to indicate the multiple hospitals at UCSF, UCLA and UCSD. This dashboard also shows current patients in the ICU, the average length of stay, the usage of ventilators, and the disposition of discharged patients.

CDI2 has received substantial feedback that its harmonized systemwide data on SARS-CoV-2 testing, which is updated daily, is extremely useful to experts both within and outside of UC Health. Accordingly, CDI2 has set up a daily email subscription list to push out this information to those within UC Health, as well as to state and federal public health authorities, including CDPH, FDA, and CDC.

Sharing Our Data Through Social Media to Support Public Health

Moreover, to better inform the public, especially when most members of the public cannot see the effects of COVID-19 or have no direct experience with it, CDI2 also tweeted some of these data visualizations through the @UofCAHealth account. Each tweet typically receives between 5 to 10 thousand views, with the initial dashboard tweet now having been viewed nearly 100,000 times.



Helping to Secure CARES Act Provider Relief

CDI2 also played an important role in supporting the UC medical centers' efforts to obtain targeted funds from the CARES Act Provider Relief Fund. These funds were allocated specifically for hospitals located in high-impact areas. To help determine the level of impact at our health centers, we focused our efforts on determining the total number of hospital admissions for COVID-19 positive patients between January 1, 2020 and April 10, 2020. This work aided UC Health centers to collect funds from the $10 billion set aside by the federal government, an amount that now totals more than $400 million received.

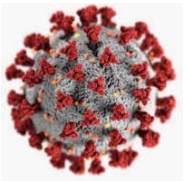
Using Data to Direct Resources



Working with data from the California Hospital Association's statewide COVID-19 tracking database, CDI2 provided daily updates on UC Health system-level capacity data to leadership. In late April of this year, AFLAC, an insurance partner of the University of California, offered a donation of 5,000 N-95 masks to a UC medical center of our choosing, and UC Health was able to quickly review the available data for that day, and within 10 minutes of receiving the initial donation offer, had identified that this much-needed PPE would most benefit Benioff Children's Hospital Oakland, which in turn received these masks within a few weeks.

Facilitating Research on COVID-19

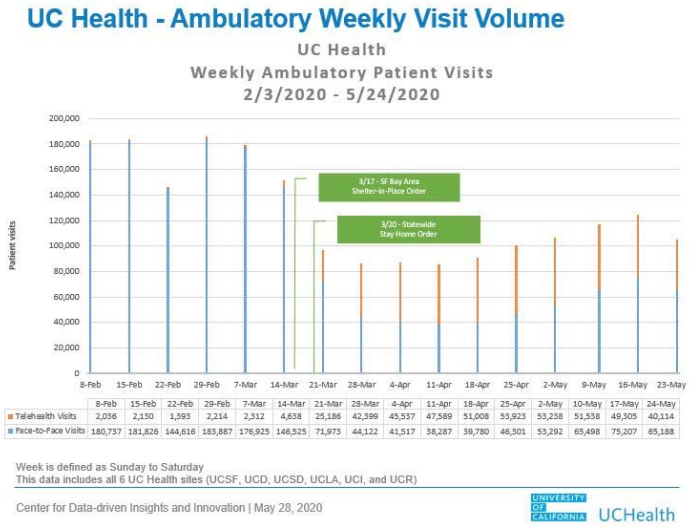
In connection with our COVID-19 work, in April 2020 CDI2 applied for and received a grant of $100,000 from the Robert Wood Johnson Foundation (RWJF). The grant stems from RWJF's desire to support a collaboration between the Health Care Cost Institute, CareJourney, and a sentinel network of geographically diverse health systems including Rush Medical Center, ICHIN, Geisinger, and Prisma Health. The goal of this effort is to help create a series of standardized data extracts and queries that will allow researchers, clinicians, policy makers, and journalists to better understand the impact and progression of COVID-19. Under the grant, UC Health will leverage the UCHDW on a non-exclusive basis to participate in important clinical queries and have its aggregate query results merged with those of other health systems to help address and answer important questions around policy and care management for COVID-19.



Additionally, in coordination with the Biomedical Research Acceleration, Integration & Development (BRAID) consortium, as well as clinicians, investigators, and bioinformaticists from each campus, CDI2 quickly moved forward with facilitating UC research efforts around COVID-19. Specifically, CDI2 created a COVID-19 patient research limited dataset (UC CORDS) that combines the SARS-CoV-2 testing data for UC Health patients with their prior history dataset. CDI2 was able to securely transfer this UC-wide COVID LDS to each of the health campuses for their use within their own secure virtual systems for research. The goal for this data set is to evolve and become richer over time as CDI2 includes more patients and more clinical depth in terms of the captured elements on those patients.

Analyzing the Increase in Telemedicine During the COVID-19 Pandemic

The coronavirus pandemic has had a significant impact on the way that healthcare is delivered. As hospitals and healthcare providers moved to prepare for a surge of infected patients, and as communities adjusted to stay-at-home orders, patients were directed to delay or postpone elective surgeries and routine care. Many providers found their practices shifting to provide telemedicine services, which had previously been less common and in many cases, not reimbursed at the same level as in-person acute care visits. On March 30, 2020, the California Department of Insurance ordered payers to reimburse telemedicine visits at the same rate as "equivalent office visits" and to expand coverage to include not only video visits through telemedicine platforms (e.g. Zoom for Health and Epic MyChart) but other methods as well, including telephone and synchronous video calls. Providers encouraged patients to use these methods in place of office visits when possible. As a result, there has been a significant decline in the number of ambulatory face-to-face patient visits across the UC Health system since the onset of the pandemic.



	8-Feb	15-Feb	22-Feb	29-Feb	7-Mar	14-Mar	21-Mar	28-Mar	4-Apr	11-Apr	18-Apr	25-Apr	2-May	9-May	16-May	23-May
Telehealth Visits	2,056	2,130	1,393	2,214	2,312	4,638	25,186	42,399	45,537	47,589	51,008	53,923	53,238	51,538	49,305	40,114
Face-to-Face Visits	180,737	181,826	144,616	183,887	176,925	146,525	71,973	44,122	41,517	38,287	39,780	46,301	53,292	65,498	75,207	65,188

In close collaboration with the systemwide telehealth working group, CDI2 helped to define the data necessary to capture visit volume and establish a consistent method and timeline for delivery of this data to a central repository. CDI2 was able to unify and synthesize this data to present a clear picture of the changing landscape in ambulatory care. Across the UC Health system, there has been a 25-fold increase in the number of telehealth visits. By evaluating the data side-by-side, CDI2 has been able to show not only the significant growth of systemwide telehealth services, but also the inverse decline in face-to-face visits, with total visit volume reduced by approximately 50 percent following the state's Stay at Home order. This shift in care delivery continues as California slowly moves to define a new normal in communities across the state.

Partnerships and Projects

In addition to its COVID-19 work, over the past year CDI2 has continued to provide analytics expertise and system-level assets in support of existing UC Health research, clinical, and operational quality improvement efforts, and also develop new projects that further these goals. We have grouped these projects into four categories below: systemwide operational partnerships; quality and population health; clinical outcomes; and research support.

Systemwide Operational Partnerships

The CDI2 team has worked closely with UC's self-funded health plans (SFHP), Chief Pharmacy Officers, and UC's Leveraging Scale for Value strategic sourcing team to assist with reporting requirements, improve care delivery, and reduce the cost of health care. A number of projects are ongoing, continuing work initiated in 2018.

Encouraging UC Specialty Pharmacy Use by Employees

CDI2 has partnered with the Chief Pharmacy Officers at each UC Health campus to provide data on specialty drug prescriptions that are filled at UC Health specialty pharmacies for the SFHP. This project includes UCHDW efforts to define the data needs for the project, develop a new dashboard to monitor and reflect the rates at which employees are using UC Health specialty pharmacies to fill their specialty drug prescriptions, and the development of a monthly follow-up list for ongoing outreach which is provided to local pharmacy teams. By redirecting employees with specialty prescriptions to our own specialty pharmacies, the SFHP and the UC specialty pharmacies are able to lower specialty drug costs and potentially pass these savings on to employees.

> *"CDI2 data allows us as a system to focus on better best practices"*
> *– UC Davis Health*

Using Data to Speed Transition from IV Acetaminophen to Oral Doses in Inpatient Care

CDI2 continues to work with the Chief Pharmacy Officers (CPOs) on transitioning from IV acetaminophen to oral acetaminophen, an ongoing priority for the health systems. CDI2 worked with the CPOs to define and refine a dashboard showing IV acetaminophen usage by campus in order to aid local sites in their clinical quality improvement efforts in this area. While IV acetaminophen has typically been utilized clinically in place of IV opioids pre- and post-surgery, pharmacists and care teams continue to use CDI2's data to identify appropriate use in these settings. Specifically, data drawn from the UCHDW and reflected in the pharmacy dashboard shows which sites could benefit from more effectively addressing the use of IV acetaminophen by administering oral medications to patients who are able to tolerate them. CDI2 also works in conjunction with pharmacists at each site to identify and monitor the various interventions implemented at each campus in order to determine what initiatives could be implemented at a system-wide level to lower IV acetaminophen usage across the system.

Utilizing Supply Chain Analytics to Support Leveraging Scale for Value (LSfV)

The LSfV Strategic Sourcing team (the LSfV team) continues to leverage CDI2's data capabilities. The team focused on identifying cost per procedure and cost by surgeon associated with surgical implants, like knees and hips. CDI2 was able to provide the LSFV team with data for each medical center identifying excess utilization of implant components in total joint replacement procedures and of bone morphogenetic proteins in spinal fusion cases. This information, which is not available with traditional purchasing data, has allowed the LSfV team to analyze the costs of implants categorized by how they are utilized, by surgeon and by procedure. This, in turn, has enabled the LSfV team to inform our surgeon communities about trends and outlier utilization to improve patient care.

Quality and Population Health

CDI2 has continued to partner closely with the Quality and Population Health (QPH) group at UC Health to support efforts to develop and implement data-driven system-wide improvement efforts in population health

management. These include advancing value-based care delivery, improving patient outcomes, and reducing per capita cost of care.

Developing Target Metrics to Improve Care

CDI2 has been working closely with QPH to enhance the comparative dashboards for the UC self-funded health plan, UC Care. The dashboards shed light on the target metrics for the 3 agreed-upon areas for intervention: Ambulatory Care Coordination, Inpatient Management, and Emergency Department Use. Subject matter experts (SMEs) at all sites have the ability to review the dashboard as a group at least monthly. CDI2 provides site-specific patient lists to help the local teams target and close care gaps. The SMEs also developed site-specific action plans for 58 strategies to improve care for patients, of which 27 have already been implemented. The workgroup anticipates initial results on the impact of these measures in early fall 2020.

Supporting Population Health Analytics

In partnership with the self-funded health plans, CDI2 is implementing the Milliman MedInsight Analytics Tools. These tools include a Health Cost grouper, Chronic Conditions grouper, Health Waste Calculator, and a tool for calculating patient risk scores. CDI2 has processed claims from the self-funded health plans to identify, segment, and characterize members, cost, and utilization. We have created dashboards to view this data with comparator benchmarks, also provided by Milliman. In addition to leveraging these tools for the Anthem UC Care PPO and HealthNet Blue & Gold HMO plans, CDI2's dashboards and analyses can be used in partnership with Quality and Population Health to accelerate local population health efforts with the CMS Medicare Shared Savings Program Accountable Care Organization (ACO) and other commercial value-based contracts.

Aiding in the Management of our Medi-Cal Population

The Quality Incentive Program (QIP) is a DHCS Managed Medicaid value-based pay-for-performance program for California public health care systems. The program focuses on four categories, representing a minimum of 20 measures – primary care, specialty care, inpatient care, and resource utilization. In 2019, with direction from the five health system CMOs and support from the Quality and Population Health teams at each medical center campus, CDI2 facilitated this program's reporting efforts by dividing & conquering the 6 new measures added to the program and the required updates to the existing 20 measures. This freed up the local sites to focus on improvement activities rather than reporting.

Using Data to Reduce Drug Spend

CDI2 has worked closely with the systemwide UC Population Health Pharmacy workgroup and the SFHP team to address the drug spend for the plans. While work completed in 2018 focused on four specific drugs, in 2019 CDI2 and the pharmacy workgroup expanded this work to include a number of brand name drugs being used in multiple therapeutic areas. This effort resulted in a cumulative savings to date of $1.7M since the onset of this project. Moving into 2020, CDI2 will continue to engage with the self-funded health plan team and the systemwide pharmacy workgroup to identify additional opportunities to further reduce the drug spend.

Assisting in the Development of Diabetes Care Management Protocols

CDI2 created comparative dashboards showing variation across the 7 target measures that the UC Population Health Steering Committee and UC Diabetes Care subject matter experts identified and agreed-upon. These leaders and experts also defined cohort of patients with diabetes whose care is provided on a longitudinal basis at UC and therefore, most likely to be impacted by improved care delivery strategies. This is a critical step toward driving meaningful impact on clinical outcomes and reducing costs of care across the entire system.

> *"Our collaboration with CDI2 allowed us to pull together previously siloed groups."*
> *– UCSF Health*

Comprised of clinical experts across 5 UC sites in Endocrinology, Pharmacy, Primary Care, Diabetes Care Coordination & Education, this UC Diabetes Care workgroup is now developing the “UC Way” for three diabetes care management protocols (listed below). The workgroup is developing the initial interventions for systemwide implementation to begin in summer 2020. The systemwide interventions and protocols are tied to the 7 diabetes target measures and will be tracked via the CDI2 comparative dashboards:

Pharmaceutical Use: A “UC-way” algorithm for appropriate prescribing of cardio-protective medications (Site champions = UCD, UCSF, UCSD)

Patient Engagement & Education: The “UC top 10” diabetes education videos list and a systemwide approach to video use and tracking (Site champions = UCSD, UCI)

Organizing diabetes care (e.g. “medical home”): A patient-centered approach to increase capture of overdue A1C levels at the point of care (Site champions = UCLA, UCD, UCSD)

Clinical Outcomes

Leveraging the information available through the UCHDW, CDI2 has partnered with constituents across the system to improve clinical outcomes for cancer.

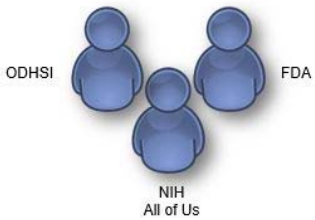
Coordinating and Providing Data for the OP-35 Quality Measures



In collaboration with the UC Cancer Consortium (UCCC) and the Chief Quality Officers at each medical center campus, CDI2 is providing data and coordinating local efforts for UC-wide tracking of OP-35 outcomes. OP-35 is a CMS-quality measure that looks at inpatient admissions and emergency department visits in the 30-day period after a patient receives chemotherapy. In 2019, UCSF Health was able to validate their local clinical data with the CMS-provided data. Using clinical data from the EHRs at each site, CDI2 validated the data in the UCHDW in order to track these UC-wide efforts for OP-35. Additionally, reporting has been expanded beyond the self-funded health plans to include all payers.

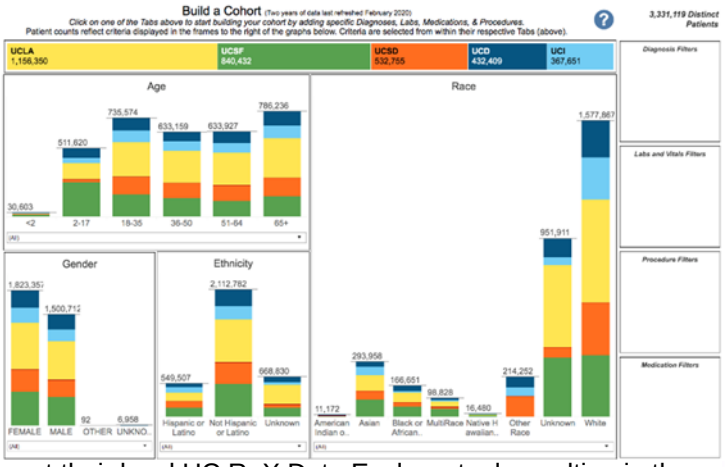
Supporting Clinical Research

CDI2 supports clinical research at UC Health campuses in multiple ways including providing access to cohort discovery tools that support grant submissions, feasibility studies, and enrollment potential for clinical trials; providing researchers across the UC with access to a data query & analysis environment; and developing specific datasets from the clinical data available within UCHDW, including UC CORDS. CDI2 also supports external research, including ongoing efforts at the FDA and NIH, and the beginning stages of greater involvement with Observational Health Data Sciences and Informatics (OHDSI, pronounced “Odyssey”), an open-science community that aims to improve health by empowering the community to collaboratively generate the evidence that promotes better health decisions and better care.



Launching a Cohort Discovery Tool (UC Data Explorer)

UC Health Data Explorer is a cohort discovery tool launched in October 2019 that is designed to support preparation of clinical research grants by providing Tableau dashboards, allowing researchers to search a legally deidentified version of UCHDW. Users are able to define a patient cohort based on diagnoses, labs, medications, & procedures, and then Data Explorer will return the counts of patients that meet the criteria entered. In addition to returning counts, Data Explorer provides a graphical presentation of the cohort stratified by age, race, ethnicity, & gender; by using dropdown filters in the graph, the cohort can be further defined by any of the demographic elements. Data Explorer also provides a fully populated version of the NIH Enrollment table that can be pasted into an NIH grant. Because of the availability of this tool, all 5 sites were able to sunset their local UC ReX Data Explorer tool, resulting in the elimination of up to six application servers and ultimately allowing the sites to reduce expenses and redirect resources.



Building a Secure Data Science Environment UC Data Discovery Platform)

CDI2 is implementing a secure cloud-based data science environment with tools to allow researchers to query and analyze legally de-identified UCHDW data. This environment will be available in late June 2020. To utilize the UC Data Discovery Platform, researchers will first work with their local campus to develop and run their queries. When researchers are ready to scale and local campuses have provided the necessary approvals, CDI2 will provision researchers with a secure virtual desktop environment with access to tools to query and analyze the UCHDW data set. Researchers may upload files to this virtual desktop, but will not be able to download patient-level data. Researchers will also be able to request the download of aggregate data files for publication and presentation purposes, and the CDI2 team will review each of these requests before securely transferring approved files to the research team.

Coordinating Participation in NIH's All of Us Program

The All of Us Research Program (http://allofus.nih.gov) is a large-scale, multi-site research effort, funded by the National Institutes of Health (NIH) as part of the Precision Medicine Initiative. The goal of the project is to improve healthcare by gathering health data on more than one million people living in the United States, with the intent to accelerate health research. Using EHR data gathered from research participants, as well as biospecimens collected from a subset of those participants, All of Us will allow approved researchers to access this information in order to further health research studies and determine new and novel ways to positively impact health.

The University of California has four participating medical center campuses (UC Davis Health, UCSF Health, UC San Diego Health, and UC Irvine Health). CDI2 coordinates the local health center efforts using UCHDW infrastructure to support the annual data submissions to the All of Us Data Coordinating Center. The previous 2 quarterly data submissions have been successfully completed using this coordinated approach, with improved quality and completeness when compared to earlier locally-based efforts. CDI2 and the UCHDW are continuing to enhance quality and completeness for the All of Us data in order to support ongoing future submissions.

Pursuing Research Grants

In addition to the Robert Wood Johnson Foundation grant for COVID-19 research, CDI2 has also received funding from the following two research grants, which support the continuation of our work.

Multi-campus Research Programs and Initiatives (MRPI) on the Development of a UC-wide Clinical Genomics Database

Principal Investigators: Dan Mercola (UC Irvine) and Olivier Harismendy (UCSD)

Goal: Collect, Map and Share genetic test results from 6 providers. Each participating site will pilot the collection and mapping from 2 providers, share the streamlined procedure with the other sites to map their own patients. All sites will contribute their data to the central UC Health Data Warehouse (UCHDW). Demonstrate the functionality of the UCHDW for precision research.

Budget for CDI2: approximately $44,000 over two years

FDA Center of Excellence in Regulatory Science and Innovation (CERSI) Collaborative Research Project

Principal Investigator: Atul Butte

Goal: Use the UCHDW to evaluate the safety and efficacy of biologics, including blood transfusions, vaccines, CAR-T cell therapies, and other CBER regulated products. Work with FDA scientists over 6-12 months to choose specific biologics exposures, particularly around cellular and cancer immunotherapies, define specific outcomes, and then determine how to detect and evaluate for those outcomes in our central data warehouse, in patients treated with these therapies.

Budget for CDI2: approximately $50,000 over one year

Systemwide Strategic Analysis and Support

In the past year CDI2 has also played a critical role in helping UC Health make significant strategic decisions with systemwide impact. For example, in August 2019 President Janet Napolitano convened the Working Group on Comprehensive Access (WGCA), which was charged with developing policy recommendations for affiliations with health systems that have policy-based restrictions on care to “ensure UC’s values are upheld” and “to ensure that UC personnel will remain free, without restriction to advise patients about all treatment options, and that patients will have access to comprehensive services.” In December 2019, the WGCA Chair released a report, and upon review of this report, President Napolitano asked Dr. Byington to provide an analysis of the impact of ending all existing agreements between UC’s academic health centers or health professional schools and organizations that have non-evidence-based policy restrictions on care.



The President also requested an analysis by Dr. Byington in her role as Chair of the Executive Steering Committee for the UC health benefits program of the potential impact that prohibiting affiliations with these types of health care providers would have on access to health care for our employees, retirees, students, and their families covered by UC’s health plans.

In support of this effort, CDI2 leveraged systemwide data to facilitate UC Health’s analysis of the impacts on patients of ending affiliations between UC’s academic health centers and institutions that have policy-based restrictions on care. In addition, CDI2 also leveraged its data to analyze the impact of ending such affiliations upon employees, retirees, and students in UC Health Plans. CDI2 created dashboards, including maps,

showing the number of patients currently served by UC clinicians at facilities with policy-based restrictions by location and by medical specialty. These graphics were included in a UC Health Report that was submitted by UC Health to the President.

Health Data Governance

In October of 2019, UC Health released the Health Data Governance Report ("Report") from the President's Ad Hoc Task Force on Health Data Governance. This Report represents the first stage of a system-wide effort to address the governance issues arising out of UC's use of data analytics to improve the quality and efficiency of care delivery, and to provide doctors with insights into their patients and how best to treat them. The Report addresses the importance of collaborating with external partners to help analyze the data produced during patient care and unlock its potential for the ultimate benefit of our patients, while also recognizing the need to act as a responsible steward of this data. The Report sets forth recommendations regarding the next stage of system-wide governance efforts and calls for the establishment of an Implementation Task Force. In addition, based on this Report, and at the direction of the President, UC Health has produced interim operating guidelines and established a "tiger team" to evaluate certain "high-risk" collaborations involving sharing of health data with third parties.



Looking Ahead to a New Normal

The COVID-19 pandemic has created a rapidly changing environment for UC Health, and CDI2 will continue to evolve over the next year to help UC Health meet this "new normal." For example, as a result of the pandemic, millions of Californians have already, or will soon, become unemployed or under-employed, with many in need of insurance coverage. Indeed, Covered California, California's health insurance marketplace, extended a special enrollment period through June 30, 2020, in order to address this need. By the end of April of this year, 84,000 Californians had signed up for health insurance through the marketplace.

UC Health has a public service mission and treats all patients regardless of their ability to pay. Accordingly, as the state and nation face unprecedented rates of unemployment, we anticipate that our payer mix will continue to evolve with increasing proportions of Medi-Cal over commercial coverage. These changes will yield a need for insights into the populations each campus is managing and CDI2 will be ready to provide this support

In addition, we expect that the number of telehealth visits will increase substantially over the next year. While the pandemic accelerated the adoption of telehealth as a method of care delivery in the ambulatory setting, California had already laid a foundation for the adoption of this technology in the near future. In October 2019, Governor Gavin Newsom signed AB 744 into law. The legislation requires, among other things, that for state-regulated commercial insurance plans issued, amended or renewed on or after January 1, 2021, payers must provide coverage for health care services appropriately delivered through telehealth on the same basis and to the same extent that the payer is responsible for coverage for the same service through in-person diagnosis, consultation, or treatment and reimburse telehealth visits at the same rate negotiated for face-to-face visits. The legislation does not change the requirements for coverage and reimbursement by the Medicare or Medi-Cal programs. Although the federal and state governments granted temporary flexibility to significantly expand coverage of telehealth services by those programs during the COVID-19 pandemic, it is not yet clear whether the federal and state governments will make similar changes on a more permanent basis. The CDI2 team is poised to continue supporting the data collection and analytic needs surrounding this transition, including helping to understand where telehealth has been and will be most impactful with regard to patient care.

Upcoming Initiatives and Partnerships

We also expect to continue moving ahead with new collaborations and projects. Below are a few of these early stage and upcoming projects.

Developing a Genetic Test Report Repository



CDI2 is working with the UC Cancer Consortium and local sites to include laboratory reports containing the genetics of tumors for patients diagnosed with cancer. CDI2 is working with local sites to define the data requirements for importing these records into the UCHDW infrastructure, making them available much like other laboratory reports included in a patient's medical record in the EHR.

Assisting in the Development of Hypertension Management Protocols

CDI2 is working with the QPH team by providing comparative blood pressure data to the UC Primary Care Collaborative (PCC) work group. The PCC is comprised of experts in primary care innovation and will drive local improvement work at their sites. Initial data analysis shows areas of variation across UC sites for blood pressure control. One area of interest is the variation found in African Americans. Once the key areas of variation in care are finalized, CDI2 will build dashboards with target metrics defined by the PCC, which will be used for tracking and reporting once interventions are implemented in FY 20/21.

Using Data to Increase Health Care Value

CDI2 and QPH are partnering with the Value-Based Care Research Consortium (VBCRC) at UCLA to measure and examine the delivery of appropriate services for patients under UC self-funded health plans. VBCRC already works closely with UCLA Health operations to implement and measure interventions to improve health outcomes and increase healthcare value. Care that is considered inappropriate, such as the overuse of services with uncertain benefit, is costly to both health systems and patients and can lead to a cascade of unnecessary tests, delays in appropriate care, and financial and personal harm. CDI2 will help VBCRC to investigate claims data from the UC Care plan and will use novel methods of discovery to identify and examine services across the UC Health system.

Building a Systemwide Primary Care Risk Model

UCLA Health developed a risk model to predict which patients are most likely to have an unplanned inpatient or emergency department visit. This risk score allows the population health care coordinators at UCLA Health to proactively reach out and engage these patients. The model performed so well at UCLA Health that they began rolling it out to their many clinics. The population health leads across the UC system have expressed interest in a risk score for their local efforts, so CDI2 began working to implement what UCLA Health has in place and scale it for system-wide use. In spring 2020, UC Davis Health increased its involvement and began providing resources to implement the risk model more quickly. This collaboration is possible because the UCHDW uses the OMOP Common Data Model which allows for the systematic analysis of disparate observational databases, and code written at one UC to be portable to other UCs as well as the central UCHDW. The UC medical centers can thus leverage each other's resources and scale expertise similar to what has already been done in other systemwide collaborations.

Moving Forward with Systemwide Health Data Governance

With a new Chief Health Data Officer on board, UC Health will lead the effort in the next year to implement its broader recommendations – including the establishment of a formal data governance committee and the development of university policies and procedures governing sharing of health data. Of particular note, a critical component of the report was the concept of justice – consistent with our mission, the use and disclosure of health data by the University of California must be for the public good, with careful attention to ensure benefit for the diverse populations we serve.

Conclusion

This past year was a pivotal one for CDI2, as it expanded its technical infrastructure, analytic capabilities, and data governance expertise to support a wide array of activities across UC Health. The UC Health mission is to provide leadership and strategic direction, foster system-wide collaboration, and catalyze innovation within the UC Health enterprise, ultimately to better educate and train the inclusive workforce of tomorrow; discover life-changing treatments and cures; and deliver exceptional care that improves the health and well-being of all people living in California, the nation and the world. CDI2's collaborations with both the UC Health IT teams at each location and other groups across UC as the COVID-19 pandemic unfolded, have furthered this mission and represent a true display of "systemness." We look forward to building upon these efforts over the next year and beyond.

Appendices

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Appendix 1 – Oversight Board Membership

Committee Leadership		
Chair	Elizabeth Engel, JD	Chief Strategy Officer, UC Health
Campus Appointees		
UCLA	Michael A. Pfeffer, MD	CIO
UCSD	Chris Longhurst, MD, MS	CIO, Associate CMO
UCR	Katherine Hansen, MHA, MS	COO
UCD	Jason Adams, MD	Medical Director, Data Analytics
UCI	Nasim Afsar, MD, MBA, SFHM	COO for Ambulatory Care
UCSF	Gina Intinarelli, PhD, RN	VP, Population Health and Accountable Care
At-Large Appointees and Areas Represented		
CMO/CQO	Robert Cherry, MD Rotating CMO Lead	UCLA
Research	Stephen M. Dubinett, MD Senior Associate Dean Translational Research, David Geffen School of Medicine	UCLA
Non-Health Campus	Jennifer Chayes, PhD Dean, School of Information	UCB
Ethics	Barbara Koenig, PhD Director, Bioethics Program	UCSF
Business/Innovation	TBD	
Compliance	Shanda Hunt, JD Manager, Systemwide Research Compliance	UCOP
Patient Voice	TBD	
UC Legal	Hillary Kalay, JD Ex Officio Member	UCOP

Appendix 2 – Center for Data-driven Insights and Innovation Team

Atul Butte, MD, PhD	Chief Data Scientist	UC Health
Cora Han, JD	Chief Health Data Officer, Executive Director	UC Health
Pagan Morris, MPH	Program Manager	UC Health
Lisa Dahm, PhD	Director, Health Data and Analytics	UCI Health
Ayan Patel, MS	Lead Data Scientist	UCI Health
Aiden Barin	Data Scientist	UCI Health
Chaya Mohn	Data Scientist	UCI Health
Ray Pablo	Data Scientist	UCI Health
Tim Hayes	Technical Project Manager	UCI Health
David Gonzalez	Infrastructure Architect	UCI Health
Charles Wilson	Lead Data Architect	UCI Health

Appendix 3 – Campus and Medical Center Partners

Technology Leadership Partners		
Michael Pfeffer, MD	Chief Information Officer CIO Sponsor	UCLA Health
Chris Longhurst, MD	Chief Information Officer	UCSD Health
Scott Joslyn	Chief Information Officer	UCI Health
Joe Bengfort	Chief Information Officer	UCSF Health
John Cook	Chief Information Officer	UCD Health

Business Intelligence Partners		
Albert Duntugan	Senior Director, Enterprise Information Architecture, OHIA	UCLA Health
Andrew Weaver	Director, Program Operations, OHIA	UCLA Health
Rick Larsen	Director, Research Informatics	UCSF Health
Kent Anderson	Director, IT Health Informatics	UCD Health
Steve Covington	Systems Data Analyst	UCD Health
Josh Glandorf	Director, Hospital Affiliations and Analytics	UCSD Health
Jennifer Holland	Director, Enterprise Reporting	UCSD Health
Eugene Lee	Senior Manager, CIN and ACO Analytics	UCSD Health
David Merrill	Director, Enterprise Data and Analytics	UCI Health
Dan Phillips	Manager, Data and Analytics	UCI Health

Campus Technical Implementation Team		
Kathy Pickell	Data Architect	UCI Health
Hemanth Tatiparthi	Data Engineer	UCD Health
Steve Covington	Data Analyst	UCD Health
Ranjit Singh	Data Architect	UCD Health
Jay Shah	Data Engineer	UCLA Health
Vajra Kasturi	Data Engineer	UCLA Health
Nelson Lee	Data Engineer	UCSF Health
Peter Ryan	Data Engineer	UCSD Health
Eddie Ramirez	Azure Architect	UCLA Health
Scott Bailey	Azure Architect	UCLA Health
Michael Swinford	Azure Project Manager	UCLA Health

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