UNIVERSITY OF CALIFORNIA HEALTH

ANNUAL REPORT

Center for Data-driven Insights and Innovation

2021-22

Contents

University of California Health
Center for Data-driven Insights and Innovation (CDI2)
Annual Report 2021–22

All images included in this report are included in the University of California Office of the President's digital image repository which is comprised of photographs taken at the various UC campuses and shows the depth and breadth of research, education and public service activities that occur at the University of California.

Introduction

University of California Health (UCH) is comprised of six academic health centers, 20 health professional schools, a Global Health Institute, and systemwide services that improve the health of patients and the University's students, faculty, and employees. The Center for Data-driven Insights and Innovation (CDI2), established in January 2018, is a cornerstone of the collaborative approach that the University of California (UC) has taken to build the pre-eminent data-driven learning healthcare system committed to improving the human condition.

The primary function of CDI2 remains the building and maintenance of the data analytics capabilities and technical infrastructure for the UCH Data Warehouse (UCHDW), a unique system-level 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 academic health centers—UC Davis, UC Irvine, UC Los Angeles, UC Riverside, UC San Diego, and UC San Francisco—this asset also includes claims data from the UC self-funded health plans, as well as from external sources including Vizient and the California Department of Health Care Access and Information (HCAI), formerly the Office of Statewide Health Planning and Development (OSHPD).

The UCHDW currently contains data on nearly 8 million patients seen at a UC facility since 2012. These patients received care in nearly 300 million encounters. In those encounters, UCH conducted over 800 million procedures, ordered or prescribed 800+ million medications, made more than two billion vital signs and test result measurements, including 16,000 sequenced cancer genomes, and assigned more than 700 million diagnosis codes. Over 600,000 of these patients receive primary care through UCH.

Under the ongoing leadership of Dr. Carrie L. Byington, Executive Vice President of UCH, CDI2 has been vital to the UCH COVID-19 response. As the COVID-19 pandemic has continued into 2022, CDI2 remains uniquely positioned to leverage the UCHDW to provide critical reporting and analysis to senior leaders throughout UCH, as well as state and federal public health authorities. These efforts include dashboards detailing positivity rates, inpatient census data, and expanded reporting on the vaccination efforts that began in December 2020.

In 2020, CDI2 developed the UC Health COVID Research Data Set (UC CORDS), a COVID-19 patient research HIPAA limited data set that combines the SARS-CoV-2 testing data for UCH patients with their prior history dataset. To date, UC CORDS has generated one preprint and 16 publications in several high-impact journals, including JAMA Network Open, the Journal of Clinical Oncology, and the British Journal of Dermatology. Of these 17 publications and preprints, one was contributed by UC Davis, three were contributed by UCSF, and 13 were contributed by UC Irvine. The pandemic work continues to evolve, including analytic efforts around the changing care delivery environment as we move toward a COVID-endemic world.

CDI2 also continues to support operational teams across UCH, including Quality and Population Health (QPH), the UC Cancer Consortium (UCCC), and Leveraging Scale for Value (LSfV). In addition, CDI2 has made progress in advancing clinical research projects across the UC system by expanding its own research portfolio and further developing the data science environment that enables secure data analysis. Finally, as CDI2 data analytics capabilities have expanded, CDI2 has grown its health data governance capabilities to ensure that any use of UC patient data is done in an ethical, safe, equitable, and responsible manner.

In this fourth annual report you will see evidence of the expanding role of CDI2 in the clinical operations and academic missions of UCH and UC. The report outlines our successes over the past fiscal year, including ongoing projects and collaborations, and the Center's vision for the future. None of this would be possible without numerous collaborations across the UCH system and the support of the UC academic health centers.

Executive Summary

CDI2 continued to play a vital role in the UCH COVID-19 response during fiscal year 21-22, while also pursuing new opportunities in anticipation of COVID-19 becoming endemic. CDI2 supported projects to advance health equity, initiated efforts to leverage UCH health data through third-party partnerships and launched a systemwide task force on health data governance to promote transparent, ethical data use.

TEAM

Under the leadership of Dr. Atul Butte, CDI2 made several strategic hires this year, including a Director of External Partnerships and Projects, a Director of Research Initiatives, and two Project Managers. These hires will enable CDI2 to expand its portfolio in key areas.

PANDEMIC RESPONSE AND BEYOND

In addition to responding quickly to the ever-changing landscape of the pandemic by shifting its reporting cadence as needed, CDI2 also refined reporting to better delineate between patients hospitalized specifically *for* COVID-19 from those who were hospitalized *with* COVID-19. This better elucidated the impact of the Omicron surge on hospital capacity throughout the system.

CONTINUING SYSTEMWIDE OPERATIONAL PARTNERSHIPS

CDI2 continued to provide analytics expertise to projects that enhance operational improvements and promote quality patient care. Among other highlights, CDI2:

- **Assisted the Pharmacy Team in Reducing Inpatient Pharmacy Costs.** CDI2 worked with the Leveraging Scale for Value (LSfV) Inpatient Pharmacy Team to develop a dashboard for inpatient drug utilization and cost that will aid UCH in identifying high-cost drugs.
- **Supported the Development of a Registry for the UCH Cancer Population.** CDI2 worked with the Quality and Population Health (QPH) team and the UC Cancer Consortium (UCCC), to create a systemwide cancer population registry and associated analytics aimed at informing quality and population-based strategies.
- **Advanced Health Equity with Hypertension and Diabetes Disparities Analysis.** CDI2 supported QPH and UC health equity experts to identify and understand health disparities in UCH populations around hypertension and diabetes.

GROWING RESEARCH SUPPORT AND ENGAGEMENT

Over the past fiscal year, usage of the Center's research datasets, including its data science research environment and its COVID-19 research dataset (UC CORDS), grew significantly. To date, 17 research papers have been generated from UC CORDS by investigators at UC Davis, UC Irvine, and UCSF. CDI2 also deepened its participation in the Observational Health Data Sciences and Informatics Program (OHDSI), a large-scale analytics open-science community, including participating in the largest OHDSI study to date, designed to assess adverse events related to COVID-19 vaccines.

BUILDING SYSTEMWIDE GOVERNANCE EFFORTS

In fall 2021, CDI2 launched a Systemwide Task Force on health data governance to ensure that data-intensive collaborations across all sectors involving UC health data are conducted in an ethical, safe, and equitable manner. As part of this effort, CDI2 hosted a virtual conference in the spring, convening experts from within and outside UC to discuss issues in ethics and data governance, as well as incorporating the patient voice into decisions around data use. The Task Force will complete its work this coming year.

DEVELOPING SAFE AND RESPONSIBLE EXTERNAL PARTNERSHIPS TO ANALYZE UCH DATA

CDI2 began to develop key infrastructure to support its partnerships with government and for-profit entities to leverage insights from the UCHDW. CDI2 also launched the Systemwide Real World Evidence Collaborative, creating a platform for leaders across UCH to share ideas and resources for pursuing collaborations that utilize UCH clinical data to assess the potential benefits and risks of a medical product, therapy, or intervention.

CDI2 Team

The Center for Data-driven Insights and Innovation (CDI2) is led by Dr. Atul Butte, Chief Data Scientist at UCH. Over the past fiscal year, CDI2 has continued to grow the team, adding a Director of External Partnerships and Projects, a new Director of Research Initiatives, and two Project Managers. These roles will enable CDI2 to expand its portfolio in these critical areas.

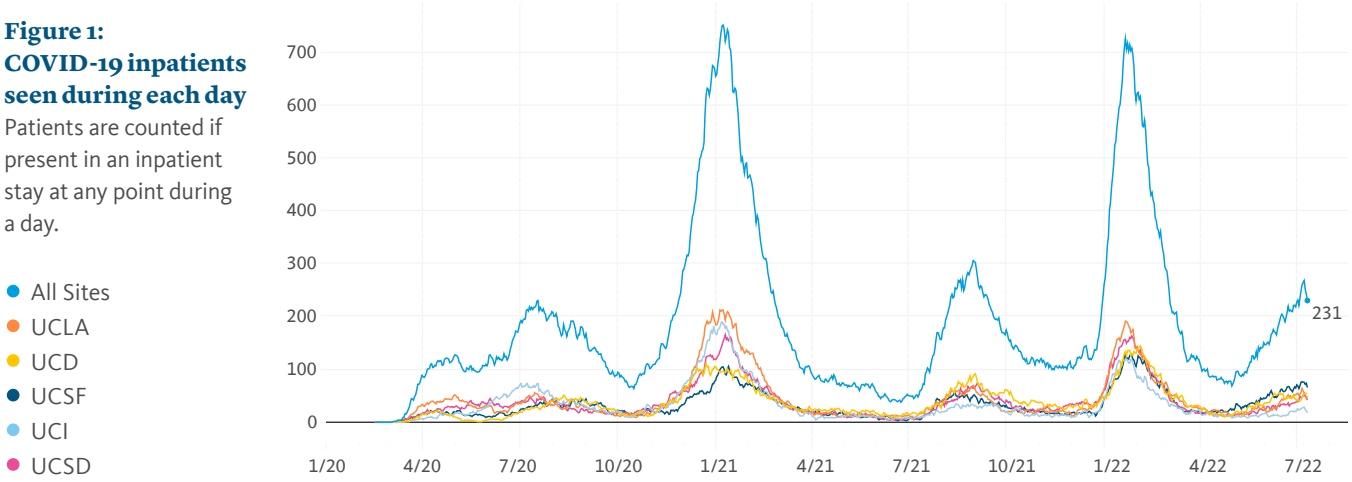
CDI2 reports on a quarterly basis to an Oversight Board with representation from each campus. The current Chair of the Oversight Board is the Vice Chancellor of Information, Technology and Data at UC Irvine. Since our last annual report, new members from UCR, UCI, and UC Biomedical, Research, Acceleration, Integration, & Development (BRAID) joined the Board, as well as a new member from the community who represents the patient voice. The full current membership of the Oversight Board is shown in Appendix 1.

Pandemic Response and Beyond

As the COVID-19 pandemic continued into this fiscal year, CDI2 once again responded to the seasonal case surge, first in the fall and winter and again in the spring, by shifting the reporting cadence from weekly to daily for COVID-19 testing and hospitalizations. The flexibility of CDI2's data team to quickly respond to this highly mutable virus continued to provide greater visibility into the impact of the Delta and Omicron surges on UC academic health centers. In addition to pivoting reporting in response to surges, CDI2 also refined the reporting on hospitalizations to better delineate between patients hospitalized specifically *for* COVID-19 from those patients who were hospitalized *with* COVID-19. This allowed for a more clearly defined understanding of the impact of the Omicron surge on hospital capacity throughout the system.

CDI2 has also continued to deepen its relationship with the California Department of Public Health (CDPH) and assist the agency in answering a variety of questions regarding COVID-19. For example, CDI2 worked closely with CDPH on the ongoing administration of vaccines across the state, with the intention of ensuring accurate data reporting for vaccination efforts in the UC Health system. CDI2 also supports the UCH and CDPH Data Modeling Consortium, which started in February 2021 and includes nearly 150 UC faculty across all 10 UC campuses. The Consortium's goal is to help guide policymaking during the COVID-19 pandemic by facilitating direct, timely engagement between policymakers and investigators on high-priority topics, including vaccinations, health equity, economic impact, challenges of new variants, and epidemiological forecasting and nowcasting. CDI2 looks forward to continuing these projects and developing future collaborations with CDPH.

Figure 1: COVID-19 inpatients seen during each day
Patients are counted if present in an inpatient stay at any point during a day.



Partnerships and Projects

Over the past fiscal year, CDI2 continued to provide analytics expertise and system-level assets in support of existing UCH efforts, while also initiating new projects in the following categories: Systemwide Operational Partnerships; Research Support and Engagement; Data Governance; and External Partnerships.

SYSTEMWIDE OPERATIONAL PARTNERSHIPS

CDI2 supports data-driven operational initiatives across UCH with projects ranging from cost-reduction to patient-care optimization. CDI2 works closely on these projects with teams in Leveraging Scale for Value, UCH Executive Leadership, Clinical Strategy and Operations, and the UC Self-Funded Health Plan group.

Leveraging Scale for Value

During FY 21-22, CDI2 contributed to several key Leveraging Scale for Value (LSfV) initiatives designed to reduce costs, enhance revenue, and improve patient care quality across the UC academic health centers.

Supporting Inpatient Pharmacy Efforts to Reduce Costs

CDI2 is working with the LSfV Inpatient Pharmacy team to develop a dashboard for inpatient drug utilization and cost. The dashboard stratifies inpatient drug data by hospital unit, service, and provider to identify high-cost drugs, allowing for more focused efforts to reduce costs to both the system and patients.

Enabling Pharmacy Team Access to Limited Distribution Drug Networks

CDI2 has begun leveraging the UCHDW to support efforts by the Chief Pharmacy Officers to gain access to limited distribution drug (LDD) networks on a systemwide basis. Access to these LDD networks is a priority for UCH because it enables physicians to monitor patient adherence and reactions to these rare drugs. The Pharmacy team has begun its efforts by focusing on LDDs that impact outpatient specialty and clinical pharmacies across the system. CDI2 securely submits monthly dispensing data, excluding any PHI, to pharmaceutical partner(s). Over this past fiscal year, the partnership between Pharmacy and CDI2 resulted in the addition of one new LDD drug, Xolair, which represented a $1.8M opportunity system wide, of which $105K has been captured in the fiscal year reported here.

Supporting Strategic Sourcing Efforts to Reduce Surgical Implant Costs

As highlighted in CDI2's 2021 Annual Report, the success of a Large Joint Replacement Initiative utilized CDI2 data, resulting in a $4.4 million expense reduction to the academic health centers. Building on this success, the LSfV Strategic Sourcing team kicked off two new initiatives in spinal implants and neurostimulators. The sourcing team is again using CDI2 data to identify surgeon implant patterns and variations in costs by surgeon. This information helps sourcing managers communicate effectively with surgeon communities and enlist their support for these cost savings initiatives. This work resulted in approximately $7 million in new cost reductions during this fiscal year.

Executive Leadership and Strategy

CDI2 continued to assist UCH leadership by providing analysis to the UC Board of Regents, Health Services Committee regarding provision of care to Medicaid patients. CDI2 developed a dashboard highlighting the increased Ambulatory Medicaid care being provided by the UC academic health centers. Data by financial class is stratified by race, ethnicity, age, and language, with additional breakdowns by Social Vulnerability Index and primary versus specialty care.

Clinical Strategy and Operations

CDI2 maintains a strong partnership with the Clinical Strategy and Operations team, which includes Quality and Population Health Management (QPH) and the University of California Cancer Consortium (UCCC). CDI2 also continues to coordinate local population health initiatives. Over the past fiscal year, CDI2 has supported projects focused on cancer care, utilization of advance medical directives for terminally ill patients, health equity in both diabetes and hypertension care across the system, and reporting of quality measures.

Quality and Population Health Management

CDI2 has continued to partner closely with QPH to support data-driven population health management strategies, including analyses aimed at reducing health inequities.

Understanding Health Disparities as Part of Hypertension and Diabetes Care Management

The COVID-19 pandemic has disrupted lives and interrupted health maintenance and care in diabetes and hypertension. It has also further revealed existing health inequities. Over the past year, CDI2 supported QPH and UC health equity experts in identifying and understanding health disparities in our populations. In the past fiscal year, CDI2:

- Created 4 dashboards using statistical process control charts to help identify best practices and monitor quality improvement outcomes by social indices, race, and ethnicity.

- Applied new race/ethnicity combined variables following national guidelines, giving a more accurate representation of our patient demographics.
- Supported a multivariate analysis of risk factors for hypertension among African American/Non-Hispanic Black patients. The analysis revealed that some of the elevated risk of hypertension observed among African American/Non-Hispanic Black patients could be explained by disparities in neighborhood disadvantage and smoking status, when the data are pooled across the UCH system. However, when the analysis was replicated for each UC health center, the findings varied between the sites. Stratifying by additional variables revealed that the results also vary by gender and time frame.

These data dashboards, analyses, and tools provided new insights to clinical experts in Endocrinology, Pharmacy, and Primary Care to help prioritize strategies and local efforts. Both the UC Primary Care Collaborative and UC Diabetes Workgroup have defined and agreed to UCH-wide quality improvement goals, including:

- Improving blood pressure control among the UC Hypertension Cohort
- Eliminating disparities in blood pressure control among African Americans/Non-Hispanic Blacks
- Improve Optimal Diabetes Care in the UC Diabetes Cohort
- Eliminating disparities in poor glycemic control among African American/Non-Hispanic Blacks and Latinos
- Improving statin therapy and other cardioprotective medications for eligible patients in the UC Diabetes Cohort

Thus far, systemwide efforts implemented at each UC health center have driven an 11% improvement across three UCH-wide diabetes and hypertension quality metrics. QPH and CDI2 will continue to apply health equity strategies to inform our UC collaborative workgroups as they design tailored interventions and outreach that can further improve quality outcomes while addressing health equity in diabetes and hypertension.

Local Population Health Support

In addition to population health efforts at the system-wide level, CDI2 coordinates quality measures reporting across all of the academic health centers as part of the Quality Incentive Program and supports population health initiatives at individual academic health centers, including projects targeting cost and utilization reduction at UCSD and UCLA, which are highlighted below.

Quality Incentive Program (QIP) Performance Year 5

CDI2 continued to provide support for the QIP Managed Medicaid program with a common software code repository, data mapping, value set management, and documentation for this reporting. CDI2 collates clinical validation feedback from sites, integrates it into the code/mappings/value sets, and disseminates it to all the sites. Not only does CDI2 share technical code as part of this process, but it also shares and disseminates clinical knowledge from one site to another. CDI2's coordination efforts and the data from each of the local instances of the UCHDW enabled the local sites to submit data to DHCS for the most recently completed Performance Year of the program, contributing to all UC academic health centers successfully obtaining the maximum incentive payment of more than $50 million.

Addressing Excess Cost and Utilization Through Claims Processing

Leveraging analytics expertise from its work with the Self-Funded Health Plans, CDI2 began supporting local population health efforts at UC San Diego Health this past fiscal year by processing CMS claims to categorize cost and utilization, classify chronic conditions, and risk adjust patients in the Medicare Shared Savings Program and Primary Care First Managed Medicare programs. CDI2's dashboard helped UCSD identify provider groups or clinics that have potential excess cost and utilization so these providers can work to improve these metrics and reduce costs. CDI2 has begun similar work with UCLA, utilizing locally processed claims data to create a Primary Care First dashboard that will likewise enable targeted cost and utilization reduction.

University of California Cancer Consortium

Over the past fiscal year, CDI2 expanded its partnership with the UC Cancer Consortium (UCCC). The UCCC is comprised of five NCI-designated Comprehensive Cancer Centers at UCD, UCI, UCLA, UCSD, and UCSF.

Assisting the Development of a Registry for the UCH Cancer Population

Collectively, the UC Cancer Centers see over 90,000 patients with cancer each year. Identifying patients actively receiving cancer treatment across our oncology specialties at a given point in time, however, is challenging. To address these challenges of scale, CDI2, in collaboration with QPH and Cancer Quality

Leaders at each UC academic health center:

- Assisted in defining use cases for a cancer population registry
- Assisted in defining the numerator and denominator of the patients to be included
- Created a UC systemwide cancer population registry and dashboards available to each UC Cancer Center

The UC systemwide cancer population registry is an important tool to inform quality and population-based strategies. QPH and UCCC have formalized a UC-wide work group with subject matter experts from our Cancer Centers that are now applying an Oncology Medical Home care model to improve health, health outcomes, and care coordination. The goals of this work group are to develop agreed-upon approaches that improve advance care planning, cancer utilization, and assess systemwide metrics for equity in cancer care.

Self-Funded Health Plans

UCH manages UC's self-funded health plans for faculty, staff, and retirees and aims to increase adoption of UC-branded health plans by offering comprehensive health plans that are innovative and affordable. Due to the success of interventions implemented across the academic health centers, CDI2 has continued to monitor the health plan metrics for HealthNet Blue & Gold and Anthem UC Care and has begun to assist with a project focused on improving access to care.

Improving Access by Analyzing Metrics

CDI2 provided the academic health centers with supporting data from the Self-Funded Health Plans to measure access metrics for members who are UC employees. These metrics include the time between appointment request and appointment scheduled, the ratio of visits considered “arrived” and completed, total number of cancelled appointments, and any no-shows. The query can be further refined by employee health plan (HealthNet/Anthem) and by provider specialty.

RESEARCH SUPPORT AND ENGAGEMENT

A primary function of CDI2 is enabling the next generation of clinical research. CDI2 has advanced this aim by expanding its own research portfolio and further developing the data science environment that enables secure data analysis.

Growing the UC Data Discovery Platform (UCDDP)

To assist systemwide research and operational efforts, CDI2 has implemented the UC Data Discovery Platform (UCDDP), a secure data science environment. The UCDDP contains tools to allow researchers to query and analyze a HIPAA limited data set generated from the UCHDW. The EHR data in the UCHDW includes diagnosis, medication, procedure, test result, and vital sign data on over eight million patients.

Interested users work with their local UC academic health center—or a collaborating UC academic health center if they are not affiliated with one—to develop and run their queries in their local environment. Each project undergoes local review to evaluate the scientific merit of the project and to confirm the value of running the query centrally. Users agree to comply with all local processes and, upon access, sign an appropriate Data Use Agreement (DUA).

Since its launch in 2020, usage of the UCDDP has grown significantly. As of June 2022, more than 110 UCH users have successfully accessed this platform for both clinical operations and clinical research purposes.

Facilitating COVID-19 Research Efforts

As detailed in the previous two Annual Reports, CDI2 created and deployed UC CORDS, a COVID-19 patient research HIPAA limited data set that combines the SARS-CoV-2 testing data for UCH patients with their prior history dataset. CDI2 was able to securely transfer this UC-wide COVID limited data set to each of the academic health centers for their use within their own

FIGURE 2: TOTAL USERS BY CAMPUS

secure virtual systems for research. To date, this dataset has been utilized by researchers at all six academic health centers, and currently has over 200 documented users. Additionally, to date, 17 research papers have been generated and are published or in press. A complete list of papers published is included in Appendix 4.

Contributing to Open Science with ODHSI

CDI2 continued its contribution to the Observational Health Data Sciences and Informatics Program (OHDSI). OHDSI is an international multi-stakeholder, interdisciplinary open-science community focusing on bringing out the value of health data through large-scale analytics. In 2022, CDI2 participated in the largest OHDSI network study to date, designed to assess the incidence rates of 16 adverse events of special interest (AESI) related to COVID-19 vaccines among COVID-19 subjects. The study included over 23 million COVID-19 patients from 26 different data partners across the world along with data and analytic contributions from the CDI2 team. As with all OHDSI studies, no patient-level data is ever shared. The results of the OHDSI network study indicated a considerable heterogeneity in incidence rates of AESIs across the databases. The findings from the study are being submitted for peer-review, and the pre-print can be found in Appendix 4.

Utilizing the UCHDW for Systemwide Clinical Trials

As reported last year, CDI2 continues to query the UCHDW to provide monthly files of potential patients for recruitment for the Kidney Injury in Times of COVID-19 (KIDCOV) study (PI: Minnie Sarwal, MD, PhD, UCSF), a longitudinal cohort funded by NIH to evaluate whether the presence of COVID-19 infection raises the 12-month risk of kidney injury. The processes developed for that effort will be used to support additional trials that are just starting this fiscal year, including a UC-wide collaboration to develop a method for early identification of individuals with rare immune diseases. In addition, CDI2 will provide lists of eligible patients for potential recruitment and outcomes data for those enrolled in a UC-wide quality improvement initiative to increase remote (home) blood pressure monitoring and improve blood pressure control for persons with hypertension.

WISDOM Study

The WISDOM Study (Women Informed to Screen Depending on Measures of Risk) (PI: Laura Esserman, MD, MBA, UCSF) is a randomized clinical trial comparing the traditional standard of care for breast cancer screening, which recommends annual mammograms for women starting at the age of 40, with a personalized approach based on a comprehensive assessment of each patient's risk. The multicenter trial, which includes each academic health center, aims to enroll 100,000 women to determine whether the screening protocol is as safe as the traditional approach, is preferred by patients, and can improve patient outcomes. The study is funded by the Patient Centered Outcomes Research Institute (PCORI) and was designed with input from a diverse cadre of stakeholders, including patients, patient-advocates, physicians, policy makers, technology innovators, and insurers. To facilitate additional analyses, CDI2 provided supplementary EHR data for patients who had already been consented and enrolled in the study, including demographics, comorbidities, and procedures.

Moving Forward with Systemwide Health Data Governance

In October 2021, CDI2 kicked off a systemwide task force on health data governance. The task force continues work that UC has been on the forefront of for several years and arises out of recognition that data-intensive collaborations among all sectors – government, non-profit, and commercial institutions – can generate new insights about disease and treatments. These collaborations, however, must be pursued safely and responsibly. The task force is comprised of three work groups: (1) Work Group A, focused on development of a "justice-based" model of health data use (i.e., one that incorporates community input to shape scientific and health goals); (2) Work Group B, focused on development of a health data access tracking repository that will capture transactions allowing access to relevant data sets across the system; and (3) Work Group C, focused on reviewing and updating interim processes around evaluating requests to access UC health data.

Dr. Patricia Flatley Brennan, Director of the National Library of Medicine at NIH

In April 2022, the task force hosted a virtual conference entitled *Got Health Data? Moving Toward a Justice-Based Model of Data Use*. The conference covered several topics, including how to incorporate the patient voice into decisions around data use, how to define public good in the context of data analytics, data ethics and governance, and collaborating with for-profit and government entities. Dr. Patricia Flatley Brennan, Director of the National Library of Medicine at NIH, delivered the keynote presentation, entitled "Incorporating the ~~patient~~ Person's Voice into Decisions Around Data Use." Among other points, Dr. Brennan emphasized that institutions such as UC are first actors in promoting accountability, transparency, and equity with respect to patient data saying, "...we must realize, as we're going to allow the experience of individuals to help shape the future of this vibrant and expensive enterprise asset called health data, we must see the whole person. We must see them ... with all of their assets, with who they are, with what they know about the world."

Video recordings of the event are available and the task force will use the conference as a resource for recommendations made in a final report.

Developing Safe and Responsible Partnerships to Analyze UCH Data

Over the past fiscal year, CDI2 has begun to identify and develop key infrastructure to support its external collaborations with government and for-profit entities to leverage insights from the UCHDW in accordance with UC's mission and core values. This infrastructure will enable CDI2 to pursue commercial agreements that serve a clear public benefit and adhere to UC principles around safe, ethical, and transparent data use. CDI2 also launched a Systemwide Real World Evidence Collaborative, creating a platform for leaders across UCH to share ideas and resources for pursuing collaborations that utilize UCH clinical data to assess the potential benefits or risks of a medical product, therapy, or intervention.

Looking Ahead to FY2023

As we look ahead to the next fiscal year, CDI2 anticipates growth across several areas, including its technical infrastructure and analytic capabilities, data governance processes, support of systemwide projects, external partnerships, and research support and engagement. Among the projects that CDI2 anticipates it will undertake over the next fiscal year:

- **Enhancing Internal Lab Testing Capability Across UCH.** CDI2 will expand the data it provides to support the Leveraging Scale for Value Systemwide Lab team's initiatives to better understand UCH's internal lab testing capability, which tests are sent to external labs, and turnaround time differences.
- **Continuing Population Health Work to Identify Health Disparities.** Building upon its work with QPH analyzing disparities in hypertension care, CDI2 plans to conduct an analysis of diabetes disparities to investigate the drivers of disparities in glycemic control among Hispanic and non-Hispanic African American populations.
- **Expanding Local Population Health Support Through Claims Processing.** CDI2 intends to expand upon its work with local population health teams to address excess cost and utilization through claims processing by (1) processing and adding Medicare Advantage claims from Humana and Blue Shield to the UCSD dashboard; and (2) expanding the UCLA dashboard to include Medicare Advantage claims for the United Healthcare and Blue Shield plans, as well as commercial managed care claims for the Anthem and Cigna Accountable Care Organizations (ACOs). The cost and utilization data available on these dashboards will enable the local teams to identify additional opportunities to improve care while reducing costs to obtain the financial incentives associated with each contract. Teams will also be able view all their value-based contract data in a single analytics platform developed by CDI2 to identify cross-contract opportunities.
- **Increasing Cancer Data Availability for Analytics.** Based on work originally completed at UCSF Health, CDI2 will extract key concepts from pathology reports, such as tumor staging, that will facilitate analysis of disease progression among cancer patients to guide improvements in treatment and outcomes. These concepts will be incorporated into the UC Data Discovery Platform (UCDDP) for use in clinical research and operations.
- **Completing Work for Systemwide Health Data Governance Task Force.** The task force will complete its work, culminating in set of recommendations to President Drake around the development of a justice-based model of health data use, and updated processes governing the sharing of health data with third parties.
- **Continued Growth of External Partnerships.** CDI2 will continue to assess and pursue opportunities with third parties where the alignment of vision and shared values gives the partnership the impetus to solve problems together. CDI2 and the Systemwide Real World Evidence Collaborative is also planning an in-person conference focused on the usage of Real-World Data (i.e., electronic health records, claims, mobile devices, wearables, etc.) to assess the potential benefits and risks of a medical product, therapy, or intervention in spring of 2023. The conference will cover UCH data capabilities and resources, current and potential Real World Evidence initiatives with government and for-profit entities, how to successfully conduct collaborations in a safe and responsible manner, and financial considerations and challenges in developing Real World Evidence projects.

Conclusion

Over the past fiscal year, CDI2 continued to play a vital role in the UCH COVID-19 response and pursued numerous projects supporting its core goals of quality, patient safety, and population health management; generating efficiencies and economies of scale across UCH; developing data governance and strategic support; and innovating around technical infrastructure and analytic capabilities. CDI2 also began to develop infrastructure to develop safe and responsible partnerships to analyze UCH data and hired a Director of Research Initiatives to begin increased engagement and support of systemwide research efforts around data. Critical to all these efforts are CDI2's long-standing collaborations with UCH IT Teams and many other groups across UC, and the support of the UC academic health centers.

Appendix 1 – Oversight Board Membership

COMMITTEE LEADERSHIP

Chair

Tom Andriola
Vice Chancellor, Information, Technology and Data, UCI

CAMPUS APPOINTEES

San Diego

Chris Longhurst, MD, MS
CMO, Chief Digital Officer

Los Angeles

Albert Duntugan
Chief Data Officer

Riverside

Andres Gonzalez, MD
CMO

Davis

Jason Adams, MD
Director, Data and Analytics Strategy

Irvine

Lisa Gibbs, MD
Chief, Division of Geriatric Medicine and Gerontology

San Francisco

Gina Shuler, PhD, RN
VP and Chief Population Health Officer, UCSF Health

Office of the President

Anne Foster, MD
Chief Clinical Officer, UC Health

AT-LARGE APPOINTEES AND AREAS REPRESENTED

CMO/CQO

Robert Cherry, MD
Chief Medical and Quality Officer
UCLA

Research (UC BRAID)

Dan Cooper, MD
Director, Institute for Clinical and Translational Science, Associate Vice Chancellor for Clinical and Translational Science
UCI

Non-Health Campus

Jennifer Chayes, PhD
Dean, School of Information and Associate Provost of Computing, Data Science, and Society
UCB

Ethics

Barbara Koenig, PhD
Professor Emeritus of Medical Anthropology & Bioethics
UCSF

Patient Voice

Ysabel Duron
President/Executive Director
The Latino Cancer Institute

EX OFFICIO

Compliance (Research)

Shanda Hunt, JD
Associate Director, Systemwide Compliance
UCOP

Compliance (Healthcare)

Noelle Vidal, JD
Healthcare Compliance and Privacy Officer
UCOP

UC Legal

Hillary Kalay
JD – Senior Counsel
UCOP

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

TEAM MEMBERS

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

Andenet Emiru, MBA
Director, External Partnerships and Projects
UC Health

Emrica Agossa, MPH
Project Manager
UC Health

Jennifer Benbow
Project Manager
UC Health

Lisa Dahm, PhD
Director, Health Data and Analytics
UCI Health

Ayan Patel, MS
Lead Data ScientistUCI Health
UCI Health

Aiden Barin
Data Scientist
UCI Health

Chaya Mohn
Data Scientist
UCI Health

Ray Pablo
Data Scientist
UCI Health

Teju Yardi
Data Scientist
UCI Health

Nadya Balabanova
Data Scientist
UCI Health

Tim Hayes
Technical Project Manager
UCI Health

David Gonzalez
Infrastructure Architect
UCI Health

Rob Follett
Lead Data Architect
UCI Health

Appendix 3 – Campus and Medical Center Partners

TECHNOLOGY LEADERSHIP PARTNERS

Ellen Pollack, MSN, RN-BC
Chief Information Officer
UCLA Health

Chris Longhurst, MD
Chief Digital Officer
UCSD Health

Scott Joslyn
Chief Information Officer
UCI Health

Joe Bengfort
Chief Information Officer
UCSF Health

Ashish Atreja, MD
Chief Information and Digital Health Officer
UCD Health

BUSINESS INTELLIGENCE PARTNERS

Albert Duntugan
Chief Data Officer
UCLA Health

Andrew Weaver
Director, Program Operations, OHIA
UCLA Health

Yael Berkovich
Director, Enterprise Information Architecture, OHIA
UCLA Health

Rick Larsen
Director, Research Informatics, EIA
UCSF Health

Kent Anderson
Director, IT Health Informatics
UCD Health

Jennifer Holland
Director, Analytics and Population Health
UCSD Health

David Merrill
Director, Enterprise Data and Analytics
UCI Health

Dan Phillips
Manager, Enterprise Data and Analytics
UCI Health

CAMPUS TECHNICAL IMPLEMENTATION TEAM

Kathy Pickell
Data Architect
UCI Health

Leanie Mayor
ETL Developer
UCI Health

Steve Covington
Clinical Informatics Specialist
UCD Health

Hemanth Tatiparthi
ETL Developer
UCD Health

Supraja Radhakrishnan
ETL Developer
UCD Health

Jay Shah
Data Engineer
UCLA Health

Vajra Kasturi
Data Engineer
UCLA Health

Nelson Lee
Data Engineer
UCSF Health

Peter Ryan
Senior ETL Developer
UCSD Health

Hiram Cardoza
Senior ETL Developer
UCSD Health

Bill Cinnater
Senior Cloud Engineer
UCLA Health

Appendix 4 – Publications

1. Nguyen, C., Shwe, S., Yale, K., Ghigi, A., Zheng, K., Mesinkovska, N. A., & Bhutani, T. (2022). **The role of gender, race, and ethnicity in psoriasis patients with COVID-19 infection: A cross-sectional study**. *International Journal of Women's Dermatology*, 8(1), e012. https://doi.org/10.1097/JW9.0000000000000012

2. Watanabe, J. H., Kwon, J., Nan, B., Abeles, S. R., & Mehta, S. R. (2022). **Examination of medication use patterns by age group, comorbidity, and month in COVID-19 positive patients in a large statewide health system during the pandemic in 2020**. *The Journal of Pharmacy Technology*, 38(2), 75–87. https://doi.org/10.1177/87551225211068675

3. Yale, K., Nguyen, C., Telep, S., Ghigi, A., Zheng, K., Subramanian, I., Feeney, C., & Mesinkovska, N. A. (2022). **Is prior antithrombotic use protective against COVID-19 infection? A cross-sectional study of the University of California Health patient population**. *Annals of Blood 2022*. https://doi.org/10.21037/aob-21-75

4. Yale, K., Nourmohammadi, N., Casale, F., Ghigi, A., Zheng, K., & Mesinkovska, N. A. (2022). **A year in review: A cross-sectional study of alopecia areata and risk of COVID-19 infection, hospitalization, and mortality from March 2020 - February 2021**. *International Journal of Dermatology*, 61(3), e81–e83. https://doi.org/10.1111/ijd.15970

5. Huang, Y., Pinto, M. D., Borelli, J. L., Mehrabadi, M. A., Abrihim, H., Dutt, N., Lambert, N., Nurmi, E. L., Chakraborty, R., Rahmani, A. M., & Downs, C. A. (2021). ***COVID Symptoms, Symptom Clusters, and Predictors for Becoming a Long-Hauler: Looking for Clarity in the Haze of the Pandemic***. medRxiv, 2021.03.03.21252086. https://doi.org/10.1101/2021.03.03.21252086

6. Mehrabadi, M. A., Aqajari, S., Azimi, I., Downs, C. A., Dutt, N., & Rahmani, A. M. (2021). **Detection of COVID-19 using heart rate and blood pressure: Lessons learned from patients with ARDS**. *43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC),* 2021, 2140–2143. https://doi.org/10.1109/EMBC46164.2021.9629794

7. Nuño, M., García, Y., Rajasekar, G., Pinheiro, D., & Schmidt, A. J. (2021). **COVID-19 hospitalizations in five California hospitals: A retrospective cohort study**. *BMC Infectious Diseases*, 21(1), 938. https://doi.org/10.1186/s12879-021-06640-4

8. Nguyen, C., Shwe, S., Yale, K., Ghigi, A., Zheng, K., Mesinkovska, N., & Bhutani, T. (2021). **Racial and ethnic disparities in COVID-19-related infection in patients with psoriasis: A cross-sectional study**. *The Journal of Investigative Dermatology*, 141(9), B15. https://doi.org/10.1016/j.jid.2021.07.113

9. Watanabe, J. H., Kwon, J., & Mehta, S. R. (2021). **Association of age and hospitalization amongst those with underlying high-risk conditions at COVID-19 diagnosis in a large, state-wide health system**. *Journal of General Internal Medicine*, 36(9), 2906–2908. https://doi.org/10.1007/s11606-021-06942-y

10. Watanabe, J. H., Kwon, J., Nan, B., Abeles, S. R., Jia, S., & Mehta, S. R. (2021). **Medication use patterns in hospitalized patients with COVID-19 in California during the pandemic**. *JAMA Network Open*, 4(5), e2110775. https://doi.org/10.1001/jamanetworkopen.2021.10775

11. Nguyen, C., Yale, K., Casale, F., Ghigi, A., Zheng, K., Silverberg, J. I., & Mesinkovska, N. A. (2021). **SARS-CoV-2 infection in patients with atopic dermatitis: A cross-sectional study**. *The British Journal of Dermatology*, 185(3), 640–641. https://doi.org/10.1111/bjd.20435

12. Yale, K., Elsanadi, R., Ghigi, A., Zheng, K., Goren, A., & Mesinkovska, N. A. (2021). **Androgens and women: COVID-19 outcomes in women with acne vulgaris, polycystic ovarian syndrome, and hirsutism**. *International Journal of Dermatology*, 60(7), e267–e268. https://doi.org/10.1111/ijd.15473

13. Nguyen, C., Yale, K., Ghigi, A., Zheng, K., Mesinkovska, N. A., Wambier, C. G., Cadegiani, F. A., & Goren, A. (2021). **SARS-CoV-2 infection in patients with thyroid disease: A cross-sectional study**. *Annals of Thyroid 2021*, 6, 7. https://doi.org/10.21037/aot-21-8

14. Vashisht, R., Patel, A., Crews, B. O., Garner, O. B., Dahm, L., Wilson, C., & Butte, A. J. (2021). **Age- and sex-associated variations in the sensitivity of serological tests among individuals infected with SARS-CoV-2**. *JAMA Network Open*, 4(2), e210337. https://doi.org/10.1001/jamanetworkopen.2021.0337

15. Kwon, D., Vashisht, R., Borno, H., Aggarwal, R. R., Small, E. J., Butte, A., & Huang, F. W. (2021). **Androgen deprivation therapy and risk of SARS-CoV-2 infection in men with prostate cancer: A University of California (UC) Health System registry study**. *Journal of Clinical Oncology*, 39(6_suppl), 37. https://doi.org/10.1200/jco.2021.39.6_suppl.37

16. Reznikov, L. R., Norris, M. H., Vashisht, R., Bluhm, A. P., Li, D., Liao, Y. S. J., Brown, A., Butte, A. J., & Ostrov, D. A. (2021). **Identification of antiviral antihistamines for COVID-19 repurposing.** *Biochemical and Biophysical Research Communications*, 538, 173–179. https://doi.org/10.1016/j.bbrc.2020.11.095

17. Nourmohammadi, N., Yale, K., Ghigi, A., Zheng, K., & Mesinkovska, N. (2020). **A cross-sectional study on herpes zoster diagnosis in the time of COVID-19**. *SKIN The Journal of Cutaneous Medicine*, 4(6), 556–558. https://doi.org/10.25251/skin.4.6.9

UNIVERSITY
OF
CALIFORNIA
HEALTH

University of California Health

1111 Franklin Street
Oakland, CA 94607-5200

University of California Health
Academic Health Centers

UC Davis Health
UC San Diego Health
UCI Health
UCLA Health
UCR Health
UCSF Health