2017

YEAR IN REVIEW

Tackling big problems in health care through smarter use of data, new technology and collaboration
WE ARE DRIVEN TO IMPROVE HEALTH CARE USING OUR EXPERTISE IN COMPLEX HEALTH DATA, LEADING-EDGE DATA SCIENCE, AND CONVENING DIVERSE STAKEHOLDERS.

This powerful combination enabled us to make strides across diverse challenges in 2017, including tackling the opioid epidemic, applying artificial intelligence to health care, developing novel quality measures and more. We at OptumLabs® are pleased to share this overview of our collective efforts to help solve health care’s greatest challenges in 2017.
Research and translation

- New research projects by 29 principal investigators from 12 partner institutions

Data-driven innovations

- Projects that apply artificial intelligence to solve business problems and enhance disease prediction

New collaborations

- Opioid research collaborations on opioid use, conservative therapies for back pain and post-surgical prescribing patterns

Integrated programs

- Opioid key performance indicators in 4 domains using claims data:
  - Prevention
  - Opioid use disorder (OUD) treatment
  - Pain management
  - Maternal and child health

AT A GLANCE

- 2017
- 2 PARTNERS
- 3 PROGRAMS:
  - Opioid use and pain management
  - Real-world evidence
  - Cancer research
- 7 COLLABORATORS AND SPONSORS
- 29 AWARDED FUNDING FOR
  - Novel measure development projects, and started 4 others, via the AARP Innovation Grant program
- 34 INITIATED
  - New research projects by 29 principal investigators from 12 partner institutions
- 2 PUBLISHED
  - Papers in high-impact, peer-reviewed journals
- 32 PROJECTS
  - Received external grant awards for
- 60 CONFERENCES
  - Presented OptumLabs work and thought leadership at more than
In 2017, OptumLabs launched three new collaborative programs.

Collaborative to Transform Opioid Use and Pain Management
The U.S. opioid epidemic is an urgent and complicated health issue. Along with all of UnitedHealth Group®, we have been working hard to help solve the crisis through the lenses of prevention, pain management, opioid use disorder (OUD) treatment, and maternal and child health. We’re working on projects in collaboration with more than 50 experts from across the enterprise, the OptumLabs partnership and beyond.

Observational Patient Evidence for Regulatory Science and Understanding Disease (OPERAND)
With the vast real-world health care data available today, we have an opportunity to generate reliable evidence more quickly and at less cost than traditional randomized controlled trials (RCTs) for certain applications. OptumLabs is partnering with the Multi-regional Clinical Trials Center at Brigham and Women’s hospital to raise confidence in the appropriate use of real-world evidence (RWE) — specifically, claims and clinical data — in medicine and regulatory decision-making. While individual RCTs have been replicated using observational databases before, OPERAND collaborators will replicate a large number of trials across several different therapeutic areas simultaneously in 2018 — something that hasn’t been attempted on this scale before.

Cancer Research Collaborative (CRC)
Cancer impacts millions of people in the U.S. and worldwide. The CRC was co-established by the American Cancer Society and OptumLabs to accelerate research among partners using the OptumLabs Data Warehouse (OLDW) that can advance cancer care and prevention. The program promotes collaborative research, recommends data improvements to support cancer research, and facilitates translation of research insights. Collaborators include Harvard Pilgrim Health Care Institute, Mayo Clinic, leadership from Optum Clinical Services and UnitedHealthcare® Oncology, Stand Up To Cancer, University of California Health, and Yale.

We also welcomed two new OptumLabs partners:
- Harvard Kennedy School of Government
- Harvard Pilgrim Health Care Institute, Department of Population Health
A highlight of this year’s OptumLabs Research & Translation Forum was Opioid Insights for Action Day—a thought leadership event in Boston that was also broadcast via live stream. Organized around the OptumLabs KPIs and research underway, we immersed participants in discussions with national experts on what’s working and what’s not, to guide solutions and opportunities that can help reverse the epidemic through innovation and partnership.

Building a comprehensive national action framework
OptumLabs saw the need for meaningful metrics to help stakeholders identify, benchmark and set performance targets to respond to the drivers of the opioid epidemic. Working with the behavioral health, pharmacy, consumer solutions and insurance businesses within Optum® and UnitedHealthcare® (UHC), we recognized the many aspects that need to be considered for a broad data-driven view of the crisis. We also convened a panel of national clinical leaders and public health experts—including representatives from the Centers for Disease Control and Prevention (CDC) and the Substance Abuse and Mental Health Services Administration (SAMHSA) — to inform our work.

The result: 29 claims-based key performance indicators (KPIs) using the OptumLabs Data Warehouse across four key domains: prevention, pain management, opioid use disorder (OUD) treatment, and maternal and child health.

We are now sharing these metrics—both internally to support various business uses and embed in products and services, as well as sharing the specifications externally—so that diverse health care stakeholders can leverage the KPIs in their own environments and maximize our collective efforts to tackle the opioid epidemic.

Research and discovery
OptumLabs partners are also conducting high-impact collaborative research to obtain new insights on opioid use, therapies and prescribing patterns to help reverse the epidemic:

- Opioid prescribing for acute pain in the emergency department — Mayo Clinic
- Opportunities in conservative therapies for low back pain — American Physical Therapy Association, Boston University, UnitedHealthcare
- Identifying unsafe opioid prescribing in patient notes through natural language processing — OptumLabs, FDA, Mayo Clinic, Yale
- Post-surgical prescribing and the impact on short- and long-term use of opioids — University of California, San Francisco

In December, we introduced the opioid KPIs and described their value as a quality improvement tootset via a Health Affairs blog post. We will continue this effort into 2018 through meetings with various government stakeholders as well as conferences such as AMGA and HIMSS.

Visit the Health Affairs blog post.
Measuring the quality of health care is vital to improving it. A large array of quality measures has been produced over the years, and the health system is now challenging us to focus on what measures truly matter. OptumLabs engaged multiple partners from across the health care industry in novel quality measure development and/or testing using our data to address some of today’s important gaps.

AARP Innovation Grants
For the second year, AARP and OptumLabs collaborated to fund innovation in quality measurement that improves patient experiences as we transition to value-based care. We received 38 applications from 34 organizations. Ten finalists were selected on topics such as imaging, cancer care, transitions to hospice, hypoglycemia, antibiotics, hepatitis C and delirium. Our review board chose two measure concept winners for grants:

Cancer care-related adverse event rate
Tufts Medical Center, Memorial Sloan Kettering Cancer Center, Dana-Farber Cancer Institute
Without a robust measurement framework focused on patient safety in oncology, it is difficult to advise patients and their clinicians about the likely toxicities of therapy, the risk of treatment-related errors, or the best site of care for their disease. This project will specify a suite of “triggers” in the electronic medical record that signify potential adverse events or medical errors.

Hypoglycemic events associated with anti-hyperglycemic medications
Pharmacy Quality Alliance (PQA), University of Maryland
Hypoglycemia is a primary concern associated with glucose-lowering medications, potentially leading to hospitalizations and emergency department (ED) visits. This project will measure hypoglycemic events requiring a hospitalization or ED visit among adults receiving these medications.

Qualified Entity: Public reporting
As a CMS Qualified Entity (QE), OptumLabs is combining Medicare Fee for Service (FFS) data with commercial claims data from one or more payers to produce public reports on standard quality measures aimed at improving the performance of health care providers and suppliers.

Having linked the Medicare FFS claims data (Parts A/B/D) to the OptumLabs Data Warehouse, we are now working with the Lewin Group to showcase a select set of standard quality measures in the context of two important issues:

Process and outcomes: Do we see strong correlations between process measures and outcome measures centered on the same topic (e.g., do trends in HbA1C testing relate to glucose control and downstream diabetic complications?).

Insurance transition: Is quality impacted as patients transition from commercial to Medicare (either FFS or Medicare Advantage) insurance coverage?
We will begin reporting on measures in 2018.
As artificial intelligence (AI) continues to make its way into health care, OptumLabs has focused on practical applications of AI to innovatively solve business problems, enhance disease prediction, and help train the next generation of data scientists.

**Solving business problems**

Through our Center for Applied Data Science (CADS), we have identified high-value opportunities to use graph analytics and deep learning to improve administrative work flows and solve other business challenges.

**Quality care through smarter network design.** We created a prototype of a network design tool using graph analytics that identifies hidden sub-networks of providers that collaborate in the care of members. This tool shows how these informal networks of trust—or natural networks—can achieve better outcomes and reduce medical costs.

**Classification & prediction solutions to improve efficiency.** We kicked off developing deep learning software prototypes for Optum businesses that can automate pre-screening medical charts for expedited review, predict people at risk of developing certain underdiagnosed conditions, and forecast out-of-network utilization and emergency department utilization.

**Enhancing disease prediction**

Together with our partners, OptumLabs data scientists have been using machine learning in a variety of discovery projects. We completed foundational work that explores the potential of machine learning techniques to predict Alzheimer’s and dementia diagnosis four to eight years in advance.

In parallel, we explored natural language processing to identify additional predictors in clinical notes that may guide more timely diagnoses of unusual and/or difficult to diagnose diseases. In the next stage of our work, we will apply deep learning methods to structured and unstructured EHR data aiming to further improve predictive ability.

The Center for Applied Data Science (CADS) is a Center of Excellence within OptumLabs focused on high-value applications of AI to health care. CADS applies innovations in artificial intelligence to solve complex analytic problems and creates software prototypes that partners such as Optum, UnitedHealthcare and beyond can bring to market.

**ENTERPRISE AND PARTNER LEARNING**

As we’ve built expertise in advanced data science methods and applied that to problems where there is a natural fit, we’ve also collaborated in broader enterprise learning and helped train data scientists within Optum. OptumLabs worked with Optum business units to launch Data Science University, a program designed to develop the next generation of data scientists within the broader enterprise by grounding them in emerging areas of machine intelligence. OptumLabs helped develop and deliver the curriculum for this program, and engaged partners with modules on deep learning in our Research & Translation Forum pre-event workshops.
We are constantly curating our data — the OptumLabs Data Warehouse (OLDW) — and deepening our capability to support the expanding range of OptumLabs and partner-led discovery programs. OptumLabs and partners collaborated to initiate many diverse projects and publish robust evidence using our data. In 2017, we enhanced the OLDW to include:

New data types: Added Medicare Supplemental, Medical Group Benefits, Pharmacy Benefits, Plan Benefit Design, Destination Medical Center indicators, as well as linked CMS Fee-For-Service (FFS) data to support Qualified Entity (QE) public reporting

Data enhancements: Reduced the need to manually join data across key tables as well as improved the performance of larger, frequently accessed tables such as Continuous Enrollment, Inpatient Confinement, Facility (including UB92 Services), automated American Hospital Association (AHA) linking, and Pharmacy Claims (added Prescriber and Provider data)

OptumLabs Europe support: Improved data access to enable U.K. partners to start research on claims data

More server power: Supported the growing partnership with more complex computational needs

ADVANCING DATA AND RESEARCH

CONDUCTING RESEARCH

IN 2017:

34 new projects were initiated by
29 principal investigators from
12 partner institutions

SIX PROJECTS WERE AWARDED EXTERNAL GRANT FUNDING.
Knowledge sharing and training
OptumLabs enhanced data education and training for researchers and data scientists working in OLDW. This includes several new ways to conveniently meet partners—who are spread across the U.S. and overseas—where they can build knowledge and accelerate research:

The Bridge: This online partner collaboration platform expanded to engage over 250 users and serve as a “one-stop-shop” for data and research support. New content includes:

Instructional videos: Shows partners how to best leverage the tools and data assets within the OLDW, enabling them to gain deeper knowledge on their own time

New FAQs: Provides quick answers to common questions as partners dig into the data on topics such as: medical group benefits, inpatient confinement, AHA survey, standard programs, Zip5 view, high resource utilization—query restrictions, and ICD-10

Standard data extraction program: Streamlines the process of pulling and cleaning data from OLDW to help research partners form cohorts quickly and consistently

Training VDIs: Temporary, restricted environments that analysts can use during training sessions to explore and evaluate data availability and feasibility.

Boot camps: Held four interactive, one to two day sessions focused on applied uses of the OptumLabs data to help maximize discovery opportunities and insights:

San Francisco and Los Angeles, CA (April 2017): First of annual University of California-based boot camps
Cambridge, MA (September 2017): Large boot camp with dual track trainings—one for principal investigators and another for analysts with a more technical focus
Atlanta, GA (October 2017): Co-hosted with partner, American Cancer Society, for a smaller audience focused on cancer-related data and research
San Francisco
In October, we formally opened our San Francisco office with a reception honoring our partner, UC Health, and engaged other partners and prospective collaborators in the Bay Area in OptumLabs work. The reception was attended by senior executives including UHG board chair Steve Hemsley; Optum CEO Larry Renfro; Senior Director for Payment Reform of co-founding partner Mayo Clinic, Rob Nesse; and University of California President Janet Napolitano. The reception was also attended by members of the regional technology community.

The event featured a Research and Innovation Showcase of high-impact work underway at OptumLabs, and ‘Lab talks’ highlighting our work on opioid KPIs and efforts with Cisco to imagine a digital future clinic where providers, patients and their data could all become better connected to improve patient care.

London, U.K.
OptumLabs is continuing to work with our U.K. partners to support the data narrative in Europe. Through 2017, OptumLabs partnered with the London School of Economics (LSE) on a program to examine the public dialogue surrounding the use of health data for health and system improvement. These efforts culminated in publishing a white paper, Improving Health With Data. We then launched our Bazalgette Series, a thought leadership program that will explore how different components of the health system can be improved through the implementation and use of linked data to drive system redesign and improve the prevention and treatment of non-communicable disease, a critical 21st century health challenge.

We also continued our efforts to pave the way for U.K. partners to engage in collaborative research programs with U.S.-based partners. We created an anonymized claims dataset for U.K. partners to use in research, and improved data access to jumpstart those efforts.
Strategic translation collaborations

As our projects and programs progressed in 2017, so did our translation collaborations:

- Connected with seven businesses to implement opioid KPIs
- In collaboration with AMGA and APTA, OptumLabs conducted two focus groups (one with providers, and another with physical therapists) to inform a translationally oriented research project conducted by Boston University and sponsored by UHC on conservative therapies for low back pain.
- The OptumLabs translation advisory team (TAT) welcomed a new member from Stand Up To Cancer and engaged seven UC Health research grant winners in early translation planning.

OptumLabs blog

At the end of Q4, we launched our blog to tell the stories about the impact of our work and amplify the diverse perspectives from across the OptumLabs community to health care professionals, researchers and policy-makers. Here we use our data insights to illustrate important findings on many topics, provide context for our research, data science and innovation efforts, and offer ideas on opportunities for change. Our initial posts explored how we partner to ask big questions, use visualization to uncover patterns in dementia, and create more personalized diabetes care measures.

Read about these topics and more.
Research & Translation Forum

Our 4th annual R&T Forum engaged the largest audience and spread of partners and collaborators to date. Our theme was “variation in health and health care.” Day 1 featured important health care topics as well as various OptumLabs projects underway. The final day of the event, Opioid Insights for Action Day, focused on this critical topic and was open to the public via live webstream. Keynotes included:

- Translating a Trillion Points of Data into Therapies, Diagnostics, & New Insights into Disease — Atul Butte, MD, PhD, University of California, San Francisco
- The Challenge of the Health Haves and Health Have Nots in the U.S. — Sandro Galea, MD, MPH, DrPH, Boston University School of Public Health
- Innovating to Enable Health — Rebecca Onie, JD, Health Leads
- Variation in Health and Health Care in 2017: Our Opportunity — Andy Slavitt, MBA, Former Acting Administrator of the Centers for Medicare & Medicaid Services
- The Opioid Epidemic: How We Got Here, How We End It — Michael Botticelli, Grayken Center for Addiction Medicine at Boston Medical Center; Former Director, White House Office of Drug Control Policy
- Our Imperative: A Father’s Perspective — Gary Mendell, Shatterproof

Leadership Learning Series Webinars on cancer research using observational data, medication adherence, value-based payment models, opioid use in pregnancy and neonatal abstinence syndrome.

OptumLabs and partner members shared work at more than 60 academic and industry conferences.

OptumLabs and partners also published 32 diverse papers using OptumLabs data in the peer-reviewed literature. See the full list of publications on the next page.


