

WHITE PAPER

Data Analytics in the Time of COVID-19



As the ongoing global pandemic drives innovation and rapid adoption of health IT solutions, hospitals look for ways to make the leap from collecting data to using that data for improved clinical and operational outcomes

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“The pandemic is a once-in-a-century health crisis, the effects of which will be felt for decades to come.” —World Health Organization Director-General Tedros Adhanom Ghebreyesus.¹

Under normal circumstances, the management and delivery of healthcare is hamstrung by data silos and disparate, disconnected technology systems. But the past couple of years weren't normal by a long shot, and in a crisis like an ongoing global pandemic, that same inability to extract insights can be catastrophic.

U.S. hospitals are indeed facing a crisis they'd never seen the likes of before. In 2020, news about the virus—how it is spread, and how it can be treated—drove the healthcare industry to a tipping point. In 2021, the distribution of vaccines made it look like an end was in sight. But new variants such as the Delta spurred breakthrough infections and more spikes. Through it all, as telemedicine leapt over the barriers that had kept it from widespread adoption, hospitals swiftly adapted data analytics for use in hospital surge planning and to track impacts on healthcare providers during the pandemic.

The COVID-19 crisis served as an object lesson in how invaluable healthcare technology can be.

There's still so much we don't know, but one thing we do: We need accessible data and the ability to translate it into actionable insights and real results more acutely than ever. There are lasting lessons to be taken from this pandemic, and a big one is that business intelligence and analytics can provide a way forward.

Increasing same-day discharge to keep beds open for COVID patients, lessening blood utilization waste to preserve blood for COVID patients, minimizing extubation times so that ventilators are available for COVID patients—these are all things that hospitals can do right now, using data visualization to drive these changes. Minimizing the financial losses that have been adding up since early 2020, as well as identifying areas for cost containment and revenue enhancement in the longer term, also call for business intelligence.

¹ <https://www.reuters.com/article/us-health-coronavirus-who/impact-of-coronavirus-will-be-felt-for-decades-to-come-who-says-idUSKCN24W27L>

Unfortunately, service line leaders have struggled with how to implement analytics in their day-to-day operations—despite evidence that they make a significant impact on a hospital's performance, patient and physician satisfaction, overall efficiencies, and finances.

Why aren't analytics more prevalent?

A Black Book Market Research survey¹ from January 2020 found that despite having access to analytics tools, 8 out of 10 managers said utilization was negligible and among the 748 provider organizations, 84% of C-Suite

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and board members use analytics “to a limited or minimal extent.” Among CFOs with implemented analytics and decision support programs, only 15% reported meaningful utilization in creating financial forecasts or strategic plans.

Exploring new ways to use data analytics is critical to meeting the demands of value-based reimbursement and healthcare consumerism, said 93 percent of hospital and physician financial executives², which begs the question: What is holding hospitals back from using data analytics to make decisions that could potentially cure some of what ails the healthcare industry? A lack of expertise certainly plays into it: 92% of executives reported that they forget how to use self-service analytics tools and 71% say they're too busy to learn³.

The same Black Book survey said that underuse of analytics could be costing the healthcare industry billions of dollars. “Besides occasional dashboard viewing, post-implementation analytics and business intelligence software and services go greatly underutilized, particularly observed in the survey responses from financially under-performing hospitals in 2019,” said Doug Brown, president of Black Book Market Research, adding: “Because analytics need to be customized for each hospital or medical group business problem, analytics are often seen as complicated and time-consuming.”

“There's a lot of work involved in coming up with conclusions in our analyses,” said Dr. Joseph Drozda, M.D., Director of Outcomes Research at Mercy Health, a 40-plus hospital system based in St. Louis.⁴ An initiative to proactively improve the identification of congestive heart failure (CHF) patients who are good candidates for pacemakers involved creating a robust data set encompassing all 120,000 patients in the system with heart failure, and then leveraged the data in that data set to identify those patients needing cardiac pacemakers.

“A lot of people in the past have tried to just gather up raw data from EHRs, and it's not really usable for meaningful analyses,” Dr. Drozda said. “That's been a major learning for us.”⁵

COVID as catalyst

However, since the pandemic began, hospitals and health systems all over the country and around the world have been fast-tracking major technology projects that may have previously been met with resistance. “What I'm hearing across the board is that organizations are making this stuff happen in days that could have taken years,” said Russell

1 <https://www.newswire.com/news/providers-underuse-of-analytics-could-be-costing-healthcare-consumers-21074087>

2 <https://www.newswire.com/news/providers-underuse-of-analytics-could-be-costing-healthcare-consumers-21074087>

3 <https://www.newswire.com/news/providers-underuse-of-analytics-could-be-costing-healthcare-consumers-21074087>

4 <https://www.hcinnovationgroup.com/analytics-ai/big-data/blog/21122399/whats-behind-the-huge-analytics-disconnect-in-healthcare-evidence-of-a-lag-in-leveraging-data-is-mounting>

5 <https://www.hcinnovationgroup.com/analytics-ai/big-data/blog/21122399/whats-behind-the-huge-analytics-disconnect-in-healthcare-evidence-of-a-lag-in-leveraging-data-is-mounting>

Branzell¹, president and CEO of the College of Healthcare Information Management Executives (CHIME).

“The outbreak is nothing to be happy about, but it has forced a lot of conversations that would have taken years to happen otherwise,” says Enterprise President Tal Heppenstall of the University of Pittsburgh Medical Center². “I think innovation is really driven by need, and the need created by the coronavirus pandemic will drive innovative solutions that can move quickly and be distributed around the world.”

A report from the Doximity physician network that was released in September³ says that from 2019 to 2020, the number of physicians reporting telehealth as a skill increased 38% and the number of Americans participating in at least one telemedicine visits has increased 57% since the beginning of the pandemic. By 2023, the report estimates, the financial value of telemedicine visits is projected to be \$106 billion.

“I think the genie’s out of the bottle on this one,” said Seema Verma⁴, administrator of the Centers for Medicare & Medicaid Services since 2017. “I think it’s fair to say that the advent of telehealth has been just completely accelerated, that it’s taken this crisis to push us to a new frontier, but there’s absolutely no going back.”

Because of the pandemic, telemedicine was able to leapfrog over some of the fear and hesitation that always surrounds a major industry shift. The specter of the coronavirus forced our hand and made patients and providers embrace a technology they may have been wary of in the past. This phenomenon could also play a part in the adoption of data analytics, which has also seen greater use since the beginning of the pandemic.

Innovation is not optional

Data has already played a starring role in new and innovative ways to fight COVID. Stanford Medicine is using data and digital tools to predict the next COVID-19 surge⁵, and researchers from New York-based Mount Sinai Health System combined artificial intelligence, imaging, and clinical data to rapidly detect COVID-19 in patients⁶. The Duke Clinical Research Institute (DCRI) created the Healthcare Worker Exposure Response & Outcomes (HERO) Registry⁷ to be populated with data



1 <https://www.fiercehealthcare.com/tech/health-system-cios-covid-19-response-we-ve-never-experienced-anything-like>

2 <https://www.beckershospitalreview.com/innovation/during-the-coronavirus-pandemic-innovation-isn-t-optional-it-s-required-key-insights-from-upmc-enterprise-president-tal-heppenstall.html>

3 <https://www.healthleadersmedia.com/clinical-care/telemedicine-projected-account-20-medical-visits-2020-report>

4 <https://www.beckershospitalreview.com/telehealth/the-genie-s-out-of-the-bottle-on-this-one-seema-verma-hints-at-the-future-of-telehealth-for-cms-beneficiaries.html>

5 <https://www.fiercehealthcare.com/tech/how-stanford-medicine-using-digital-health-tools-apps-to-fight-covid-outbreak>

6 <https://www.healthcareitnews.com/news/researchers-mount-sinai-use-ai-detect-covid-19-lung-scans>

7 <https://www.healthcareitnews.com/news/new-duke-registry-invites-hospital-workers-share-data-covid-19>



and information from frontline healthcare workers—and is being launched to support fast-cycle research on the impact of COVID-19 on caregivers. A National Response Portal was activated to collect and make accessible critical information and analytics¹ to enable “data-driven decisions to prepare for and respond to emerging crises,” starting with COVID-19.

Healthcare systems and smaller hospitals as well are exploring every avenue that could help them to increase operational efficiencies and ensure they’re equipped to handle crises—large and small—and all while containing costs and looking at new ways to increase revenue.

For those in the business of patient care, it can be awkward to talk about money. But like innovation, focusing on the financial bottom line is no longer optional. Pivoting to mission-critical projects that can increase operational efficiencies is a critical step in helping the healthcare industry regain its financial footing.

The already bleak situation for U.S. hospitals isn’t getting any better. Margins are down month over month, volumes and revenues are continuing to fall, and expenses are over budget, according to Kaufman Hall’s latest monthly flash report². Data from Strata Decision Technology, which provides financial analytics for the healthcare industry, showed that with admissions trending down and lower volumes as COVID fears keep patients away, hospitals are continuing to lose money³. The American Hospital Association has estimated⁴ that hospitals stand to lose more than \$323 billion from March 2020 through December 2020 due to the pandemic.

Quality improvement is the first step

The financial situation simply cannot be ignored. Fortunately, there exists a clear and direct correlation between the three Triple Aims—improving quality results in both lower costs and greater patient satisfaction.

Reduced patient lengths of stay (LOS) have been

1 <https://www.healthcareitnews.com/news/hca-bon-secours-others-using-sada-portal-covid-19-data-sharing>

2 <https://www.healthcarediver.com/news/kaufman-hall-november-flash-report-hospitals-financials-worsen/592584/>

3 <https://news.bloomberglaw.com/health-law-and-business/hospitals-lose-money-volume-as-covid-fears-keep-patients-away>

4 <https://www.aha.org/system/files/media/file/2020/05/aha-covid19-financial-impact-0520-FINAL.pdf>

correlated with both lower costs and fewer readmissions in a large UK analysis¹ of 324,000 elective PCI patients. In a study cited in RevCycle Intelligence, the Advisory Board found that high-quality hospitals delivered lower cost care for approximately 82 percent of diagnoses². Analyzing healthcare costs and quality data from almost 500 hospitals for three years, they found that the average hospital spent up to 30 percent more than the highest quality hospitals to deliver care with comparable or lower quality outcomes. Researchers estimated that closing just a quarter of the cost gap for less than 10 percent of the



conditions analyzed could net over \$4 million in annual savings for a typical hospital and over \$40 million for 10-hospital system—without compromising quality.

Institutions with significant investments in data analytics and process improvement methodologies have had great success. The Minnesota-based Allina Health Systems achieved \$45 million in measurable savings over five years by assessing clinical care variation and other sources of adverse outcomes in more than 50 individual projects across the multi-facility enterprise³. The Allina Health project included an IT commitment that linked an estimated 75 sources of patient clinical, cost accounting and satisfaction information.

But even on a smaller scale, there are a number of key performance indicators that hospitals can measure and monitor to identify opportunities for improvement and guide initiatives that will yield better clinical and operational outcomes to help weather the current crisis—or any crisis.

Resistance to change

After working with hospitals on analytics implementation for the past several years as Director of Business Intelligence at LUMEDX, Matthew Esham understands why there is hesitancy to make a change, especially when everything is going relatively smoothly.

“But then things get a little rocky, maybe you come to a bump, and suddenly we’re forced to look at things a little differently,” Esham said. “The global coronavirus pandemic was a pretty big bump and so the focus has changed and the need for data has become more acute.”

“If you can’t measure it, you can’t improve it” is an oft-quoted adage attributed to Peter Drucker, an Austrian-born American management consultant, educator, and author, whose writings contributed to the philosophical and practical foundations of the modern business corporation. He asserted that you need a clearly established metric for success so you can quantify your progress and make necessary adjustments to produce the desired outcome. And never has this been more true than in healthcare, says Esham.

Tracking information is the first step toward understanding and optimizing your hospital’s performance—and critical to improving outcomes and reducing unnecessary spending. The question “how are we doing?” has traditionally been a tricky question for hospitals to answer, but a new wave of analytics tools is making it easier and faster to get a meaningful answer.

1 <https://www.cardiovascularbusiness.com/topics/coronary-intervention-surgery/longer-hospital-stays-pci-increase-readmissions>

2 <https://revcycleintelligence.com/news/care-variation-reduction-key-to-improving-care-quality-costs>

3 <https://www.healthcareitnews.com/news/allina-applies-analytics-patient-data-save-45-million-over-5-years>

Expectations are high

Increasingly, facilities have a greater need to quickly view, monitor, and analyze clinical and financial data, thereby helping contain costs, maximize reimbursements, and improve processes and patient care. Expectations are high for hospitals to improve survival rates, reduce complications, and follow best practices. Using data analytics can be used to do everything from measuring readmissions rates, for example, against national standards, to identifying high-risk patients so that providers can intervene. Allowing service line leaders to track and monitor things such as complication rates or cost-per-case variance or equipment use in context, giving them the whole picture, will dramatically affect the way healthcare is delivered.

While the importance of data analytics to the overall health of a healthcare organization cannot be overstated, the most compelling use of data is always going to be to improve clinical outcomes for patients. When clinical performance is improved, readmissions and complications are reduced, hospital stays are shortened, and higher rates of recovery are achieved. All of these improvements benefit the patient and end up saving the hospital money. By increasing positive results and decreasing negative outcomes, healthcare providers improve their bottom line as we saw with Allina Health.

It is now possible to bring together retrospective financial and clinical results from various sources, evaluate the organization's performance, and identify areas for additional attention. Curating a comprehensive view of service line program performance offers hospital leaders better context and helps them gain insight into the quality-cost-value synergy in their operations. Improving automation of the report-generating process can allow analysts to focus on problem solving instead of manual data gathering.

But for this to have a real impact, it needs to happen in real-time. Looking at a report and seeing that hospital-acquired infections (HAI) linked to change in workflow best practices spiked almost three months ago is extremely frustrating. If you had that data the next day, instead of at the end of the quarter, you could have made adjustments to the workflow and prevented almost three months of unnecessary HAI. Or you might discover in your year-end tracking reports that your catheterization volumes only support four Cath Labs when you've been staffing eight — creating a financial drain on your institution. Hindsight is 20/20, and in 2020 we learned that it's not nearly enough.

It's also important to remember that post-coronavirus, patients are bound to be sicker. For cardiovascular health in particular, the coronavirus is expected to have long-lasting effects¹. The other reason patients might be further along in their disease progression is because of safety concerns related to COVID-19, an estimated 41% of U.S. adults delayed or avoided medical care in the early months of the virus². This means that pre- and post-coronavirus lengths of stay (LOS), for example, are going to be very different because of an increase in comorbidities and diseases that are more advanced because they didn't seek care sooner. Some analytics tools have incorporated the Elixhauser Comorbidity Index so hospitals can see how disease burden impacts quality and financial outcomes.

The technological transformation of healthcare delivery and a move toward evidence-based medicine continues. "We are witnessing the rise of the data-driven physician," Lloyd Minor, MD, dean of the Stanford University School of Medicine, said about the Stanford Medicine's 2020 Health Trends Report³. "Physicians and those in training are now seeking out education in data science disciplines, and they express openness to using emerging sources of patient data as part of routine care."

1 <https://www.statnews.com/2020/07/27/covid19-concerns-about-lasting-heart-damage/>

2 <https://www.cdc.gov/mmwr/volumes/69/wr/mm6936a4.htm>

3 <https://www.beckershospitalreview.com/data-analytics/the-data-driven-physician-is-on-the-rise-stanford-medicine-report.html>

Same-day discharge

With hospitals getting coronavirus patients in waves that are not always predictable, same-day discharge (SDD) is one of the more important things to concentrate on—ensuring that there are beds available for those who need them most and containing costs at the same time. For example, many heart programs miss a huge opportunity when it comes to percutaneous coronary intervention (PCI). A JAMA Cardiology study¹ found that while SDD resulted in an average of \$5,100 cost savings per PCI procedure, there was no higher risk of death, bleeding, acute kidney injury (AKI), or acute myocardial infarction (AMI), at 30, 90, or 365 days among same-day discharge patients when compared to non-SDD patients.

And even though same-day discharge was shown to be a safe and effective cost-containment strategy, researchers found that the rate of same-day discharge only increased from 1 percent to 10 percent among the 700,000 PCI patients observed from 2005–2015. In addition, there is significant variation in hospital practices surrounding same-day discharge. Some hospitals discharged their patients the same day about 40 percent of the time, while other hospitals always kept patients overnight—and the study determined that it was “just as safe to go home at the hospitals who were discharging half their patients the same day versus those hospitals who were keeping patients overnight.”

Vent times

Because ventilators are one of the things used to treat patients with COVID-19, there were shortages early in the pandemic that could happen again. Tracking vent times post-surgery so that you can reduce them, freeing up ventilators and providers who know how to operate the devices, is a major priority for hospitals right now.

Delayed extubation increases the risk of ventilator acquired pneumonia, prolongs the use of sedative medication, delays rehabilitation, and increases costs,

according to a study from the Annals of Thoracic Surgery². Despite this, the opportunity to perform early extubation is frequently missed—fewer than 12 percent of surgery patients in the cardiothoracic intensive care unit (ICU) are extubated within six hours.

Researchers proposed establishing standard protocol for more efficient extubation, concluding that the implementation of such a protocol was safe and associated with a significant reduction in the duration of mechanical ventilation and ICU length of stay after cardiac surgery, which would reduce costs while providing quality care.



A similar effort was spearheaded by Dr. Paul Levy at NEA Baptist Memorial Hospital, a 228-bed healthcare facility in Jonesboro, Arkansas³. Previously, only 9 percent of patients were extubated within eight hours of their surgery, and 65 percent of their patients had a two-day ICU length of stay. After implementing a standardized approach to cardiac anesthesia and a protocol-driven extubation process in which patients arrived at the ICU less sedated, fewer arterial blood gas (ABG) tests were required with no reintubations. A year later, 62% of our patients were extubated within 8 hours, compared to only 9% 12 months before. ICU LOS

1 <https://www.cathlabdigest.com/article/Missed-Opportunity-Same-Day-Discharge-United-States>

2 [https://www.annalsthoracicsurgery.org/article/S0003-4975\(16\)00255-1/pdf](https://www.annalsthoracicsurgery.org/article/S0003-4975(16)00255-1/pdf)

3 <https://www.sts.org/publications/sts-news/practice-management-timely-extubation-cardiac-surgery-team-sport>

similarly improved, with 78% of patients having a one-day LOS in 2016 compared to only 35% in 2015. And the NEA Baptist Memorial was able to save at least \$650 a case while improving quality of care.

Blood waste

With much of the population still sheltering in place, parts of the United States in lockdown, and non-emergent visits to medical facilities way down, a blood shortage looms¹. Hospitals can learn from a data-driven educational initiative designed to show cardiac surgeons how often they use blood transfusions—and how much they cost. One such facility was St. Vincent Heart Center in Indianapolis, which significantly cut its rate of blood utilization and saved a projected \$500,000 each year².

“We were able to separate it out not only by physician but also by pre-op, intra-op and post-op, and really take a look at where our opportunity was,” said Lori Shannon, MBA, RN, who presented the study findings to the American College of Cardiology. “In this case, just by raising awareness with the surgeons and taking a look at the data and the science and cost ... we were able to see our rates go down, and further from there the physicians started taking actions to try to actively reduce blood transfusion rates when appropriate.”

Previous research had shown that 40 percent of blood transfusions are unnecessary.³ The St. Vincent study supported that by showing a drop in utilization from 37.8 percent to 27.7 percent in just six months. At a cost of about \$1,100 per unit, the study showed that the average cost of blood transfusion dropped from \$573 to \$361 per case, with an estimated savings of \$500,000.

Furthermore, quality measurements did not change:

- Average length of stay dipped from 7.2 days to 7.0 days.
- In-hospital, risk-adjusted mortality remained at 1.2 percent.



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1 <https://abcnews.go.com/Health/alarmingly-low-us-facing-blood-shortage-amid-ongoing/story?id=74367511>

2 <https://www.cardiovascularbusiness.com/topics/coronary-intervention-surgery/initiative-cuts-transfusions-costs-heart-surgery>

3 <https://www.cardiovascularbusiness.com/topics/coronary-intervention-surgery/initiative-cuts-transfusions-costs-heart-surgery>

- Renal failure increased from 1.0 percent to 1.1 percent.
- Readmissions declined from 5.7 percent to 5.2 percent.

Shannon believes quality might actually improve with fewer transfusions. “We’re hoping that as we continue to monitor this, it will actually be even a bigger impact on quality because the data shows that there are issues with the more transfusions you give, the more side effects that patients have,” she said.

Labor utilization

At the onset of the pandemic, volumes went way down in most areas of the hospital. And as infection rates fluctuated, the ability to track yesterday’s volumes today became key to meeting needs when demand increased, and keeping labor costs down when demand declined.

This is a key area where data analytics can help improve care and reduce costs.

At Bergen New Bridge Medical Center, a 1,070-bed hospital in Paramus, N.J., data analytics were used in their emergency department to better measure and predict staffing levels to reduce the need for overtime or having to call in employees at the last minute. Hospital leaders say it resulted in improved patient care and cost savings, in addition to boosting employee morale due to more dependable work schedules.¹

“Any improvement in knowing the right number of people and the right number of skills to have at a hospital at any given time is important,” says Cynthia Burghard, research director at IDC Health Insights. “It improves operational efficiency and effectiveness and improves the bottom line for hospitals.”

1 <https://healthtechmagazine.net/article/2019/10/how-hospitals-use-analytics-staff-rush>



The time for analytics is now

The clinical behavior of providers is based on a complex decision matrix at the point of care. When timely, trusted analytics data is generated, compared with best practices, and delivered in a nonobtrusive, informative context, caregiver teams are able to adjust performance as appropriate over a remarkably short period of time.

Even during a pandemic—especially during a pandemic—hospitals must strive to serve their patient population at the highest level. It is important to understand exactly how analytics enable clinical teams to perform at their best across the care continuum:

- **During prevention and early diagnosis:** Analytics can help physicians identify patients at risk, ensure preventive screening and education and support improved timeliness and accuracy of diagnoses.
- **Before interventions:** Physicians can see a complete picture of the patient, including risk profile and personalized comparisons of the efficacy of intervention choices.
- **During treatment:** Data is needed as care guidelines and compliance requirements are considered.
- **After acute treatment and throughout the recovery/readmission period:** Clinicians can look at comparative performance feedback, identify readmission risk, track follow-up, and monitor key metrics.
- **During the review process:** Dashboards provide an overall view of clinical and operational outcomes, as well as an opportunity to learn from them and pinpoint areas where a change is needed.

Although vaccination rates are continuing to climb and we know so much more about how the virus is transmitted, the industry is still in crisis mode. The impact of COVID-19 will not be soon forgotten.

Hospitals have a deluge of data. And in this vast amount and array of data, lies opportunity. Discovering associations and understanding patterns and trends within the data has the potential to save lives—along with the healthcare industry that we rely on.

The highlighted value of data and analytics has led the industry to prioritize the improvement of what has often been a patchwork digital infrastructure—so facilities can better prepare for the future amid ongoing instability. The time for analytics is ripe. Hospitals must embrace innovation and use data and analytics to enact changes that will make impacts that last beyond this crisis.