



Preparing for a new era of AI and analytics

Five insights from our 2022 AI/Analytics provider survey

ABOUT

Mojisola Ndukwe

Expert Partner, Digital Health Transformation

Mojisola has over 7 years of experience within digital health transformation, identifying, analyzing, and improving upon existing business processes through solution implementation, health information exchange integration, and overall digital strategy.

Since joining the Advisory Board, her goal has been to utilize strategy and innovation to solve complex problems and improve business operations. Her passion for health technology and interoperability is just the icing on the cake.

Mojisola holds degrees from the University of Maryland, Baltimore County and Johns Hopkins University in Health Administration, Health Information Technology, and Healthcare Management/Leading Organizations.

Areas of expertise

Digital Strategy, Telehealth, Interoperability, Artificial Intelligence, and Innovation



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Today's agenda

- 1** What we mean when we talk about AI in health care
- 2** Survey insights about a new era of analytics
- 3** Actualizing the transformational value of AI

Do we even know what we're talking about?

Is Natural Language Processing (NLP) part of Machine Learning (ML), or a different category?

Why AI terminology is confusing

1. Terms are used interchangeably.
2. Terms are grouped differently.
3. Terms vary depending on source.

“NLP is a field **in** machine learning...”

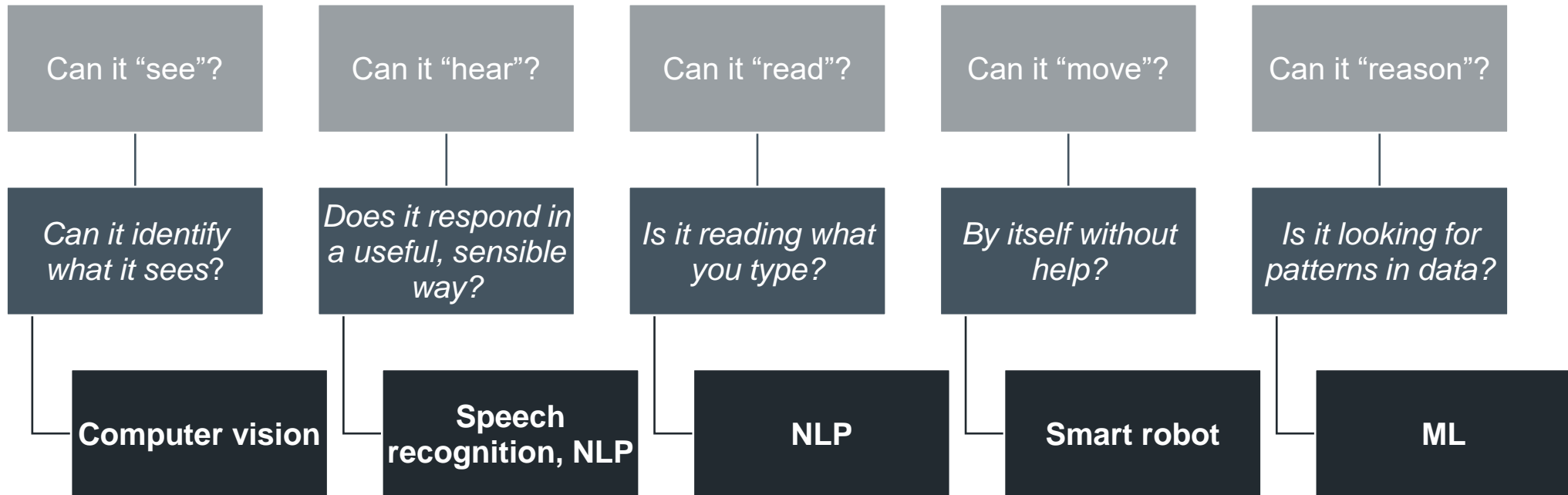
Towards Data Science

“**What is the difference between the two?** NLP interprets written language, whereas Machine Learning makes predictions based on patterns learned from experience.”

Iodine Software

Source: Shetty B, “[Natural Language Processing \(NLP\) for Machine Learning](#),” Towards Data Science, November 2018; Wratchford A, “[Machine Learning vs. Natural Language Processing: What is the Difference?](#)” Iodine Software, July 2020.

A better approach to thinking of different AI functions



Source: Hao K, "What is AI? We drew you a flowchart to work it out," MIT Technology Review, November 2018; Kovalenko O, "12 real-world applications of machine learning in healthcare," SPD Group, February 2020; Advisory Board interviews and analysis

A better approach to thinking of different AI functions

Potential use cases of AI applications in health care



Patient care with Artificial Emotional Intelligence (AEI)

- Computer vision
- NLP
- ML



Personal health assistants

- NLP
- ML
- Speech recognition



Diagnostics and imaging

- ML
- Computer vision

Source: Hao K, "What is AI? We drew you a flowchart to work it out," MIT Technology Review, November 2018; Kovalenko O, "[12 real-world applications of machine learning in healthcare](#)," SPD Group, February 2020; Advisory Board interviews and analysis

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Survey overview

When

January 2022

Who

251 provider organizations
across the U.S.

Why

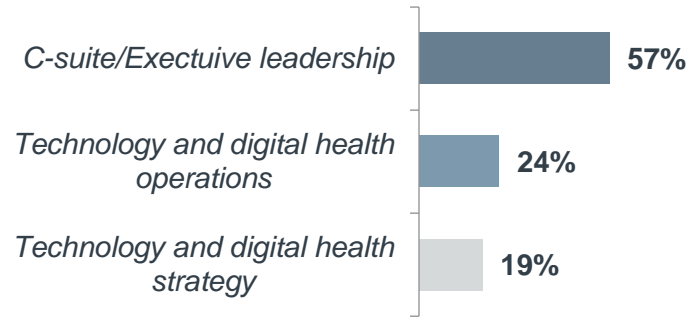
Explore analytics trends in the
current health care landscape

Goals of the survey included:

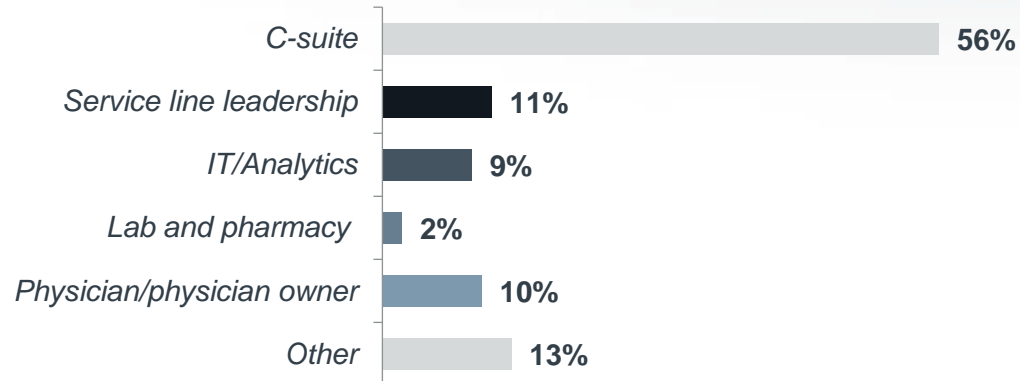
1. Explore current and planned use of health care analytics
2. Understand how and when analytics and AI applications are built, staffed, and deployed
3. Determine what key barriers exist and how analytics and AI fit within organizational strategy and future vision

Survey respondent profile

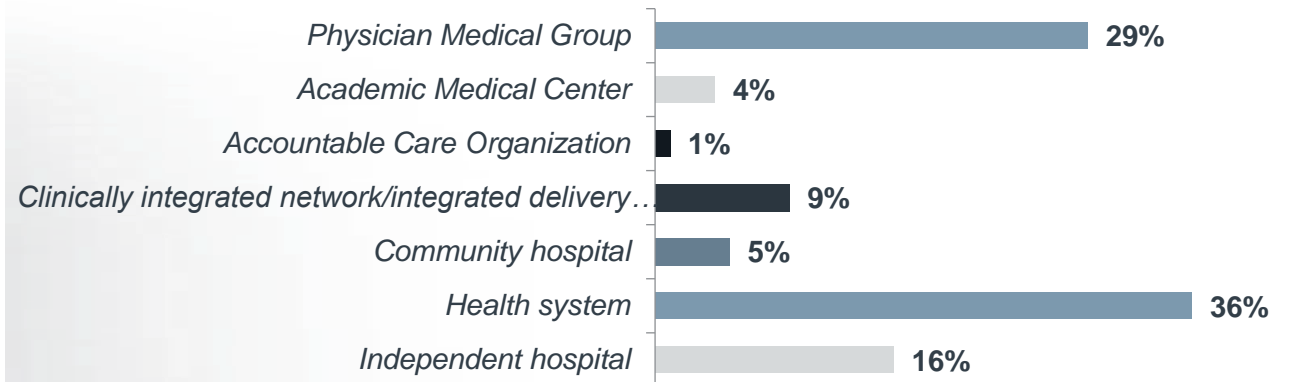
Function



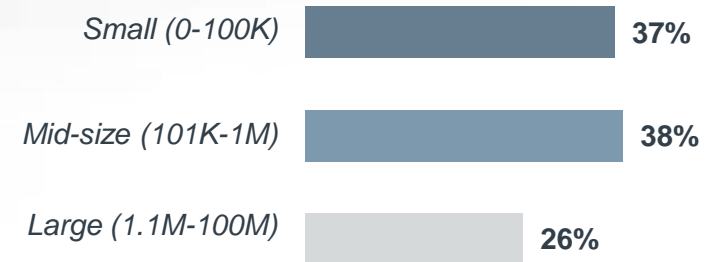
Title



Organization type



Organization size



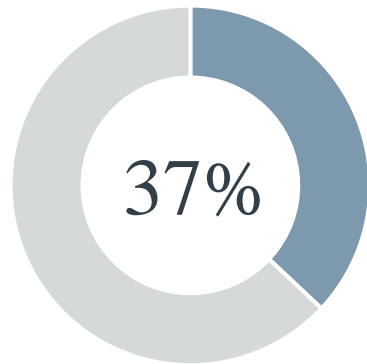
Summary of key findings

- 01 Since 2018, provider organizations are increasingly viewing AI as a tool that will provide incremental value, as opposed to being a transformative, essential part of the health system.
- 02 Organizations view analytics as a corporate asset and align analytics initiatives with corporate priorities to follow the data, *even* when it leads to difficult choices.
- 03 Analytics has grown in presence in the C-suite. However, who leads the charge for an organization sets the tone for how analytics are perceived and prioritized.
- 04 As a whole, organizations are recognizing the incremental value of AI and expect a wave of increased funding by 2024.
- 05 Funding and staff capability are the standout challenges for organizations in their quest to implementing their ideal analytics environment.

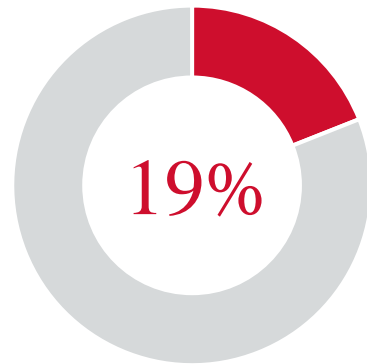
Expectations are shifting about AI's real value

Provider organizations' view on the potential of AI to advance organizational objectives

n=251

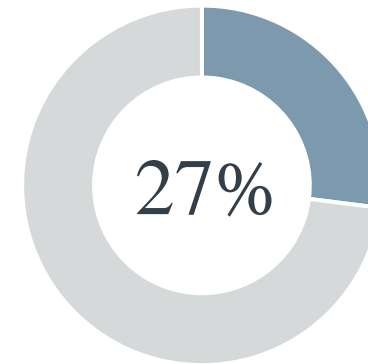


2018

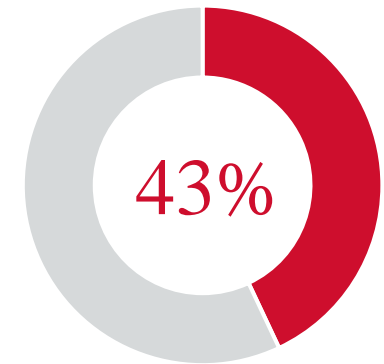


2022

*"We believe AI will become a **transformative, essential** part of our health system"*



2018



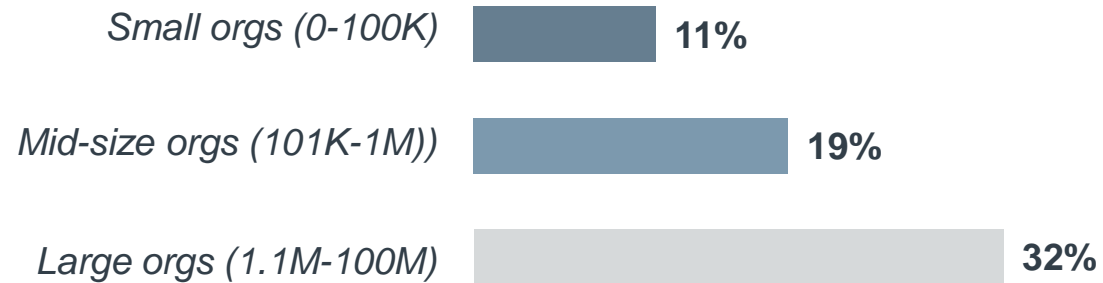
2022

*"We believe AI will deliver **incremental value**"*

Source: 2022 AI and Analytics Survey Results, Advisory Board.

Organizational size influences expectations

“We believe AI will become a transformative, essential part of our system”

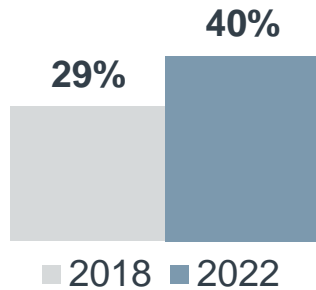


“We don’t know what AI can do or what role it might play”

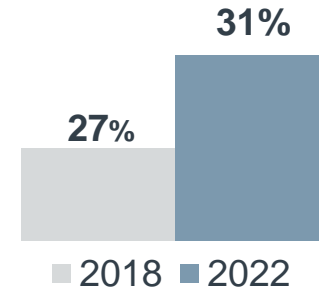


Silos are out, strategic assets are in

“We view data as a corporate asset and use it to validate insights”



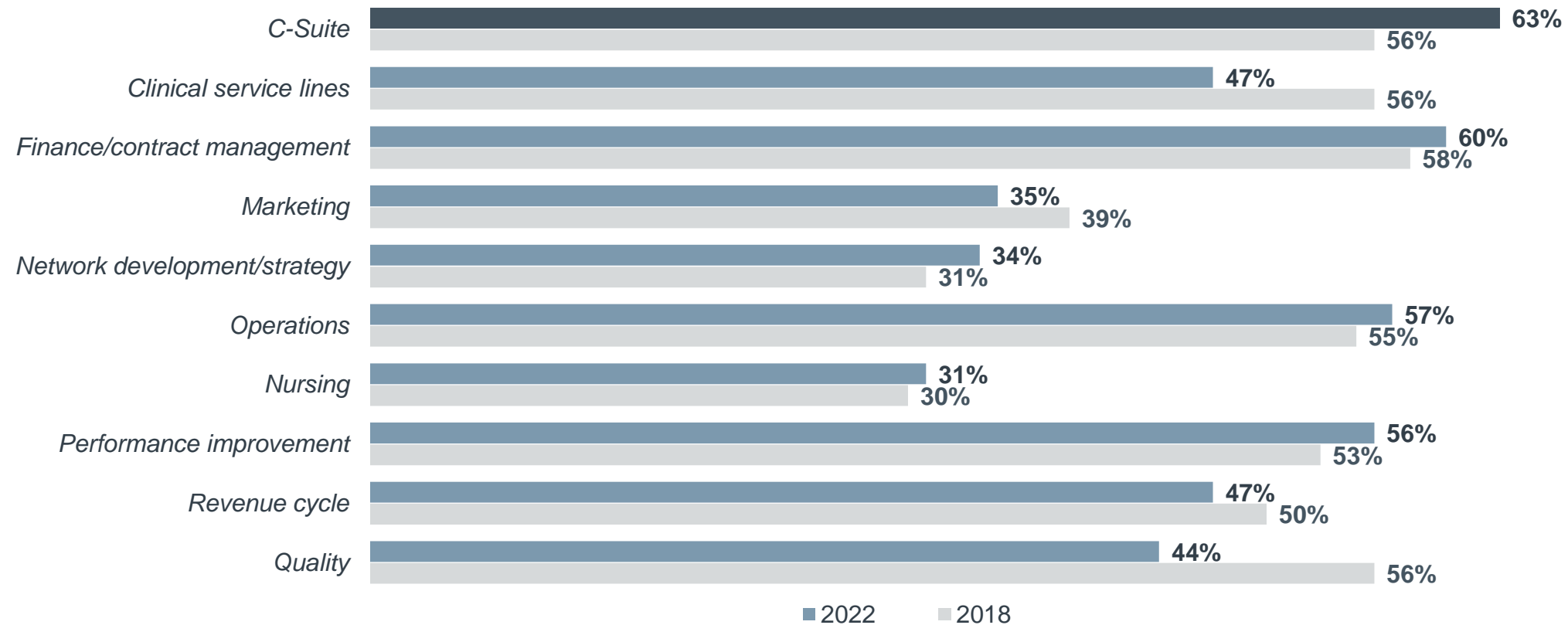
“We align analytics initiatives with the corporate priorities and follow the data even when it leads to difficult choices”



Analytics are moving into the C-suite...

“Which internal customers or functions make consistent use of analytics to improve decision making?”

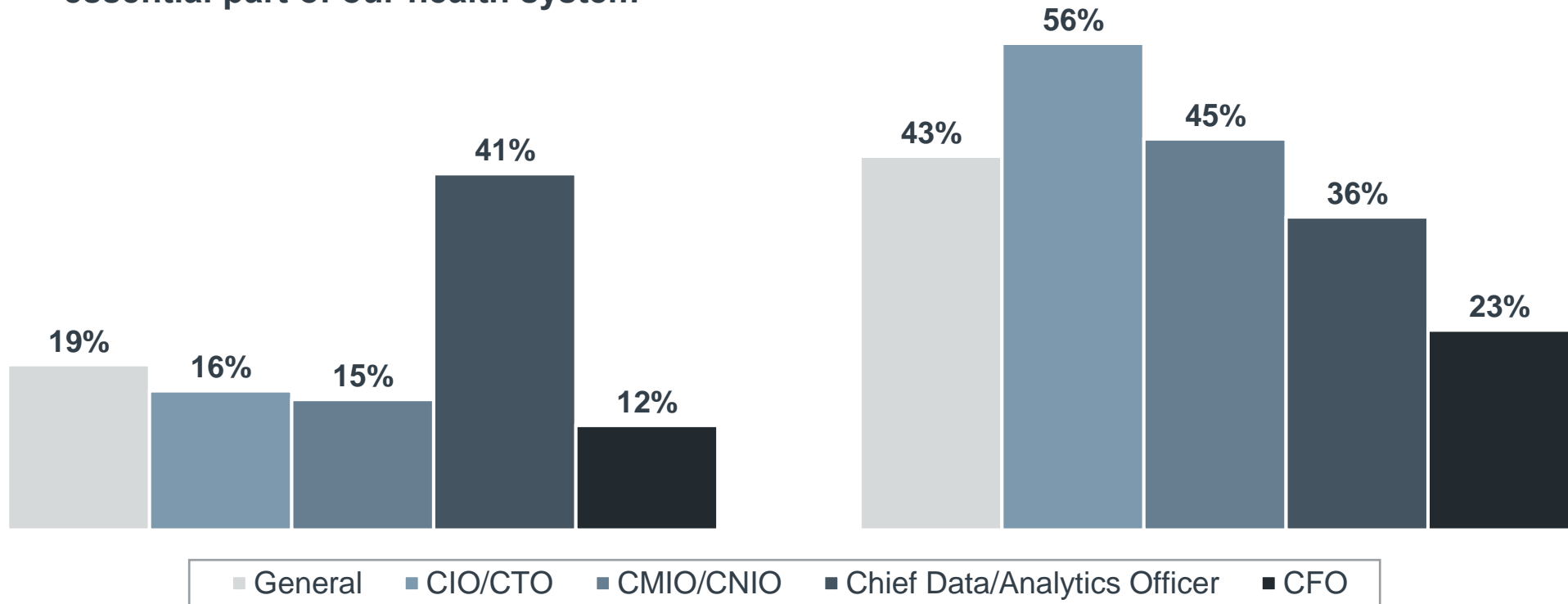
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...but different leaders set varying tones for AI strategy

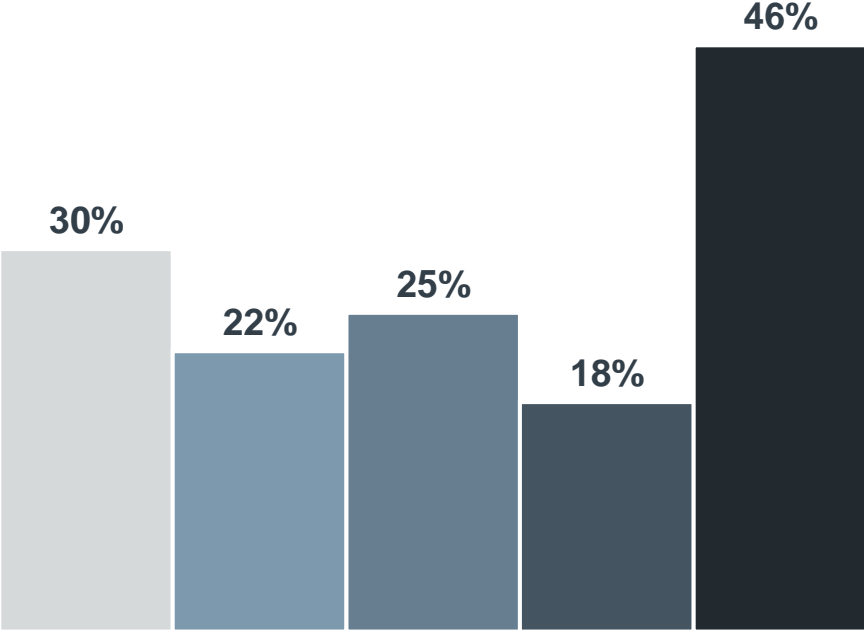
“We believe AI will become a transformative, essential part of our health system”

“We believe AI will deliver incremental value”

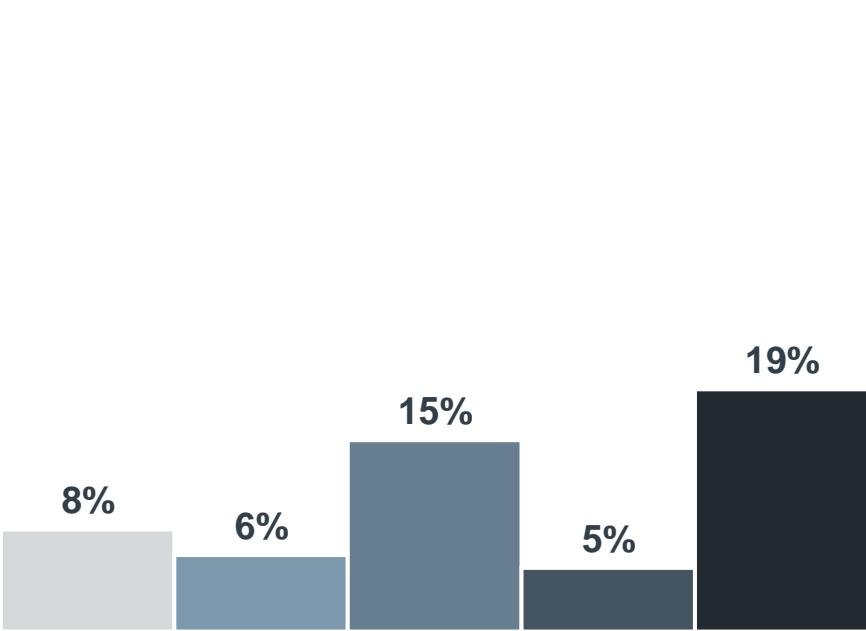


Finance remains most critical of AI's potential value

“We don't know what AI can do or what role it might play”



“We don't believe AI will deliver significant value”

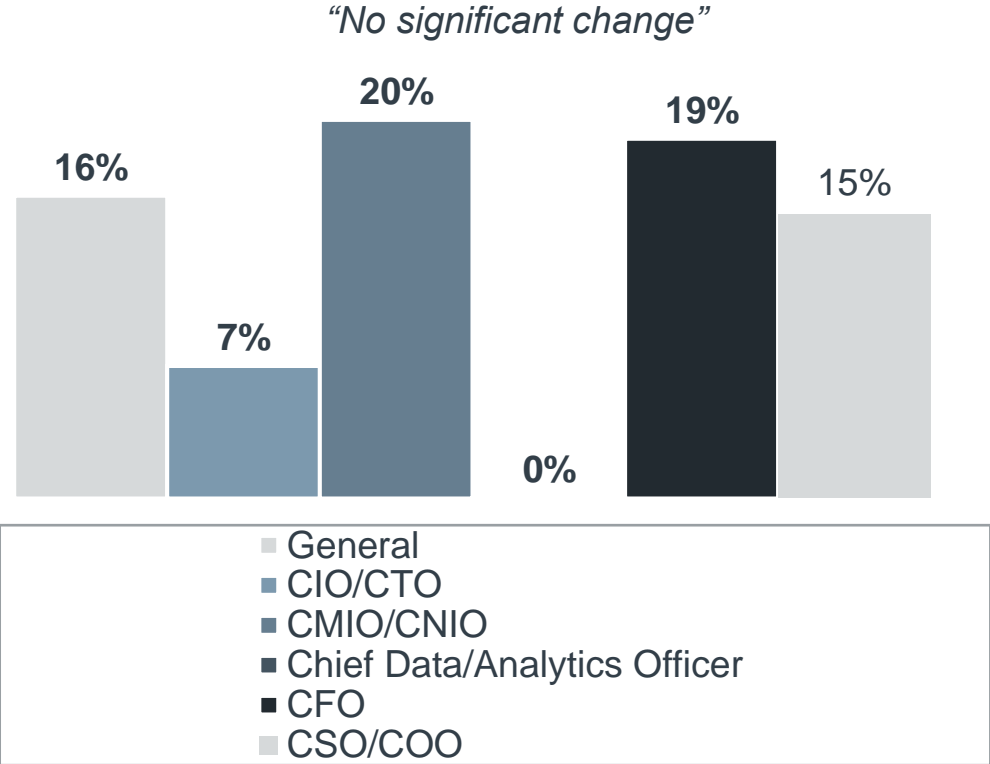
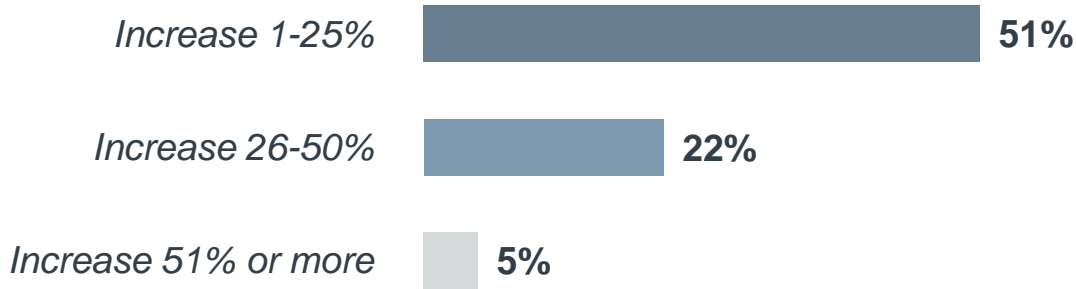


■ General ■ CIO/CTO ■ CMIO/CNIO ■ Chief Data/Analytics Officer ■ CFO

New funding waves are expected, but it's leader-dependent

“How do you expect your organizations’ total funding for the analytics program, including people and technology, to change in the next 2 years?”

n=251



Hurdles remain to a new analytics era

“What are your top three challenges for implementing your envisioned analytics environment?”

53%

Funding

49%

Staff capability/skillsets

39%

Identification of the right tools and approaches

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Actualizing the transformational value of AI

IMPERATIVES

- 01 Determine AI applications by functionalities rather than by its technological definitions
- 02 Acknowledge the role of bias in AI and account for underlying disparities
- 03 Streamline data structures and workflows

RELATED RESOURCES

- RESEARCH
[Artificial intelligence resource library](#)
- BLOG POST
[5 questions about the reality of artificial intelligence in health care](#)
- CASE STUDY
[How Flagler Hospital fought pneumonia with AI and CVR](#)

AI as an international viral spread prevention tool



Eva AI: Greece's Covid-19 testing AI for tourists

- Installed at 40 airports, ports and land border crossings
- Arriving passengers were grouped by arrival country/region, sex, and age. Based on previous prevalence of positive tests for each category, the system decided whether a Covid test was appropriate for each person
- Aim 1: Maximize infected asymptomatic travelers identified
- Aim 2: Allocate enough tests to traveler categories for which the system lacked a high confidence in its Covid-prevalence data to hone those estimates



DATA SPOTLIGHT

Results during peak tourist season, August-November 2020

25-45%

More infections identified with equal resources invested

3 major principles of Eva's design:

Minimal personal data

Requires only the most necessary personal data categories, omitting categories that would be too invasive

Interpretability

Algorithm has confidence ranges for prevalence estimates, making a more intuitive way for non-statisticians to grasp the information

Flexibility

Modular design: can update each information category without changing the whole system

Source: Kahn J, "Lessons from A.I.'s rare pandemic success," Forbes, September 2021.

AI's potential to improve patient safety

Incidence, cost, and preventability of events in the eight harm domains from the peer-reviewed literature

Patient safety domain	Population (years): incidence	Annual total cost adjusted to U.S. (2019) dollars ^a	Population: % preventable
Healthcare-associated infections	Inpatients (2015 data): 3.2% ¹¹	\$10.7 billion ¹² [five significant HAIs]	Inpatients: 65% to 70% ¹³ [CABSI or CAUTI]; 55% ¹³ [VAP or SSI]
Adverse drug events	Inpatients (2014 data): 2.1% ²² Present on admission (2014 data): 5.1% ²²	\$30.0 billion ²²	Inpatients: 28% ²³
Venous thromboembolism	Inpatients (2013 review): 3.3% ⁷	\$15.1 to \$30.4 billion ²⁸	Inpatient to 90 days after discharge: 70% ²⁹
Surgical complications	Inpatients (2014–2017 data): 16.0% within 30 days ³⁴ [invasive surgery]	\$7.5 billion ³⁵ [emergency general surgery]	Inpatients: 42.1% ³⁶ [emergency non-trauma surgery]
Pressure ulcers	Inpatients (2009–2010 data): 2.7% ⁴⁴	\$28.2 billion ⁴⁵	Inpatients: 97% ⁴⁶
Falls	Inpatients (2013 review): 1.1% ⁷	\$53.4 billion ⁵¹	Inpatients: 87.5% ⁴⁶
Decompensation	Inpatients (2013 data): 3.6% ⁵⁷ [septicemia] Inpatients (2005–2015 data): 13.2% ⁵⁸ [failure-to-rescue after complications of trauma surgery]	\$25.7 billion ⁵⁷ [septicemia]	Inpatients: 24.2% ⁵⁸ [failure-to-rescue after complications of trauma surgery]
Diagnostic errors	Outpatients (2014 review): at least 5.1% ⁷²	Exceeding \$100 billion ^b (ref. ⁷¹)	Unknown

Source: Bates DW, et al., "The Potential Of Artificial Intelligence to Improve Patient Safety: A Scoping Review," *npj Digital Medicine*, March 2021.

AI a catalyst for broader adoption of new diagnostics



GRAIL's Galleri the first AI-driven multi-cancer early detection blood test

- Detects cancer in asymptomatic patients by measuring cell-free nucleic acids
- Demonstrated 99.3% specificity across more than 50 cancer types, with 93% accuracy in identifying tissue of origin
- Uses GRAIL's AI capabilities to distinguish cancer from non-cancer, and differentiate between different types of cancer

CASE EXAMPLE



GRAIL, Inc.

Diagnostic start-up • San Francisco, U.S.

- Blood test reads circulating tumor DNA (ctNA) to detect cancer in asymptomatic people
- Leveraged over 1M gigabytes of data amassed through clinical study programs to develop AI and machine learning tool to detect cancer signals and identify the signal's location in the body
- Partnered with Providence Health System in U.S. to make Galleri test available to providers and patients in three states

GRAIL-NHS partnership scales liquid biopsies across U.K. and signals future proliferation in international markets

140,000

People ages 50+ with no cancer symptoms enrolled in program

25,000

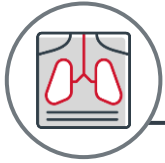
People ages 40+ with suspicious signs, symptoms of cancer enrolled in program

1M+

Number of people who could have access to Galleri test in U.K. by 2024-2025 if study is successful

Source: "GRAIL Announces First Health System to Offer Galleri, Novel Multi-Cancer Early Detection Blood Test," GRAIL, March 2, 2021; "GRAIL Announces Validation of its Multi-Cancer Early Detection Test Published in Annals of Oncology," GRAIL, March 30, 2020, "GRAIL and UK Government to Make Galleri Multi-Cancer Early Detection Blood Test Available to Patients," GRAIL, 26 November 2021.

AI in precision treatment benefits entire ecosystem



Austrian company Allcyte uses AI to quickly identify most appropriate therapy for patient's tumor

Clinical evidence highlights shortcomings of narrow genetic testing for cancer treatment matching

- In a 2020 study in Nature, **90%** of lung cancer patient tumors did not respond to therapies recommended by genetic testing
- In another, only **22%** of the time did two similar genetic tests identify the same genetic mutations in the same tumor



Allcyte's prospective treatment study shows AI's potential to target treatment and improve outcomes

- Study to find new treatment options for 143 patients with aggressive, late-stage blood cancers
- Allcyte used AI-powered screening technology to analyze tissue samples from these patients across 136 different drugs
- **54% of patients** responded and experienced significantly longer progression-free survival compared to the prior lines of therapy

Allcyte proliferating its AI functionality across the oncology ecosystem

Use case #1:

Providers use tool for more accurate personalized treatment

Use case #2:

Drug manufacturers gain pre-clinical insight into drug efficacy

Use case #3:

Pharmaceutical companies find new uses for old therapies

Source: "This startup has found a way to uncover bespoke cancer therapies", *Forbes*, 2021; "When Genetic Tests Disagree About Best Option For Cancer Treatment", *NPR*, 2016; *Allcyte*, 2021

AI-informed cancer surgery the next evolution in CVR¹

PARTNERSHIP IN BRIEF

Caresyntax

Digital surgery startup based in Massachusetts, US
AI platforms used in 4,000+ ORs worldwide



Sheba Medical Center

Largest AMC in the Middle East, located in Ramat Gan, Israel
2,000-bed, 159-department hospital serves over 1M patients per year

- Caresyntax's digital surgery platforms use AI to analyze large volumes of video, audio, images, device data, clinical, and operational data in and around the operating room.
- Data informs **real-time surgical decisions**, post-op care standard analysis, and hospital-led surgical quality improvement initiatives.

- Sheba's ARC (Accelerate, Redesign, and Collaborate) Innovation Center collaborates with the external medical ecosystem to innovate and transform patient care and delivery.
- ARC houses six workstreams, each led by a clinical champion: **big data and AI**; precision medicine; telemedicine; virtualization in medicine; rehabilitation, and **innovations in surgery**.

'Smart surgery' platform has a clear use case to help alleviate surgical backlog pressure

- Caresyntax's software measures **300+ variables in oncological procedures**, with which its AI will predict outcomes and influence real-time care team decisions.
- Program will use Sheba's EHR records, pulling data from **3,000+ oncological surgical procedures**.



“Operating rooms need to perform as effectively and efficiently as possible, and this is especially true now to make up for the **surgical backlog driven by the pandemic**.”

— Dennis Kogan, Caresyntax CEO

1. Care Variation Reduction.

Source: “[caresyntax & ARC at Sheba Medical Center Launch Collaboration to Predict Surgical Outcomes Using AI and Machine Learning](#),” *Business Wire*, 7 January 2020; “[Caresyntax Raises \\$100 Million to Make Surgery Smarter and Safer](#),” Caresyntax, 28 April 2021.

Community hospital fights pneumonia using AI

CASE EXAMPLE



Flagler Hospital

335 bed acute care center • St. Augustine, FL

- AI solution identified optimal care path to better treat patients with pneumonia
- The solution pulled data from Flagler's EHR, financial system, and surgical system to find patterns among care paths
- Dashboard displayed how different care paths led to variation in cost and care outcomes
- The analytics team worked with the Physician IT (PIT) crew to match the optimal care path to a standardized order set



DATA SPOTLIGHT

Results after nine months of standardized order set

\$1.06M

Saved

0%

Mortality rate,
down from 4%

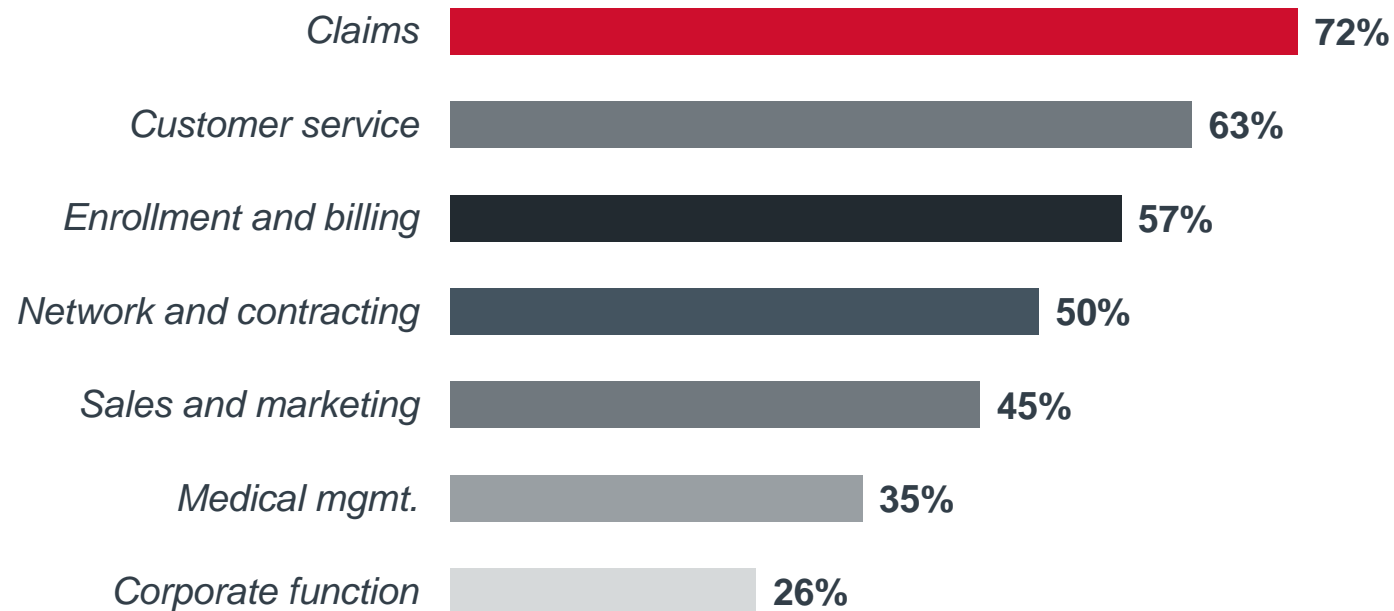
1.5

Days reduction
in LOS

How are payers using AI?

Survey: Automation impact for health care payers (n=500)

Where could automation yield its greatest cost impact for your organization?



Estimated work that is “automatable” by stakeholder group



Source: Carrus B, et al., “Making Healthcare More Affordable through Scalable Automation,” McKinsey & Company, September 2020.

AI could make health care fairer, reveal gaps in outcomes

An algorithmic approach to reducing unexplained pain disparities in underserved populations



Radiologists' review of osteoarthritic knee x-rays scored patient pain levels on KLG¹ grade

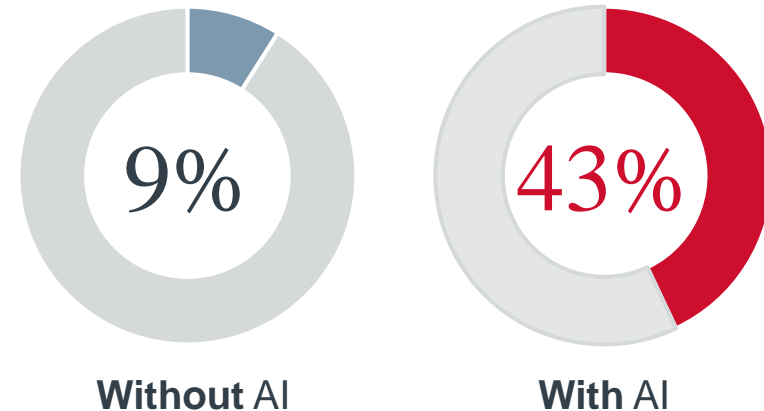


NIH data reveals doctors using the KLG method systematically scored Black patients' pain far less severe than self-reported levels



Deep-learning model more accurately predicts patients' self-reported pain levels from knee x-rays, suggesting there are radiographic indicators of pain more common in non-White populations that aren't part of KLG rubric

AI predictions accounted for 4.7x more racial pain disparities than KLG alone



Source: Pierson, E. et al, "An algorithmic approach to reducing unexplained pain disparities in underserved populations," *Nature Medicine*, January 13, 2021; Hao, K., "AI could make health care fairer—by helping us believe what patients say," *MIT Technology Review*, January 22, 2021.

1. Kellgren-Lawrence Grade

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