REPORT

AI *in* **HEALTHCARE**

LEADERSHIP SURVEY 2020

HEALTHCARE LEADERS SPEAK OUT ON AI

7 Key Findings: Just What the Doctor Ordered

The AI in Healthcare Leadership Survey 2020 shows healthcare organizations are using AI, believe in AI and are leading the way to adopting machine-learning enabled clinical care and business processes

About the Survey

The *AI in Healthcare* team embarked on this survey to gain a deeper understanding of the current state of artificial and augmented intelligence in use and being planned across healthcare in the next few years. We polled readers of *AI in Healthcare*, AIin.Healthcare and sister brand HealthExec.com over 2 months. All data is presented in this report in aggregate, with individual responses remaining anonymous.

The content in this report reflects the input of 1,238 physicians, executives, IT and administrative leaders in healthcare, medical devices and IT and software development from across the globe, with 75 percent based in the United States. The report focuses on the responses of providers and professionals at the helm of healthcare systems, integrated delivery networks, academic medical centers, hospitals, imaging centers and physician groups across the U.S. For a deeper dive into survey demographics, turn to page 14.

Some respondents chose to share more specific demographics that help us better get to know our survey base. Those 165 healthcare leaders work for 38 unique health systems, hospitals, physician groups and imaging or surgery centers, across 39 states and the District of Columbia. They are large, small and mid-sized, for profit, not for profit, academic and government owned. Respondents, too, herald from all levels of leadership. Here are some of the interesting titles who chimed in— and we are thankful they did: CEO, CFO, CMO, CIO, chief innovation officer, chief data officer, chief administrative officer, medical director of quality, senior VP of quality and innovation officer, system director of transformation, VP of service line development, and plenty of physicians, directors of ICU, imaging, cath lab and surgery, nurses and technologists.

In this report we unpack current trends in AI and machine learning, drill into data from various perspectives such as the C-suite and the physician leader, and learn how healthcare systems are using and planning to use AI. Turn the page and see where we are and where we're going.

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AI in Healthcare magazine and AIin.Healthcare

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AI in Healthcare worked alongside Pure Storage on this survey, with Pure offering an educational grant to sponsor the data gathering and report creation. Data collection, tabulation and collation was the responsibility of *AI in Healthcare*, thus maintaining the anonymity and integrity as promised to the survey base.

View report online: AIin.Healthcare/2020report

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AI in **HEALTHCARE**

Applying information technology to achieve better care at lower cost: This is the charge of every healthcare provider entity. *AI in Healthcare* (AIin.Healthcare) equips healthcare executives, IT professionals, technology managers, clinicians and other innovation and technology leaders so they can best leverage the emerging Big Data methodologies that are changing the very face of healthcare.

Leveraging Intelligence to Enhance Care and Processes

Artificial and augmented intelligence are poised to revolutionize healthcare and medicine. Healthcare is being reshaped by new trusted data models enabled and inspired by AI that are starting to make an impact on what leaders say told us in this survey are their top priorities: Improving accuracy, efficiency and workflow.

Hospital systems, physicians, data scientists, IT and informatics leaders as well as industry are joining together to apply artificial intelligence and machine learning to some of the most intractable problems in healthcare. They are unpacking and unlocking data in an EMR, detecting brain bleeds in CT scans, atrial fibrillation in an ECG or cancer lesions via mammography or ultrasound, quantifying coronary artery calcifications in X-rays and recognizing patterns in coding to facilitate swift payment. AI will drive improvements in patient care because machine-optimized tasks will be automated as will workflow and workload be streamlined. Physicians will be able to visualize and interpret more data in greater depth than ever before. And as the U.S. FDA says, "AI and machine learning technologies have the potential to transform healthcare by deriving new and important insights from the vast amount of data generated during the delivery of healthcare every day."

AI also is being applied behind the scenes to detect drug-drug interactions, predict which patients will decline in the ICU, those most at risk for readmissions or bed shortages in the ER. The mix of apps are both commercially developed and designed in house. FDA-approved apps have surged since the first, an Afib detector, got the nod in 2014.
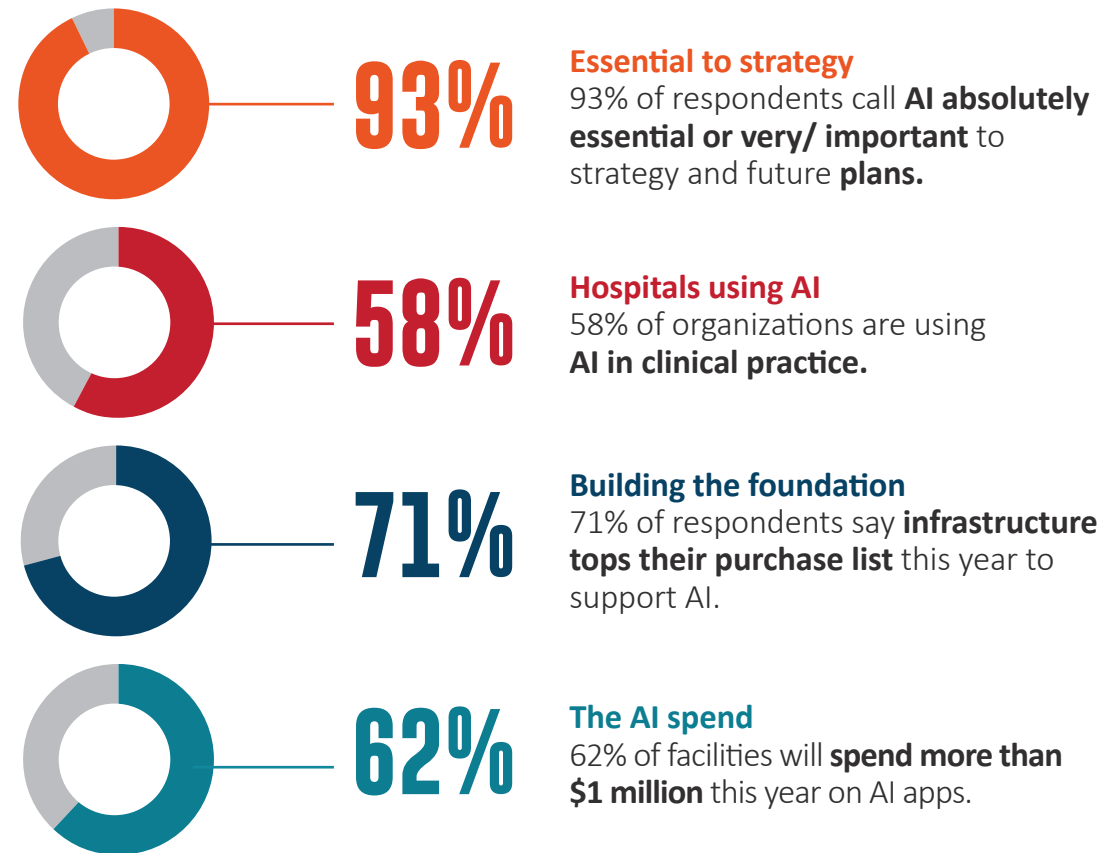
The pace is picking up quickly, we learn from our survey of 1,238 healthcare leaders. Senior leadership are demonstrating ownership, commitments to and investments in AI initiatives. Healthcare is building a new paradigm that requires a new mindset and new infrastructure. Clinicians trust AI-generated insights, they are using AI for clinical tasks and business processes, they are developing and buying AI apps.

With this survey we look at AI in healthcare through leaders' eyes. What are their challenges and top priorities? What are they investing in and who is making it happen? Which 'ologies are benefitting most? We look at all of this and more. Dig in, read on.

Survey at a Glance

Gaining insight and knowledge from data is the objective of adopting AI and machine learning to medicine. Think predicting risk, speeding clinical decision-making, making devices less user dependent and diagnosing and detecting disease earlier and better. Here is an overview of top priorities, barriers to adoption and the mindset of leadership. Healthcare organizations are focused, creating plans and paths to make AI happen.

93%

Essential to strategy
93% of respondents call **AI absolutely essential or very/ important** to strategy and future **plans.**

58%

Hospitals using AI
58% of organizations are using **AI in clinical practice.**

71%

Building the foundation
71% of respondents say **infrastructure tops their purchase list** this year to support AI.

62%

The AI spend
62% of facilities will **spend more than $1 million** this year on AI apps.
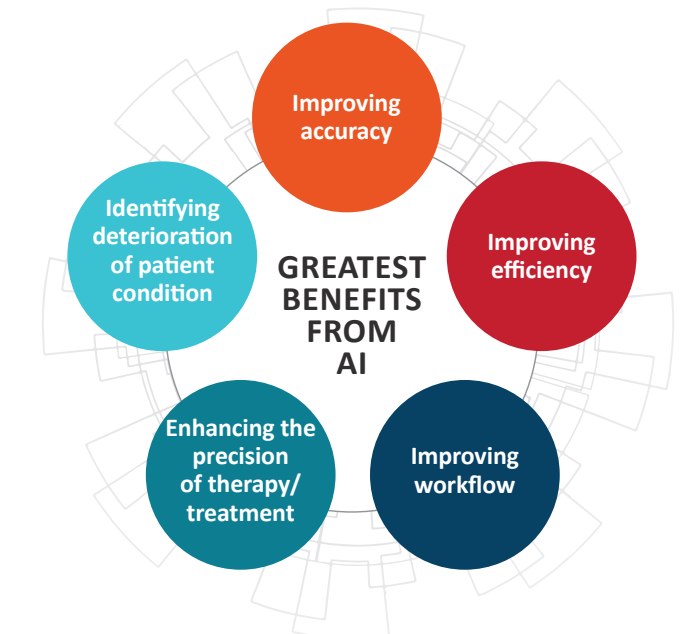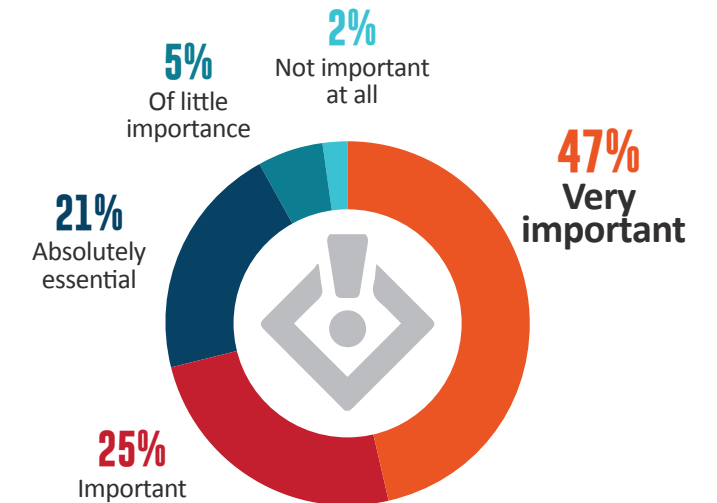
Top 5 Priorities of AI

1. Using EHR data to reliably predict risk
2. Revolutionizing clinical decision making at the bedside
3. Developing the next generation of radiology tools
4. Bringing intelligence to medical devices and machines
5. Utilizing AI to more effectively manage population health

Top 5 Barriers to AI Adoption

1. Lack of financial resources
2. Lack of clear strategy for AI within your organization
3. Limited understanding of insights from AI
4. Lack of leaders' ownership of and commitment to AI
5. Uncertain or low expectations for return on AI investments

IMPORTANCE OF AI TO STRATEGY AND FUTURE PLANS

2% Not important at all

5% Of little importance

47% Very important

21% Absolutely essential

25% Important

GREATEST BENEFITS FROM AI

- Improving accuracy
- Improving efficiency
- Improving workflow
- Enhancing the precision of therapy/ treatment
- Identifying deterioration of patient condition

AI in HEALTHCARE | **2020 LEADERSHIP SURVEY REPORT**
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7 Key Findings

Artificial and augmented intelligence are already helping healthcare improve clinically, operationally and financially—and there is extraordinary room for growth. Success starts with leadership, vision and investment and leaders tell us they have all of the above. Here are the top 7 survey findings.

01 C-level healthcare leaders are leading the charge to AI. AI has earned the attention of the C-suite, with 40% of survey respondents saying their strategy is coming from the top down. Chief information officers are most often managing AI across the healthcare enterprise (27%).

02 AI has moved into the mainstream. The future is now. It's here. Health systems are hiring data scientists and spending on AI and infrastructure. Some 40% of respondents are using AI, with 50% using between one and 10 apps.

03 Health systems are committed to investing in AI. 93% of respondents agree AI is absolutely essential, very important or important to their strategy. There is great willingness to take advantage of intelligent technology and leverage machine intelligence to enhance human intelligence. Administration holds financial responsibility for AI at 43% of facilities, with IT paying the bill at 26% of sites.

04 Fortifying infrastructure is top of mind. 20% of survey respondents are investing $1 million to $10 million this year. Storage strength and computing power are essential to analyze and speed access to data.

05 Improving care is AI's greatest benefit. Improving accuracy, efficiency and workflow are the top benefits leaders see coming from AI. AI helps to highlight key findings from the depths of the EMR, identify declines in patient conditions earlier and improve chronic disease management. Cancer, heart disease and stroke are the disease states survey respondents see AI holding the greatest promise—the 2nd, 1st and 5th leading killer of Americans.

06 Health systems are both buying and developing AI apps. Some 50% of respondents tell us they are both buying and developing AI apps. About 38% are exclusively opting to purchase commercially developed apps while 13% are developing everything in-house.

07 Radiology is blazing the AI trail. AI apps for imaging outnumber all other categories of FDA-approved apps to date. It's no surprise then that respondents tell us that rad apps top the list of tools they're using to enhance breast, chest and cardiovascular imaging.

01 C-level healthcare leaders are leading the charge to AI

AI has earned the attention of the C-suite, with some 40% of survey respondents saying their strategy is coming from the top down. The top 5 key stakeholders in decision-making are the CEO, CIO, CFO, COO and CMO. And who else is on the team? The chief technology officer, CMIO, chief of radiology, chief nursing officer and chief analytics officer.

Pairing the C-suite with IT, 83% of strategy is established. Clinical departments are overseeing strategy in about 15% of organizations while a small percent (2%) look external for guidance and strategy.

When the C-suite speaks, 34% tell us their organizations are advanced, using and developing AI for several years, and proficient in its use, while 31% are planning to deploy next year or assessing to deploy in the future. (See more From the C-suite on page 10.)

IT leading the charge

Leadership of AI efforts is the charge of information technology for the majority of health systems (31%), while administration leaders the charge in 23% of systems. Radiology, analytics and medical informatics make up the balance.

The CIO is the overseer of AI in most healthcare systems (27%), with the CEO taking the reins in 13% of organizations. Also taking charge are CFOs, CMOs, CMIOs, chief technology officers, chiefs of radiology and some newer titles: chief AI officer, chief analytics officer, chief innovation officer, chief digital officer, chief performance officer, chief data officer and chief transformation officer.

The CIO also controls the data, according to 42% of respondents. Managing clinical data also is the responsibility of medical and nursing informatics (18%), radiology (11%), administration (10%), and analytics (9%).

5 KEY STAKEHOLDERS IN AI DECISION-MAKING

CEO · CIO · CFO · COO · CMO

Paying the bill

While the CIO also oversees the finances in a quarter of health organizations, administration holds the purse strings in 43%. Finance, radiology, medical informatics and analytics make up the balance of the rest.

02 AI has moved into the mainstream

The future is now. It's here. Health systems are hiring data scientists and spending on infrastructure. 58% of respondents are using AI in clinical practice, with 50% using between one and 10 apps.

Some 25 percent call themselves advanced and proficient when it comes to AI, 15 percent are rolling AI apps out this year. Another 33 percent are planning to deploy it in the future. Only 27 percent say AI is not part of their current plans.

There also is a lot of room for growth, with 42% of respondent facilities not yet using AI-based applications in clinical practice.

CURRENT STATE OF AI

25%
Advanced and proficient

15%
Rolling out AI apps this year

33%
Plan to deploy in the future
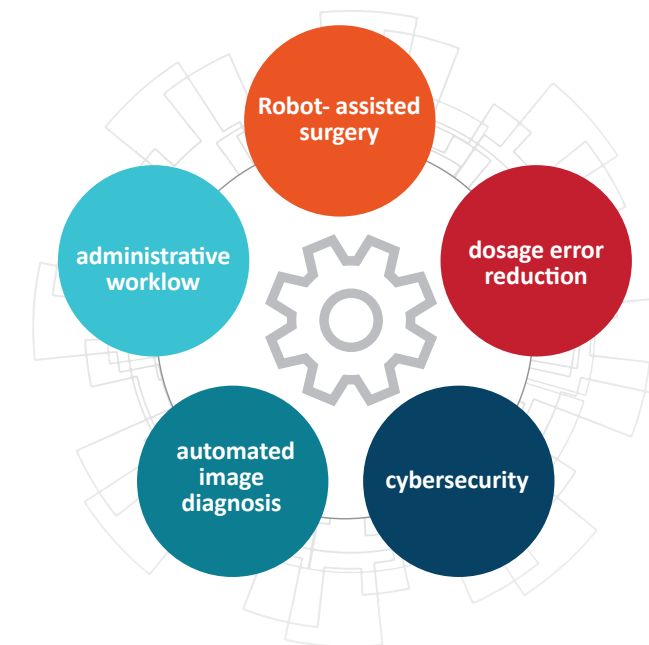
27%
Not part of current plans

03 Health systems are committed to investing in AI

93% of respondents agree AI is absolutely essential, very important or important to their strategy. There is great willingness to take advantage of intelligent technology. Only 8 percent see it as having little to no importance. Most facilities (34%) report they'll spend $1 million on AI this year, while 18 percent are committed to spending $1 million to $10 million this year. About 10 percent are upping the ante and spending upwards of $10 million. According to survey respondents, projects are being funded by strategic investments for personnel retention and to minimize physician burnout, as well as cost savings and improved productivity.

THE TOP 5 AI APPLICATIONS IN USE

Robot- assisted surgery

dosage error reduction

administrative worklow

cybersecurity

automated image diagnosis

04 Fortifying infrastructure is top of mind

Healthcare leaders are in full gear in investing in infrastructure—with 45 percent buying this fiscal year. AI is all about the data and it is infrastructure that opens up access and brings speed for bedside and immediate decision-making. Storage strength and computing speed is essential to analyze and speed access to data. Of the respondents who are investing, almost two thirds will spend less than $1 million, while 31% will spend $1 million to $10 million and 9% over $10 million this fiscal year.

Healthcare organizations also are thinking hard about data and data sharing. Do they want to share de-identified data with other organizations to improve AI methods? Yes at no cost say 20%, while 11% say yes for a fee. Some 15% aren't sure just yet, but 55% aren't sure at this time. Of those collaborating with research organizations to develop AI applications trained on local patient data, 17% are collaborating and 23% plan to. About 60% have no current plans to collaborate. And of those healthcare organizations developing AI apps, about 37% will then look to commercialize them.

INFRASTRUCTURE SPENDING CURRENT FISCAL YEAR

60%
Less than $1 million

31%
$1 million to $10 million

9%
Over $10 million

05 Improving care is AI's greatest benefit

Improving accuracy, efficiency and workflow are the top benefits leaders see with AI. Next are enhancing the precision of therapy/treatment, identifying deterioration of patient condition, reducing physician burnout, expanding access to care and cost containment.

Respondents see the greatest promise for AI in cancer, heart disease and stroke. The list continues to closely mimic U.S. statistics on chronic disease: neurological diseases, diabetes, Alzheimer's and infectious diseases. They also see benefits coming in obesity, asthma and alcohol-related diseases.

Radiology leads the charge in putting clinical AI apps in place and planning for over the next 18 months, with the focus on diagnosis, detection, screening, scheduling and research. Breast imaging, chest radiography, cardiovascular imaging, neuroradiology and cardiothoracic radiography the top 5 apps.

Some 58% of respondents are using AI applications in clinical practice. Of the sites deploying AI, 89% are taking the path of slow and sure, utilizing between one and 10 applications. Some 9% are using 11-50 apps, with 2% of hyperachievers using more than 50.

Health systems are following the money—with the No. 1 business AI app investments coming in scheduling and staffing. It is revenue that rules with business AI apps, with respondents planning to gain insight in coding and reimbursement, scheduling, revenue cycle, billing and staffing over the next 18 months.

06 Health systems are both buying and developing AI apps

Standard practice seems to be a blend of commercial AI solutions and teams at healthcare facilities and systems developing their own, with half adopting this strategy. Exclusively purchasing commercial apps is the plan of 38% of facilities, while 13% will take a develop in-house-only strategy. When commercial apps are the plan, three quarters are validating their accuracy with local patient data.

Some 60% of respondents say they'll add 1-10 AI apps over the next 18 months, with 6 percent pushing that number to 11 to 50. 1% say they'll add more than 50, while 33 percent say none. 37% of respondents say they are developing AI apps.

With the C-suite at the AI helm, it's not surprising that almost 60 percent of healthcare organizations report having a data governance policy providing guidance for the utilization of PHI (EHR data, imaging and reports) in AI research and application development.

Data scientists are increasingly part of the team too, so say 60% of facilities who employ them. Of those, about 38% have fewer than 10, while 17% employ 11 to 50. About 4% report having more than 50. Physician data-scientists also are more likely to be pitching in on clinical AI projects like automated brain bleed and AFib detection.

Beyond planning strategy, 50% of facilities plan to use AI as a competitive advantage, marketing its use and emphasizing innovation.
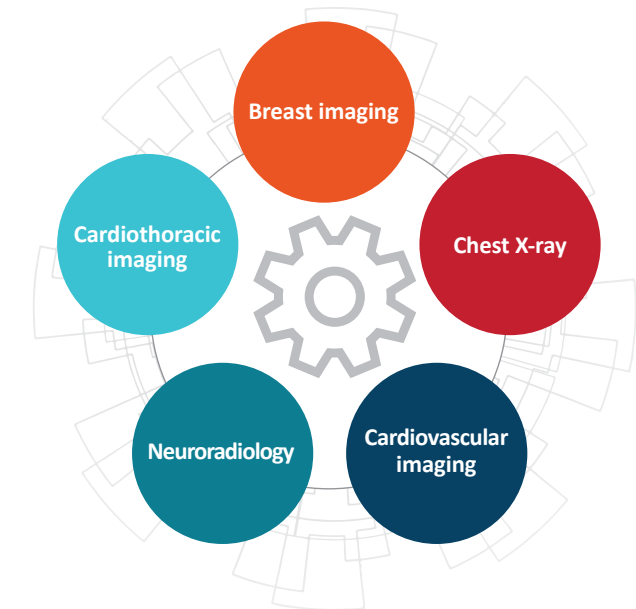
07 Radiology is blazing the AI trail

AI apps for imaging outnumber all other categories of FDA-approved apps to date. It's no surprise then that respondents tell us that rad apps top the list of tools they're using too, namely to enhance breast, chest, cardiovascular imaging, neuroradiology and cardiothoracic imaging. Diagnosis, detection, screening and scheduling are the areas they focus on deploying solutions over the next 18 months.

As a whole, survey respondents rank developing the next generation of radiology tools No. 3 on the list of highest priorities for AI across healthcare. Automated image diagnosis also ranks fourth among the AI apps that healthcare organizations are already using.

Cardiology is next in line—with a focus on cardiovascular imaging, interventional cardiology and heart failure. The placement of radiology and cardiology at No. 1 and 2 also reflects the FDA approvals of artificial intelligence-based algorithms to date, giving the nod they are proven, reliable, and accurate.

TOP APPS RADIOLOGISTS ARE USING

- Breast imaging
- Chest X-ray
- Cardiovascular imaging
- Neuroradiology
- Cardiothoracic imaging

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Does Size Matter?

It sure does. Here is a drill down into some key data points by facility type.
Interesting to see some commonalities across healthcare organizations.

	IDN	Academic Medical Center	General Hospital
Current state of AI	Accessing/planning to deploy in the future (33%) and advanced/proficient with AI (29%)	Deploying in the future (40%) and advanced/proficient with AI (39%)	Not part of current plans (45%)
Importance to strategic and future plans	Very important (49%)	Very important (54%)	Very important (44%)
Greatest investment in next 18 months	Infrastructure (71% ranked it No. 1)	Infrastructure (43%)	Infrastructure (48%)
AI apps plan to add in next 18 mos.	1-10 (70%)	1-10 (64%)	1-10 (55%)
Top priority of AI	Using EHR data to reliably predict risk	Revolutionizing clinical decision-making at the bedside	Bringing intelligence to medical devices and machines
Leader of AI initiative	CIO (33%)	CIO (40%)	CIO (23%) or CEO (21%)
Top use of AI in business areas in next 18 months	Coding/reimbursement	Coding/reimbursement	Coding/reimbursement

The doctor says

- AI is "very important" or "absolutely essential" to strategy and future plans (72%)
- Health system is advanced or proficient with AI (29%) or they are assessing and planning to deploy AI in the future (28%)
- Expect to add 1-10 AI apps in the next 18 months (56%)
- Top 3 benefits of AI: Improving efficiency, workflow and accuracy
- AI holds the greatest promise in: cancer detection and diagnosis
- Top 5 highest priorities for AI: Developing next-gen radiology tools; Utilizing AI to more effectively manage population health; Revolutionizing clinical decision-making at the bedside; Alerting clinicians to declines in patient condition; and Using EMR data to reliably predict risk
- Top 5 barriers to AI adoption: Lack of finances; Lack of clear strategy for AI within organization; Lack of leaders' ownership of and commitment to AI; Limited understanding of insights from AI; and Uncertain or low expectations from returns on AI investments

The early adopters

- Proficient in AI (75%) or advanced (25%) in using and developing AI for several years
- 67% are using 1-10 AI applications; 15% are using 11-50 apps and 7% are using more than 50 apps
- Most (38%) are multihospital systems/IDNs (38%) or academic medical centers (27%)
- 71% have a data governance policy
- Infrastructure is the No. 1 purchase this year, with 76% spending up to $10 million
- Almost three quarters of these facilities are using or expect to be using 1-10 AI-based applications, while 18 percent will be using 11-50 AI applications
- Top 3 benefits of AI: Improving workflow, efficiency and accuracy
- Top priority for AI: AI alerting clinicians to declines in patient condition
- Top barrier to AI adoption: Lack of financial resources
- AI holds the greatest promise in: Heart disease, cancer and stroke
- 70% will spend up to $10 million on AI this fiscal year; about 12% will spend more than $10 million this year on AI
- CIO is leading the way (35%) but these facilities also are more likely to have a chief analytics officer, chief innovation officer or chief AI officer
- Data scientists are helping to develop and hone AI apps: 46% employ fewer than 10 data scientists, while 32% have 11-50 on staff
- 45% are collaborating with research organizations to develop AI applications trained on local patient data; 54% plan to commercialize AI apps

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Through the eyes of the CIO

- AI is not part of their current plans (36%), more than quarter (27%) are assessing and planning to deploy AI in the future and 23% are advanced and proficient with AI
- Top 3 benefits of AI: Improving efficiency, workflow and accuracy
- Top priority for AI: Using EMR data to reliably predict risk
- Top challenge of AI: Lack of financial resources
- AI holds the greatest promise in: Diabetes, neurological disease and heart disease
- Almost two-thirds of their organizations expect to add 1-10 AI apps in the next 18 months
- About half report their organizations will spend $1million to $10 million on AI this year
- About half will spend $1 million to $10 million this year on infrastructure
- Optimism reigns supreme among CIOs, with most of them reporting that their organization has a full understanding of data governance and privacy, uses data to effectively support AI efforts and senior leadership demonstrates ownership and commitment to AI initiatives
- 59% work for an organization that is already using 1-10 AI-based apps in clinical practice
- 53% have a data governance policy
- CIOs aren't yet sure (44%) if they want to share de-identified data with other healthcare organizations to improve AI methods, although 38% will share it for a fee.
- While about half are shy on collaborating with research organizations to develop AI apps trained on local patient data reporting they have no plans to collaborate. Some 38% are planning to collaborate.
- 57% plan to commercialize AI apps they have developed

From the C-Suite

- 34% work for health systems "advanced" and "proficient" in AI
- 60% will spend up to $10 million on AI this year
- 68% will deploy 1-10 AI apps over the next 18 months
- 66% will spend up to $10 million on infrastructure to support AI this year which is their greatest investment this year
- Top 3 benefits of AI: Improving efficiency, accuracy and workflow
- Top priority for AI: Alerting clinicians to declines in patient condition
- Top challenge of AI: Lack of financial resources
- AI holds the greatest promise in: Diabetes, heart disease and stroke
- 43% are taking a wait and see attitude toward sharing de-identified data with other healthcare organizations to improve AI methods; 21% want to share data with a fee, while 18% will share data at no cost
- 62% do not plan to commercialize their AI apps