the AI effect

How artificial intelligence is
making health care more human

MIT Technology Review

GE Healthcare

Introduction

Health-care institutions have been anticipating the impact that artificial intelligence (AI) will have on the performance and efficiency of their operations and their workforces—and the quality of patient care. But many have already been reaping the benefits of AI tools. And contrary to common, yet unproven, fears that machines will replace human workers, AI technologies in health care may actually be "re-humanizing" health care, just as the system itself shifts to value-based care models that may favor the outcome patients receive instead of the number of patients seen.

A survey of more than 900 health-care professionals by MIT Technology Review Insights, in association with GE Healthcare, finds that health-care professionals are already using AI to improve data analysis, enable better diagnoses and treatment predictions, and free medical staff from administrative burdens. These findings are even more critical as health-care delivery and administration are becoming more complex and costly, and professional and technological capacity is ever more burdened, with doctors buried amid vastly expanding workloads and administrative, lower-yield work, and patients robbed of personal interactions with their physicians.

For one, machines must work for doctors and clinicians, not the other way around; much patient consultation time is spent entering data, not drawing inference from it. This, however, is largely an evolutionary transition in the adoption of AI. More important, health-care organizations must allow for fundamental shifts in how patients are cared for—doctors and other health-care workers must leverage increasingly comprehensive pools of AI-mediated medical data to make decisions in collaboration with machines.

by MIT Technology Review Insights in partnership with **GE Healthcare**

The effect of AI is already here

More than one-third of respondents will increase AI spending in the next two years.

"By focusing on areas that patients, providers, or systems are invested in addressing, we have set stage for more rapid adoption and dissemination of AI."

Dr. Rachael Callcut   Associate Professor of Surgery at the University of California, San Francisco (UCSF) Medical Center and Director of Data Science for the Center for Digital Health Innovation

Not long ago, no one would have dreamed that a machine could be a partner in guiding a medical procedure. But advancements in AI have positioned this class of technologies as a powerful tool for clinical and operational efficiency. Numerous technologies are in play today to allow health-care professionals to deliver the best care, increasingly customized to patients, and at lower costs. Our survey has found medical professionals are already using AI tools, to improve both patient care and back-end business processes, from increasing the accuracy of oncological diagnosis to increasing the efficiency of managing schedules and workflow. Indeed, 72% of respondents show interest in implementing AI.

Of business and administrative health-care professionals

80%

believe AI is helping them **improve revenue opportunities.**

81%

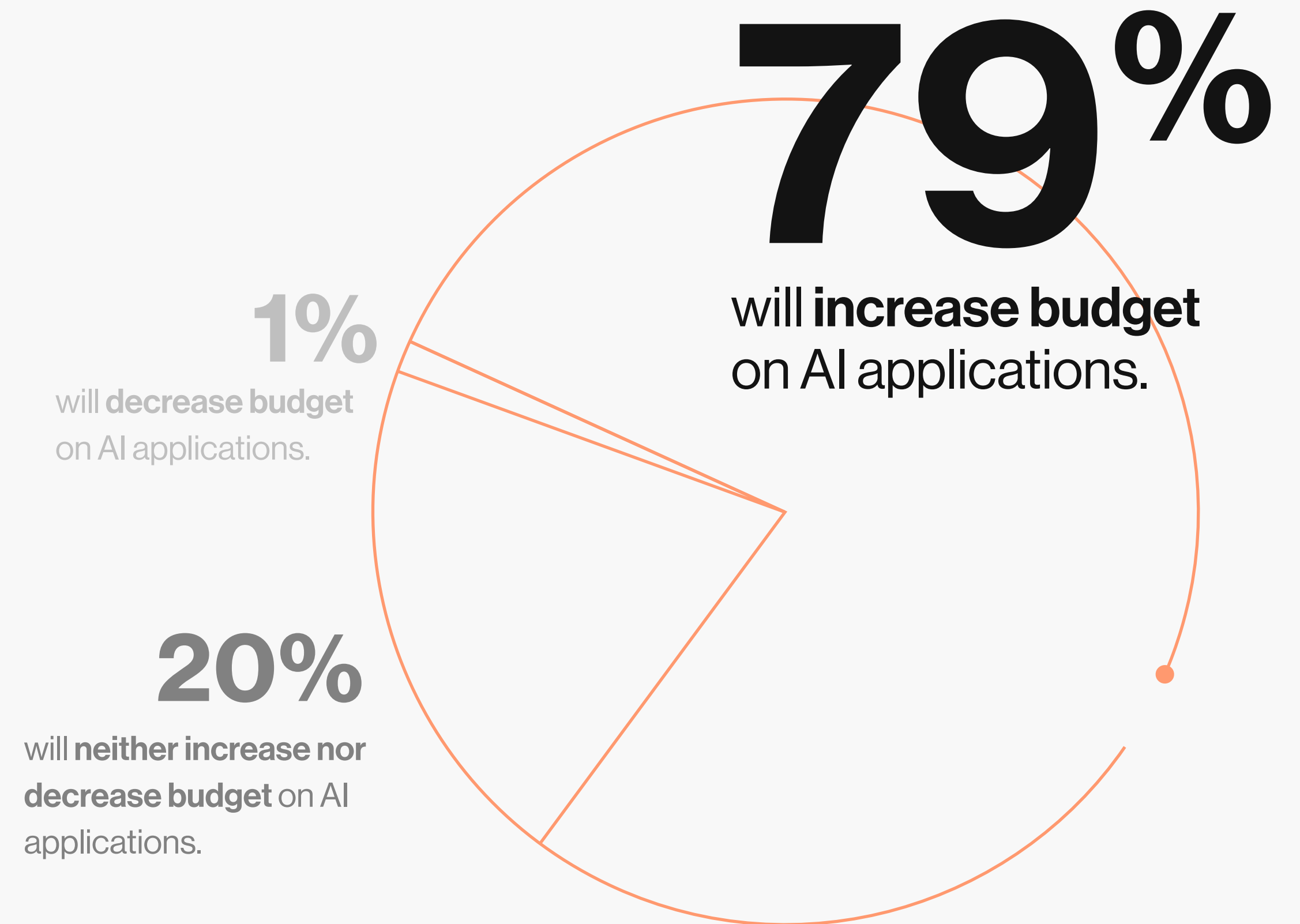believe that AI will make them **more competitive providers.**

The vast majority of survey respondents believe AI represents the extension—not extinction—of professional capability in health care: of those who have implemented AI, or are planning to, more than 80% believe that AI is, or will, help them improve their ability to generate revenue, recruit talent, and be competitive. And during the next 10 years, AI will radically streamline health-care delivery processes.

AI-related projects will continue receiving an increasing share of health care spending both now and in the near future.
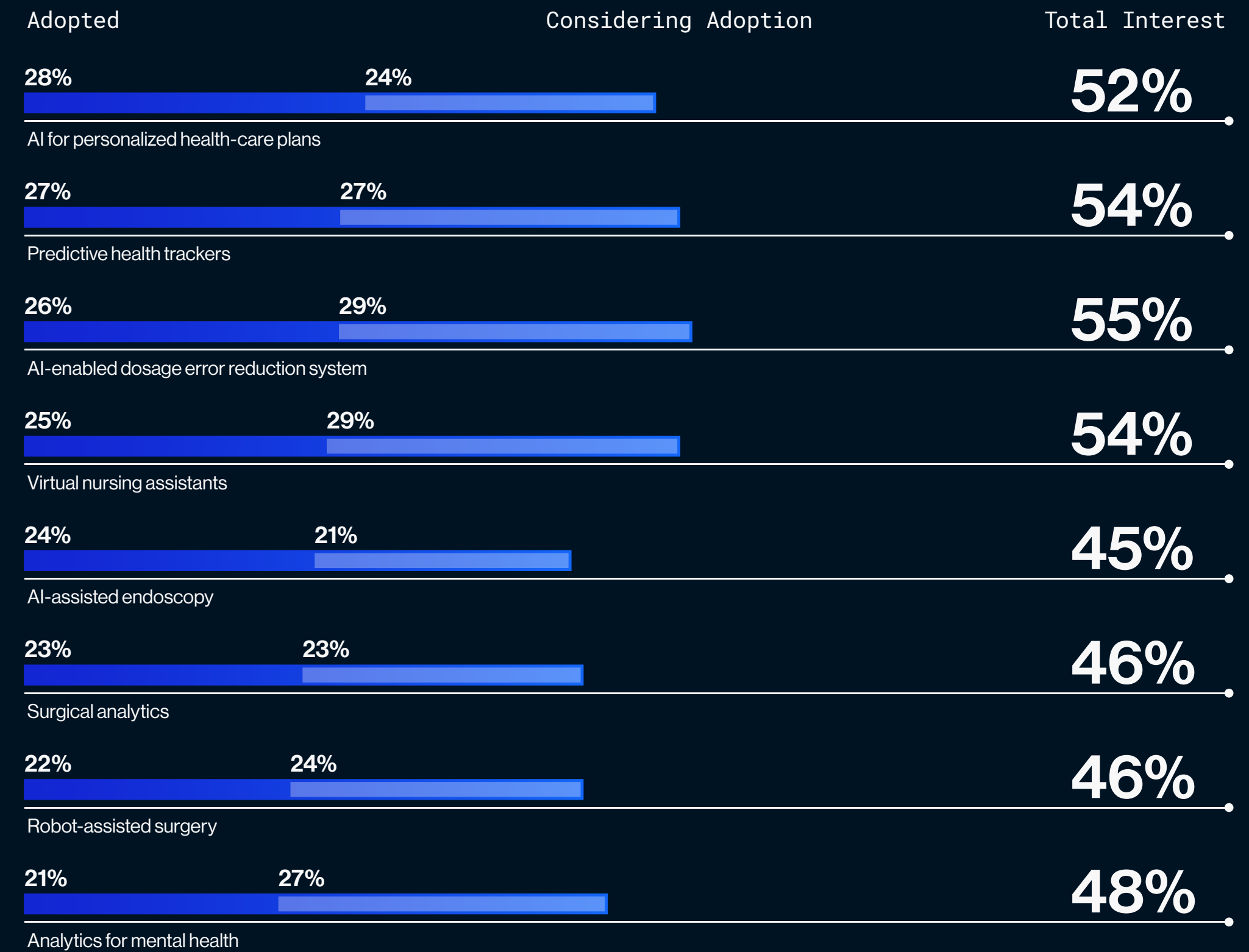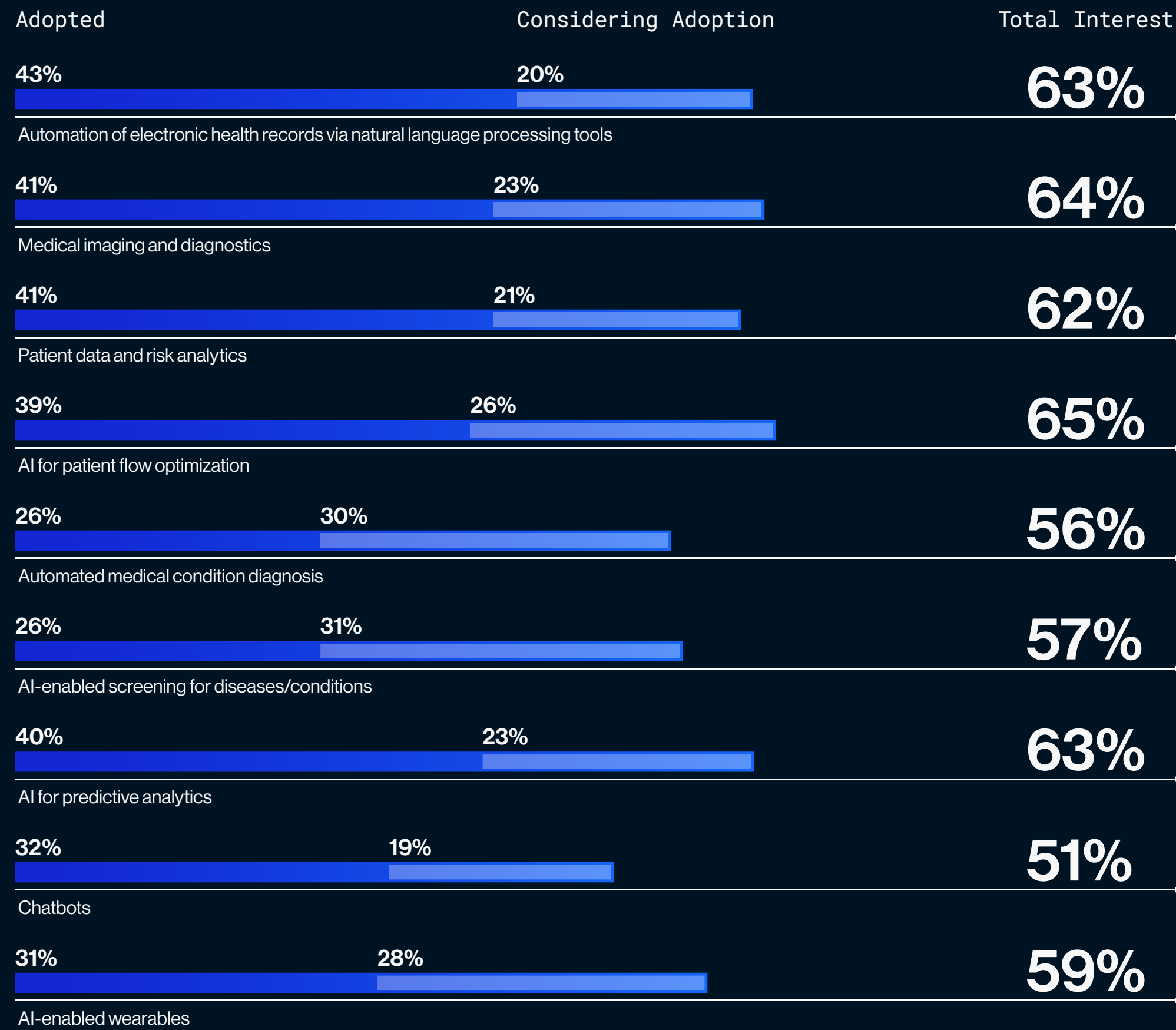
AI investment in health care has only just begun: most survey respondents with ongoing AI projects say that they will be spending even more to develop applications in 2020.

79% will **increase budget** on AI applications.

1% will **decrease budget** on AI applications.

20% will **neither increase nor decrease budget** on AI applications.

Breakdown of AI products/services currently deployed or under consideration

Adopted	Considering Adoption	Total Interest
43%	20%	**63%**

Automation of electronic health records via natural language processing tools

Adopted	Considering Adoption	Total Interest
41%	23%	**64%**

Medical imaging and diagnostics

Adopted	Considering Adoption	Total Interest
41%	21%	**62%**

Patient data and risk analytics

Adopted	Considering Adoption	Total Interest
39%	26%	**65%**

AI for patient flow optimization

Adopted	Considering Adoption	Total Interest
26%	30%	**56%**

Automated medical condition diagnosis

Adopted	Considering Adoption	Total Interest
26%	31%	**57%**

AI-enabled screening for diseases/conditions

Adopted	Considering Adoption	Total Interest
40%	23%	**63%**

AI for predictive analytics

Adopted	Considering Adoption	Total Interest
32%	19%	**51%**

Chatbots

Adopted	Considering Adoption	Total Interest
31%	28%	**59%**

AI-enabled wearables

Adopted	Considering Adoption	Total Interest
28%	24%	**52%**

AI for personalized health-care plans

Adopted	Considering Adoption	Total Interest
27%	27%	**54%**

Predictive health trackers

Adopted	Considering Adoption	Total Interest
26%	29%	**55%**

AI-enabled dosage error reduction system

Adopted	Considering Adoption	Total Interest
25%	29%	**54%**

Virtual nursing assistants

Adopted	Considering Adoption	Total Interest
24%	21%	**45%**

AI-assisted endoscopy

Adopted	Considering Adoption	Total Interest
23%	23%	**46%**

Surgical analytics

Adopted	Considering Adoption	Total Interest
22%	24%	**46%**

Robot-assisted surgery

Adopted	Considering Adoption	Total Interest
21%	27%	**48%**

Analytics for mental health

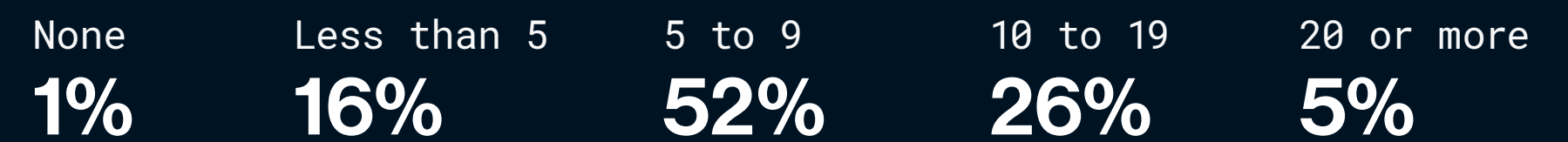AI adoption in clinical applications is widespread, but survey respondents showed the highest level of interest in AI-powered patient flow optimization—making sure patients move through a facility, with the right level of care, as efficiently as possible.

Percentage of health-care institutions developing or with current plans to develop AI:

74% Yes

13% Not sure

13% No current plans
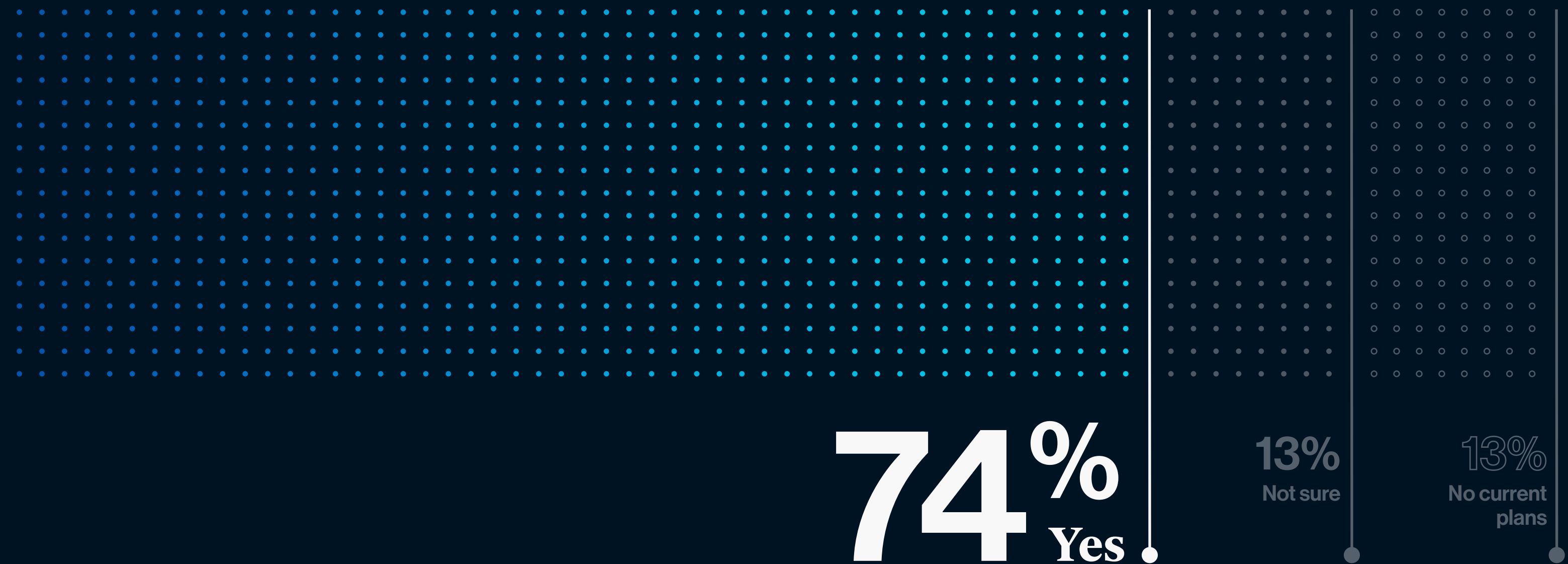
Mean number of staff planned for hire

9.4

None	Less than 5	5 to 9	10 to 19	20 or more
1%	16%	52%	26%	5%

AI's growing centrality to health-care executive strategy is evident in how much effort they are placing in tailoring their solutions to fit their precise requirements—and recruit expertise to maintain and improve their AI resources. For Bijoy Khandheria, cardiologist at Aurora Hospital's Aurora International & Executive Health Program, in Milwaukee, Wisconsin, "the basic interpretation [of an MRI], with the help of machine learning and AI, can be standardized and left to the machine. But there is still a need for human intervention."

Actionable insights untangle complexity

With AI streamlining workflow and operations, clinicians can focus on applying tools that improve diagnoses and treatment.

"Using AI for 'smarter' scheduling opens up more slots, which in turn empowers referring physicians to schedule more patients or more effectively match patients with specialists."
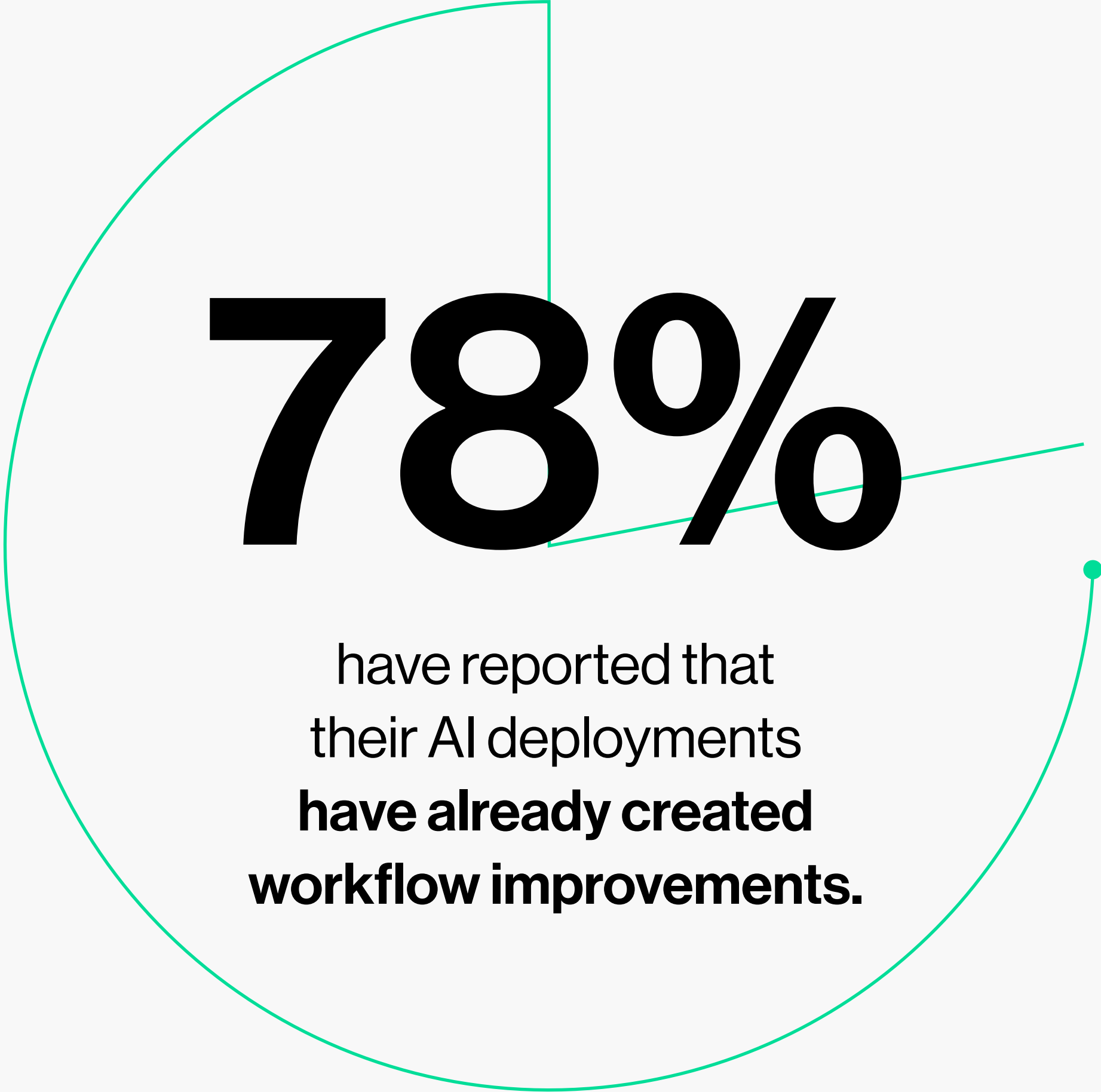
Dushyant Sahani   Professor and Chair of Radiology,
                    the University of Washington Medical Center

AI's core value proposition is in both improving diagnosing abilities and reducing regulatory and data complexities by automating and streamlining workflow. This allows health-care professionals to harness the wealth of insight the industry is generating, without drowning in it.

In our survey, respondents indicated that AI has increased the operational efficiency of health-care institutions: medical professionals report that their workweek is now being rebalanced in favor of care-giving activities.

78%
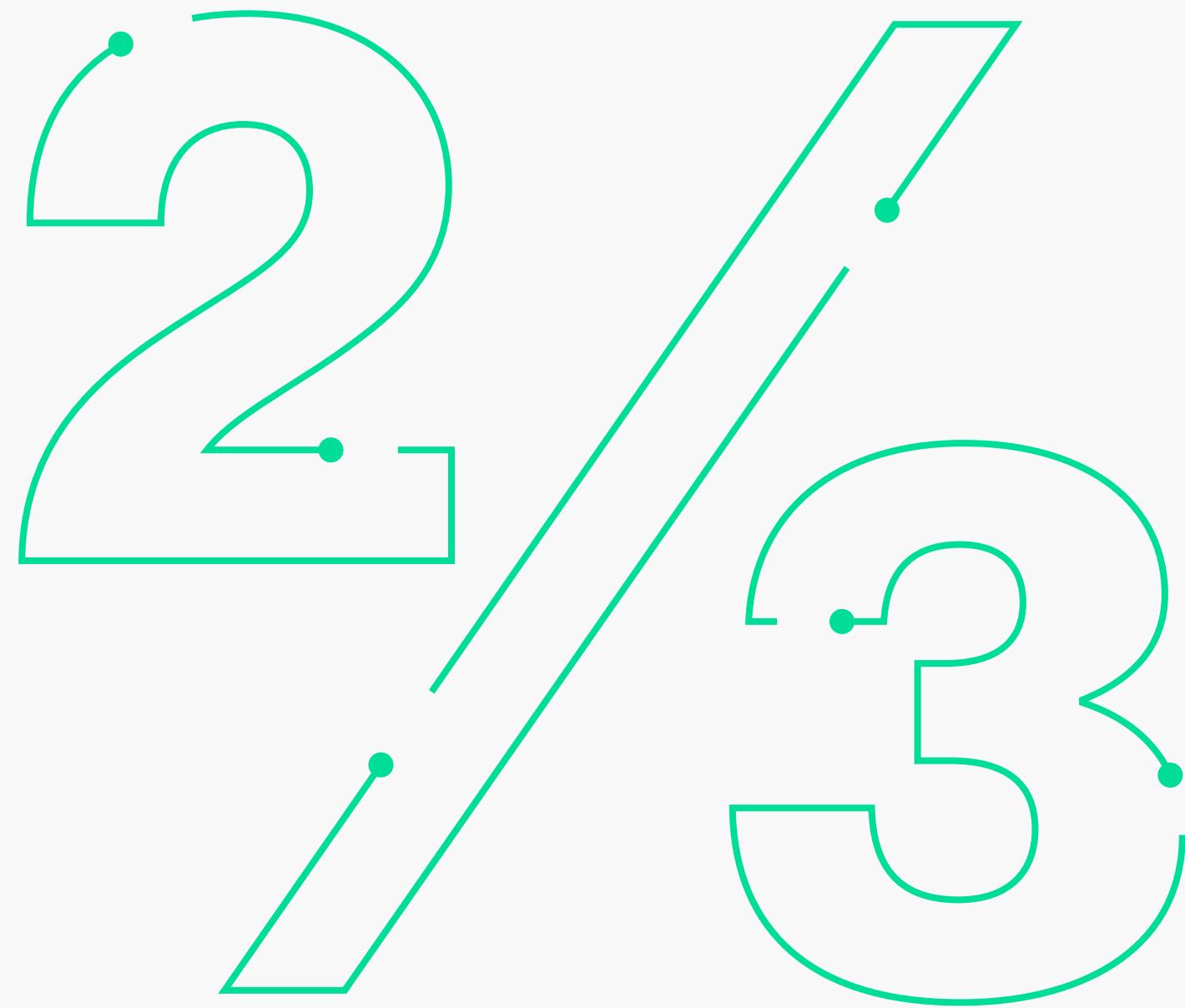
have reported that their AI deployments **have already created workflow improvements.**

AI-optimized schedule management not only makes a doctor's day more efficient—it creates opportunity to use AI for more patient-facing applications, giving clinicians time back to work with their patients more closely, and with more insight. For Dushyant Sahani, professor and chair of radiology at the University of Washington Medical Center, "with improvement in the physician's workflow and health-care operations, diagnostic tools will be better applied. If the focus is only on the diagnostic tool, adoption will be much slower."

AI-enabled hospitals are more likely to say that AI has improved expediting actions to help front-line care teams.

AI decision-support tools further improve the ability of front-line doctors and other caregivers to provide better treatment. With the help of AI, "what we see is that the technology supports decisions," says Michael Brady, Professor of Oncology in the University of Oxford, UK, and founder of several medical imaging companies, "and amplifies the performance of radiologists."

Fighting clinical error is the key challenge cited by medical staff without AI

Medical professionals using AI applications are seeing immediate gains in reducing clinical error—something that's still a major challenge for those who have not yet adopted such tools.

2/3 of the time.

That is more than double that of medical staff who have AI deployments.

75%

of medical staff who have AI agree that it has enabled better predictions in the treatment of disease.
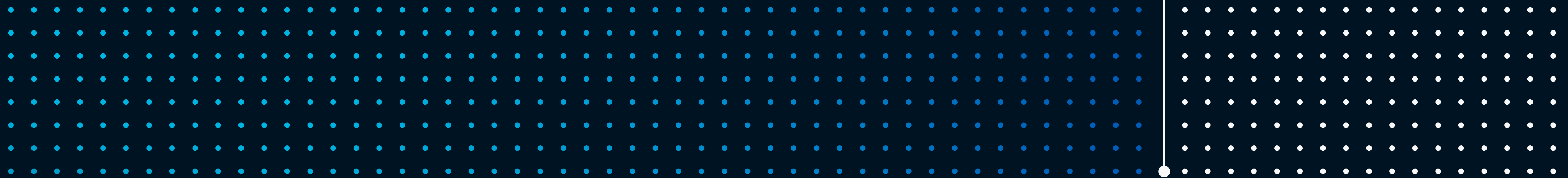
AI-enabled decision support algorithms allow medical teams to make more accurate diagnoses. For Matthias Merkel, professor of anesthesiology and perioperative medicine at the School of Medicine at Oregon Health & Science University, it's doing something big by doing something really small: noticing minute irregularities in patient information. That could be the difference between acting on a life-threatening issue—or missing it.

More time means more meaningful relationships

Physicians' job descriptions already are changing,
as they get back time to spend with patients.

"When we combine AI-based imaging technologies together with radiologists, what we have found is that the combination of the AI technology and the radiologist outperforms either the AI or the radiologist by themselves."

Michael Brady   Professor of Oncology in the University of Oxford, UK
                     and founder of several medical imaging companies

Scheduling tools give more autonomy to patients while streamlining smarter scheduling and increasing resource capacity. And AI-enabled clinical tools help medical professionals manage growing information overload.

But, as Merkel points out, there is room for improvement: much of consultation time is spent with computers in between patients and caregivers, with the latter recording information, rather than being health coaches or facilitators.

79%

indicate that AI has **helped avert health-care worker burnout.**

AI is helping to enable doctors to reconnect with their aspirations to go into medicine in the first place. "When I was in medical school," says Merkel, "one strong benefit was if you had a photographic memory and could memorize large data sets. This is almost obsolete today, and the ability to combine the patient information rapidly with relevant information in the digital world is pivotal."

Medical staff with pilot AI programs spend

1/3 less time writing reports.

AI is being used to assume many of a physician's more mundane administrative responsibilities, such as taking notes or updating electronic health records,which survey respondents report takes up to 10% of a typical medical professional's workweek.

Medical staff with extensive AI programs spend

2/3 less time writing reports.

The more AI is deployed, the less time doctors spend at their computers. Indeed, 45% of survey respondents believe that AI has helped increase consultation time and time to perform surgery and other procedures.

60%

of AI-empowered medical staff expect to **spend more time performing procedures** vs. administrative or other work.
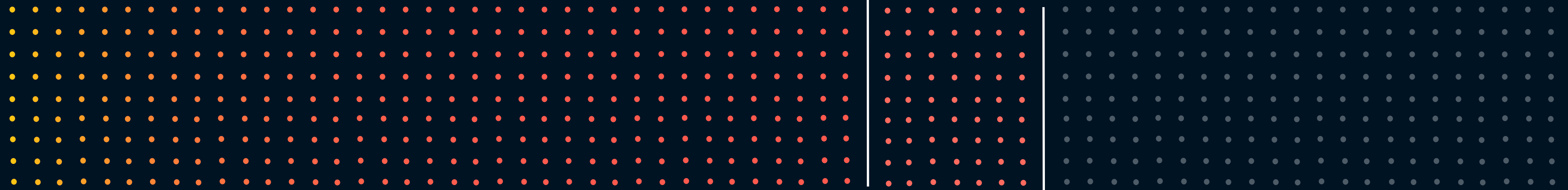
For those with the most extensive AI rollouts, the figure rises to

70%

AI frees up medical staffers' time so they can do other things—spending time with patients, or assessing and planning treatment requirements. Cancer doctors, for example, might examine 200 cases at a time, and the majority of the information they sift through will not be clinically significant.

According to Brady, on the time-saving benefit of AI, "clinicians are looking more and more towards AI technologies to help them focus within the time available onto the most salient parts of images."

AI lets medical staff spend almost

37%
more of their time

than non-AI counterparts in leading and mentoring junior staff.

Doctors supported by AI spend more time consulting and collaborating with their colleagues. During the next 10 years, AI will transform health-care delivery processes into collaborative platforms that will allow patients and professionals to harness, share, and act on immensely powerful insights.

Business staff empowered
by AI spend almost **30**% **more time** **attracting new patients**
and meeting with their families.
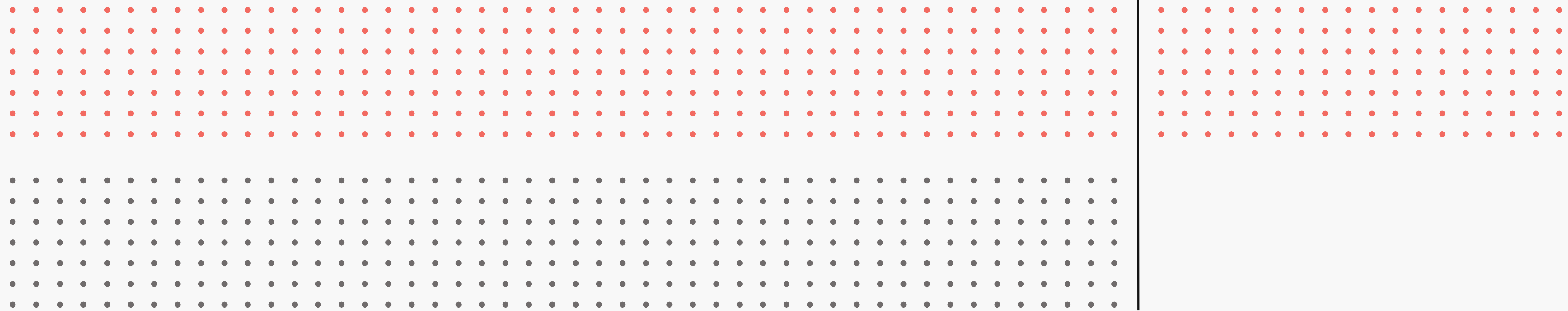
For Aurora Hospital's Khandheria, "A health-care provider is bombarded with information—it's so much so you can't keep pace with it. And if you can't keep pace with it, you tend to make mistakes."

Expect challenges

Integrating AI applications into existing systems was challenging for 57% of respondents. But other challenges—or lack therefore—were surprising.

"We need to evolve and better understand how AI can work for us, so we can interpret patients' health-care conditions, giving them good recommendations and guiding them through a longitudinal process."

Matthias Merkel   Professor of Anesthesiology and Perioperative Medicine, Oregon Health & Science University

Implementing AI in health-care operations, like any significant technology organizational transformation, presents multiple challenges. Respondents reported multiple hurdles that they found significantly challenging. Among those was skepticism about the provable benefit and overall cost of AI as top factors hindering its adoption.

Hospital administration is generally more skeptical than medical staff. One is the disruptive impact that AI has on existing processes; another is the difficulty of integrating AI applications into existing systems.

More than

1/2

of respondents planning to deploy AI raised **concerns about medical professional adoption, support from top management, and technical support.**

"Traditional" technology adoption hurdles—and in particular, the all-important buy-in from top management—are ongoing issues for survey respondents still in the planning stage. Leadership and strong business cases need to be established in order to execute an AI adoption strategy. But this is changing: as AI allows for the synthesis and more precise distribution of the growing wealth of medical data and insight the industry is generating, it will allow for more efficient sharing and collaboration in pursuit of better, less expensive outcomes.

"It's challenging working to move the field forward in a transformative way with artificial intelligence. There has to be alignment in vision, commitment to exploration, and mutual excitement. Everyone involved needs to be willing to push forward into a sometimes unproven space. If we are afraid to fail on a project and thus, don't take it on, the opportunity to change the future will pass us by."

Dr. Rachael Callcut   Associate Professor of Surgery at the University of California, San Francisco (UCSF) Medical Center and Director of Data Science for the Center for Digital Health Innovation

Medical staff with AI cite concerns about the challenges of data privacy half as often as those without AI. Health-care professionals who have not deployed AI are challenged not only by access to accurate data, but also by issues related to maintaining patient privacy and data integrity.

Medical staff without AI cite concern about data privacy

2x

more often than those with AI.

Collaborative care will connect an ecosystem

AI is turning decision-making into a more collaborative process, creating a new, connected ecosystem to improve delivery of care.

"It's not about whether it will benefit the consumer, the patient, the health-care system. We want to ensure the health of a population."

Bijoy Khandheria   Cardiologist, Aurora Hospital's Aurora International & Executive Health Program

The growth of AI and automated processes often creates concerns that the human touch will be removed from the health-care delivery process. What the industry is finding, however, is the opposite is becoming true: AI can extend the resources and capabilities of overworked health-care professionals and vastly improve processes. Clinicians and administrators alike are providing care in a network of AI-enabled tools and insight that lets them engage colleagues, automated resources, and patients to make more accurate, more proactive care decisions.

In AI, we are interested in partnerships in which the improvements that are made can both scale locally at our institution, but also impact health care worldwide," says Rachael Callcut, associate professor of surgery at the University of California, San Francisco (UCSF) Medical Center and director of data science at the Center for Digital Health Innovation. "We also need to do this work with a solid scientific foundation with all the important protections for our patients and providers.

Faster access to better patient data is the most critical benefit AI-enabled health-care teams are seeing.
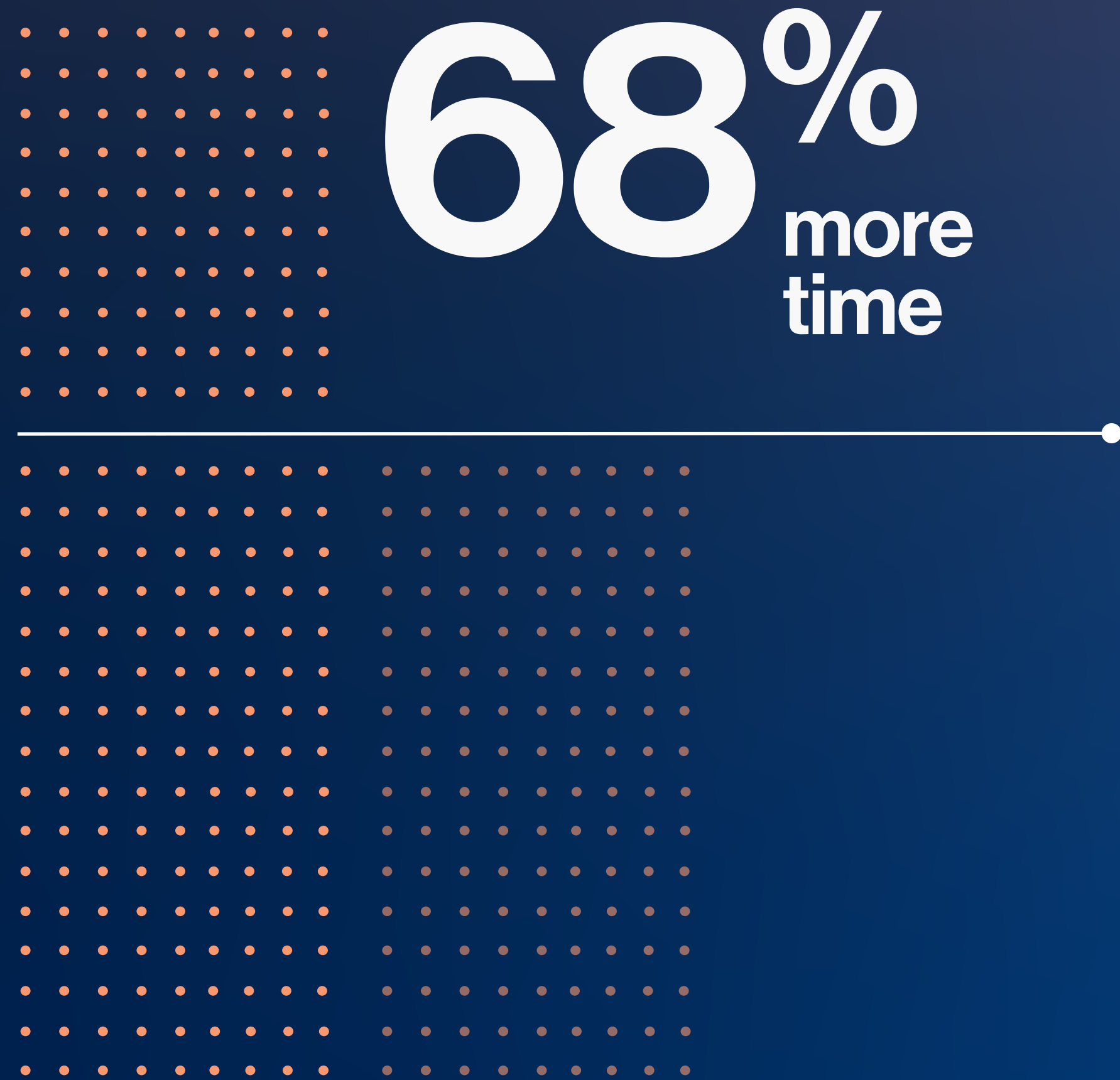
93%

agree that AI has improved the speed and accuracy with which patient data is analyzed and shared.

Medical staffers with a full AI deployment spend

68% more time

collaborating with other staff.

AI can synthesize multiple perspectives from data and insight provided by patients and health-care providers, not only for immediate diagnosis and treatment but for monitoring wellness on a continual basis.

Conclusion

AI needs to work for health-care professionals as part of a robust, integrated ecosystem. It needs to be more than deploying technology—in fact, the more humanized the application of AI is, the more it will be adopted and improve results and return on investment. After all, in health care, the priority is the patient. As Khandheria confirms, "humans are not going away; they are just going to make smarter decisions, with fewer errors."

See examples from health-care institutions across the world where AI is taking effect.

Learn more at www.gehealthcare.com/AIeffect ─────●

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