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Thought Leadership Paper
Commissioned By Intel

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The Dawn Of Data-Driven Healthcare

Upgrade Your Analytics And Patient
Engagement Platforms To Improve Health
Outcomes

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Executive Summary

Advancements in technology and access to new data sources have changed the ways in which healthcare provider organizations can improve patient experiences and outcomes while reducing costs. Analytics that improve quality outcomes like reduced length of stay and rehospitalization rates, coupled with patient engagement technologies that improve treatment plan adherence and lower costs, will reshape the way that the healthcare industry operates in the future.

Most healthcare provider organizations have migrated to electronic health record systems (EHRs), but to succeed in value-based care and drive outcomes-based care, data-driven providers should be looking at systems of insight. With EHR adoption at over 85% across the US, having data is quickly becoming table stakes; the organizations that are fastest to extract insights from that data to streamline operations, improve outcomes, and manage costs will have a competitive advantage. The first step includes analysis of that EMR data itself, followed by analysis of other structured data like lab results, medication interactions, and demographic data. Forward-looking analytics platforms that enable predictive and prescriptive analytics by leveraging novel data sources like genomics, internet of things (IoT), and consumer-generated data (CGD) will help drive organizations to a 360-degree view of patients to better align care. Organizations that can prescribe treatment plans that reflect unique patient preferences as well as social and emotional circumstances will be able to pivot to value-based care while reducing cost and improving patient satisfaction.

In February 2017, Intel commissioned Forrester Consulting to evaluate current technology adoption trends among healthcare providers. To do so, Forrester conducted an online survey of 308 business decision makers responsible for technology investments at healthcare organizations in the US and China.

KEY FINDINGS

- › **Healthcare has been slow to adopt analytics when compared with other industries.** Due to security and regulatory concerns (and often a lack of resources), hospital IT departments are often slow to invest in new analytics and engagement platforms. But while healthcare organizations have been slower to adopt technology in the past, this year will see a sharp increase in new implementations.
- › **Organizations are overinvested in EHRs while ignoring other platforms.** Healthcare providers need to be thinking about three different types of systems: 1) systems of record (e.g., EHRs); 2) systems of insight (e.g., analytics platforms); and 3) systems of engagement (e.g., mobile apps, websites, patient portals, or other patient engagement solutions). Each of these technologies plays a unique role in driving better cost and quality outcomes. Unfortunately, healthcare lags in its adoption of systems of insight and engagement.
- › **Healthcare organizations plan to invest heavily in technology in 2017.** Those that have invested in analytics and patient engagement platforms are experiencing significant benefits in the form of improved patient satisfaction and health outcomes, among others. Those that haven't yet implemented these systems are taking notice and planning to increase investments in the next year.



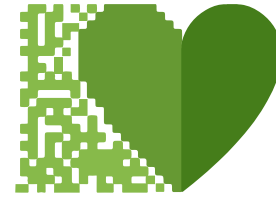
Healthcare providers will increasingly move beyond making operational decisions based on analysis of past data to using data to predict the future and intervene in real time to change outcomes.



Healthcare Lags Behind Other Industries In Adoption Of Advanced Analytics, For Now

The age of the customer describes the paradigm shift — created by the advancement of mobile devices and other technologies — in which consumers have more control than ever over exactly when and how they interact with businesses. Organizations across industries are now investing in analytics capabilities to gain insights from the myriad sources of data available to them. They are also investing in new platforms to better engage with customers. Healthcare has lagged behind other industries in its adoption of many analytics technologies, with the majority of organizations' spend and resources focusing on EHRs. But EHRs are insufficient on their own to enable the insights necessary to engage healthcare's customers. Healthcare leaders recognize the need to invest in other systems to enable greater insights from their existing EMR data and to augment the existing data with disparate data sources and drive deeper engagement. 2017 will see healthcare organizations dramatically increasing their investments in these technologies and prioritizing new investments in:

- › **Patient engagement platforms.** Ninety percent of healthcare providers agreed that patient engagement is critical to improving overall care, and 79% of providers agreed that technology is changing the way that they engage with patients. Significant percentages of healthcare providers are now engaging with patients through web portals (57%), email (46%), and mobile applications (39%) — particularly in rural areas where getting to a healthcare provider's office may be a much more burdensome task. But patient engagement does not end with EHRs and communication platforms — as every clinician knows, one of the hardest things to do is to drive care plan adherence in patients, and communication tools can only help so much. Tools such as mobile health monitoring, wearables, and biometrics help to track patient actions and remind patients of their healthcare provider's orders. These technologies are all poised for significant adoption growth in 2017 (see Figure 1).
- › **Analytics technologies.** In 2016, Forrester found that healthcare's technology adoption lagged behind the cross-industry averages for all categories of advanced analytics (see Figure 2). In 2017, healthcare organizations will sharply increase their investments in this area. Our survey found that 88% of organizations will have healthcare analytics technologies within the next 12 months, and 86% will have predictive analytics.

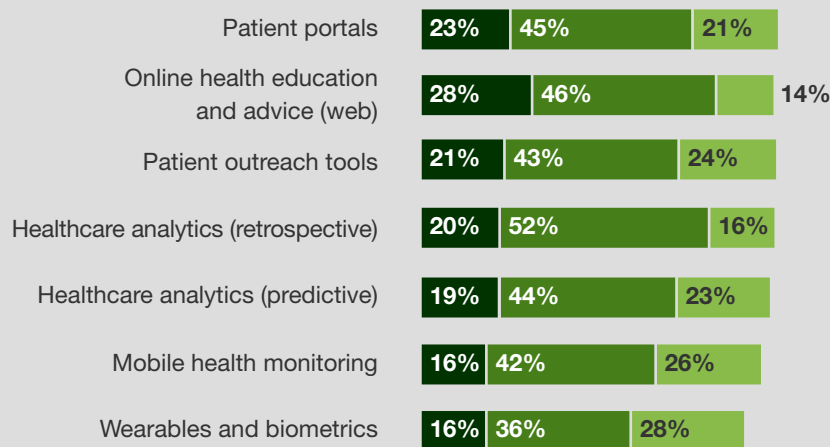


79% of healthcare providers agreed that technology is changing the way that they engage with patients.

Figure 1

“What are your plans to implement the following patient engagement technologies?”

■ Expanding/upgrading implementation
 ■ Implementing/implemented
■ Planning to implement within the next 12 months



90% of respondents have implemented analytics and/or plan to do so in the next 12 months.

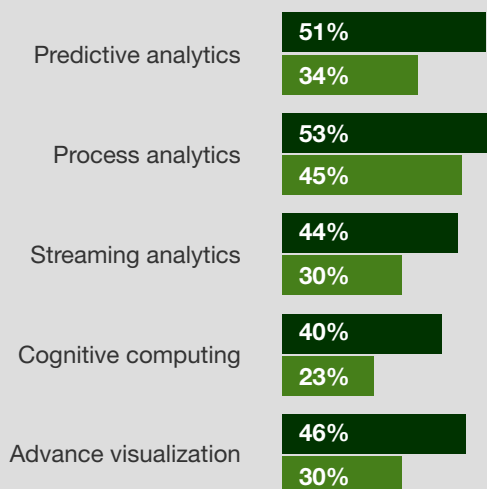
Base: 308 BDMs in the healthcare industry responsible for technology investments in the US and China
 Source: A commissioned study conducted by Forrester Consulting on behalf of Intel, February 2017

Figure 2

“What are your firm’s plans for using the following analytics technologies?”

(Implementing/implemented/expanding implementation)

■ All industries
 ■ Healthcare



Use of healthcare analytics lagged in 2016, but is growing.

Base: 47 to 2,094 business and technology decision-makers working in healthcare organizations
 Source: Forrester Data Global Business Technographics® Data And Analytics Survey, 2016

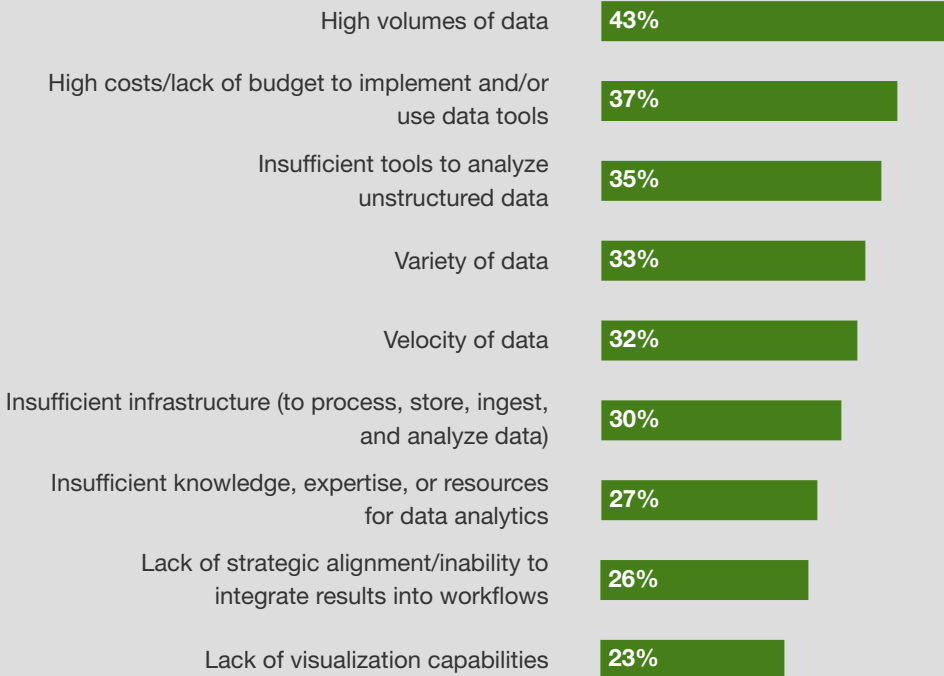
Your EHR Is Not An Analysis Tool

Healthcare organizations are often overinvested in systems of record, and they misuse them in a failed attempt to drive insight and engagement. It is that failure that has spurred interest and investment in new technologies, and healthcare organizations have to purchase systems of insight and engagement in order to be successful. Healthcare leaders are grappling with a number of challenges:

- › **Data challenges are driven by too much data and insufficient tools.** Respondents reported that their biggest challenges with data analytics are high volumes of data and lack of budget to implement the tools that they need (see Figure 3). Without purpose-built analytics systems, healthcare organizations cannot handle the size and scope of data available to them. Our study found that while patient and clinical data are analyzed by many healthcare organizations, dozens of other data types (such as unstructured, population, social, and genomics data) are only used by a small minority.

Figure 3

“What are your biggest challenges with data analytics? Please select all that apply.”

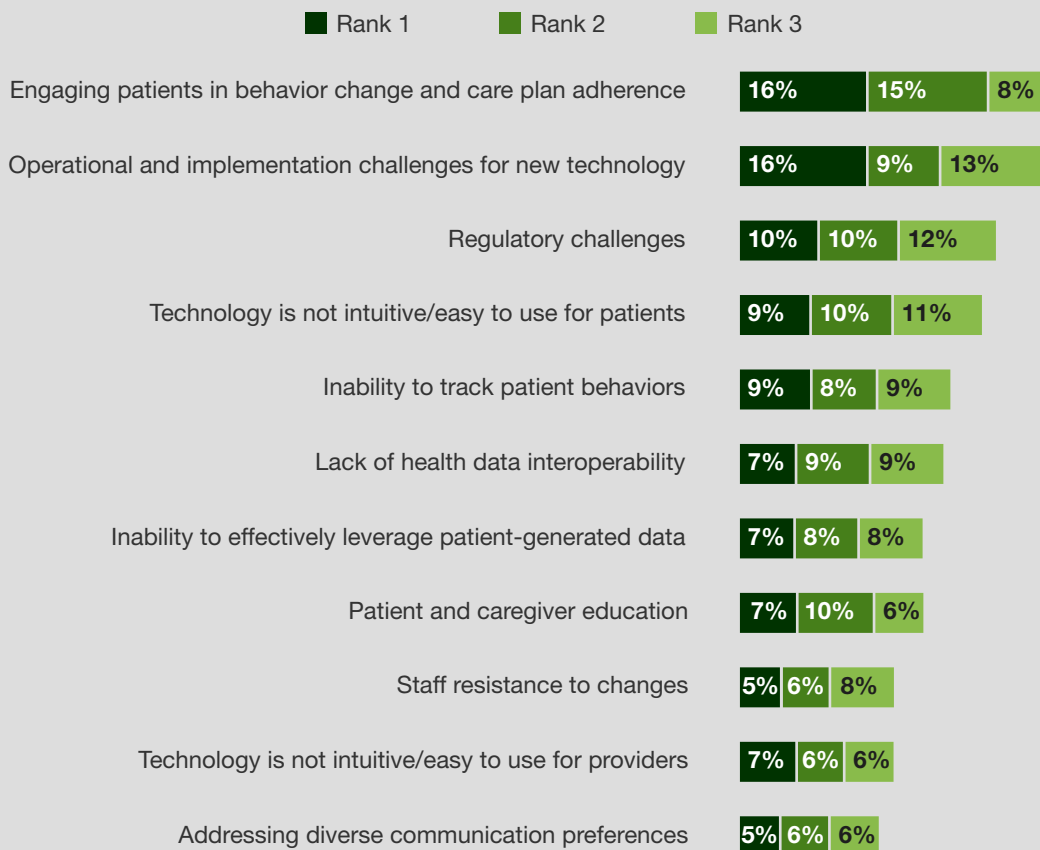


Base: 308 BDMS in the healthcare industry responsible for technology investments in the US and China
Source: A commissioned study conducted by Forrester Consulting on behalf of Intel, February 2017

- › **A lack of EHR interoperability leads to patient and clinician confusion.** In the absence of health record interoperability, EHRs are still disparate systems that generally do not interface with each other. Patient history, prescription records, billing, and lab results all must be manually transferred from system to system, and there are often omissions that may contribute to false diagnoses.
- › **Operational and regulatory restrictions abound.** Our study found that the top three challenges in driving patient engagement include engaging patients in behavior change and care plan adherence, operational and implementation challenges for new technology, and regulatory challenges (see Figure 4). Regulations often slow adoption of analytics technologies, as well, as most of the available investment budget is spent on highly structured requirements.¹ Healthcare organizations are more conservative in their technology adoption when compared with other industries, in part because they are a strictly regulated industry and must take great care to ensure HIPAA compliance.

Figure 4

“What are your top three challenges in driving patient engagement? Please rank up to your top three.”

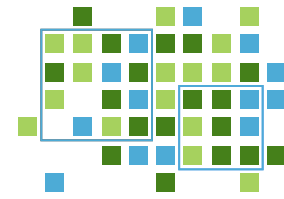


Base: 308 BDMs in the healthcare industry responsible for technology investments in the US and China
 Source: A commissioned study conducted by Forrester Consulting on behalf of Intel, February 2017

Systems Of Insight And Engagement Will Reshape The Future Of Healthcare

Today's technology marketplace is rich with vendors that specialize in helping organizations overcome healthcare-specific regulatory and technical challenges. Most organizations that are beginning to take advantage of those technologies are realizing an array of benefits. As providers prioritize improving patient outcomes, they must not wait any longer to invest in systems that will facilitate patient engagement and/or derive insights from the many sources of data available to them. The future of healthcare includes an expanding range of technologies to increase understanding and drive better patient satisfaction and health outcomes. Our study found that:

- › **Analytics are a top investment priority.** We asked respondents about their top adoption priorities for various technology categories and found that analytics rose to the top, even above more common technologies such as patient portals, websites, and EHR systems. The majority of healthcare providers (78%) consider operational/financial analytics to be a high or critical priority, and almost as many feel the same about patient and consumer analytics (75%). Patient engagement technologies are a high/critical priority for 72%, and artificial intelligence (AI) for 60% (see Figure 5). Use cases for AI range from supply chain automation to machine learning and natural language processing in advanced analytics. AI's ability to automate healthcare will help organizations not only speed up care but also drive innovations in care delivery and patient engagement.



Nearly **four out of five** providers cite analytics as a high or critical priority.

Figure 5

“What are your adoption priorities for the following types of technologies?” (“Critical/high priority” responses are shown)



Base: 308 BDMs in the healthcare industry responsible for technology investments in the US and China

Source: A commissioned study conducted by Forrester Consulting on behalf of Intel, February 2017

Emerging use cases for AI include:

1. Expert assistance.
2. Predictive customer engagement.
3. Intuitive communication.
4. Intelligent narratives.
5. Accessibility for the impaired.^{III}

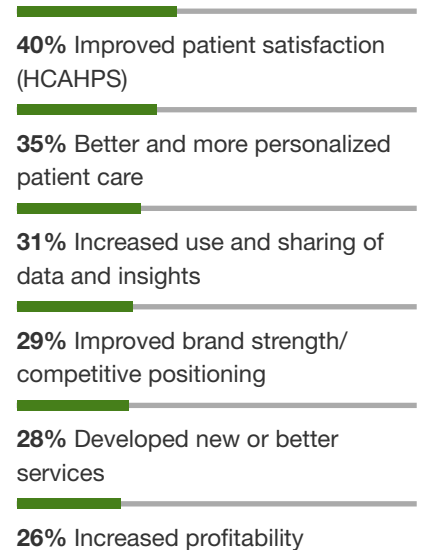
- › **Analytics drive key outcomes.** It stands to reason that analytics lead to better patient outcomes, and our data provides evidence to support this assertion. We evaluated linkages between analytics investments and success against business metrics and found a few key correlations. Specifically, value-based performance metrics and physician/network/contract performance analytics are both correlated to better patient engagement, and disease registry analytics are correlated to lower mortality rates.² Our study found that a significant percentage of healthcare providers are already realizing benefits such as improved patient satisfaction (40%), better and more personalized healthcare (35%), and improved data quality and consistency (31%) (see Figure 6).
- › **Patient engagement technologies benefit communication, patient access, health, and cost management.** We asked respondents what their top results were of using patient engagement technologies and found that the majority experienced better communication (62%), improved patient access (56%), and improved population health management (52%) (see Figure 7). Just under half experienced reduced costs (48%) and reduced readmissions (46%). While analytics provide insights to improve diagnosis accuracy, patient engagement platforms are effective at driving treatment plan adherence.
- › **Advanced analytics are on the horizon.** If the current step is using analytics that measure satisfaction, costs, and patient outcomes, the future step will be a foray into artificial intelligence, genomics, and prescriptive analytics. Analytics gurus are able to go well beyond basic models and integrate technologies that do a lot of the analytical legwork for them. Prescriptive analytics can automatically process new patient data and clinical research, determine possible clinical outcomes, and provide treatment recommendations (see Figure 8).

If the current step is using analytics that measure satisfaction, costs, and patient outcomes, the future step will be a foray into artificial intelligence, genomics, and prescriptive analytics.

Figure 6

ANALYTICS DRIVE BUSINESS OUTCOMES

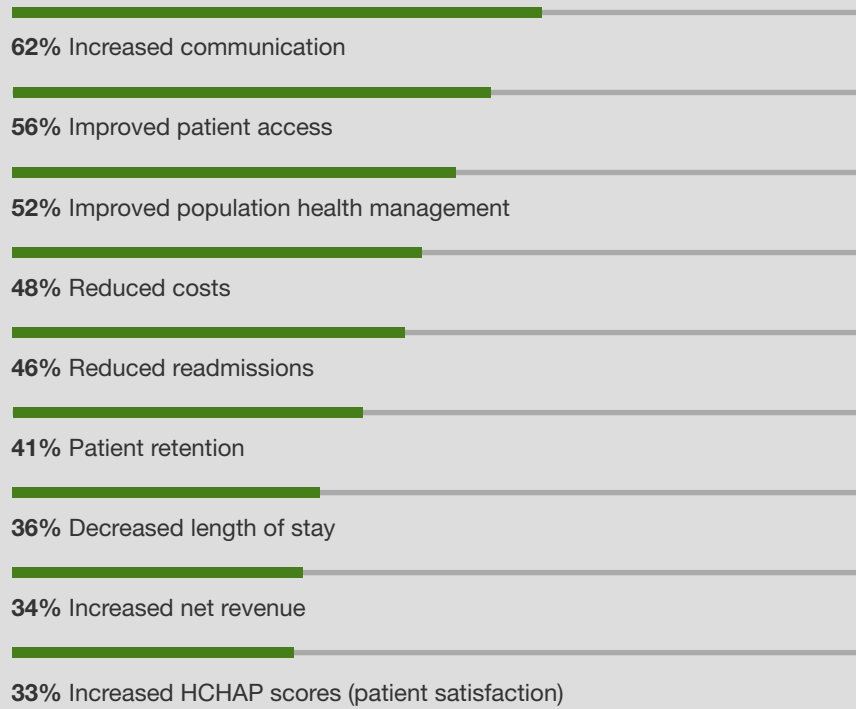
“Which of the following benefits has your firm experienced as a result of using analytics?” (Select all that apply)



Base: 308 BDMs in the healthcare industry responsible for technology investments in the US and China
 Source: A commissioned study conducted by Forrester Consulting on behalf of Intel, February 2017

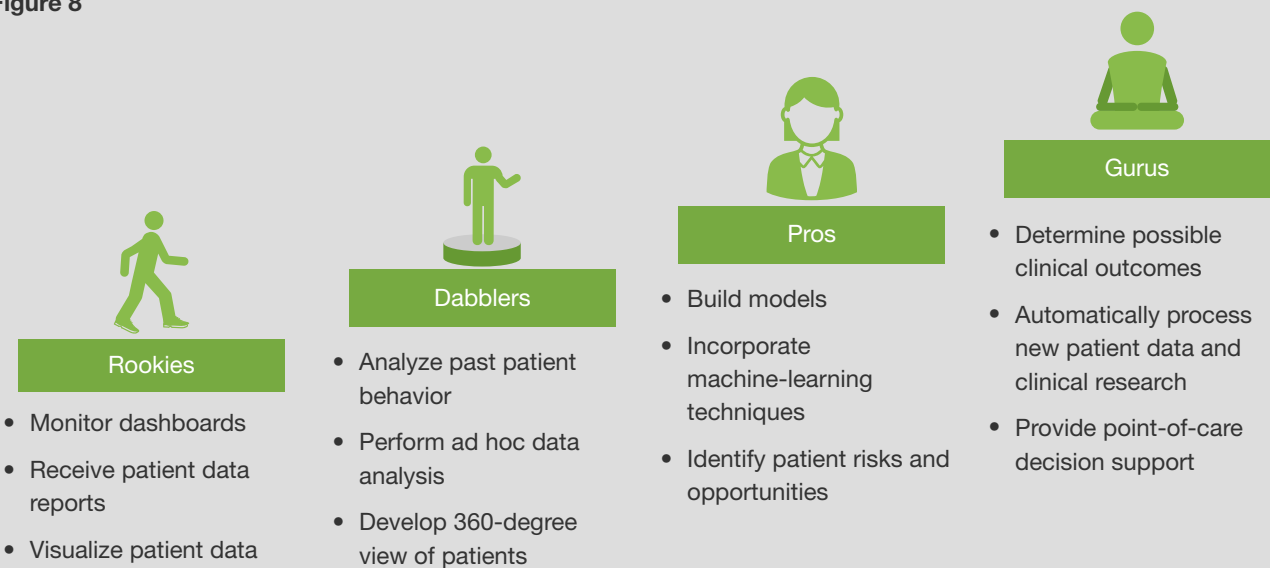
Figure 7

“Which of the following benefits has your organization experienced as a result of using patient engagement technologies?” (Select all that apply)



Base: 308 BDMs in the healthcare industry responsible for technology investments in the US and China
 Source: A commissioned study conducted by Forrester Consulting on behalf of Intel, February 2017

Figure 8



Source: Forrester Research, Inc

Key Recommendations

Today's leading healthcare provider organizations recognize their EHR systems are limited in their ability to derive patient and customer insight and drive engagement. As organizations struggle to deliver on the imperative to reduce the cost of care while improving quality and meeting customer needs and preferences, healthcare leaders are beginning to find systems of insight and engagement necessary additions to their BT framework.

Forrester's in-depth survey of healthcare business decision makers about their technology investments yielded several important recommendations:



Ingesting and deriving insight from big data is mandatory. In order to understand and engage patients more efficiently and effectively, healthcare organizations must build a 360-degree view of a patient by incorporating unstructured data from novel data sources such as social, environmental, location, consumer generated and IoT. Healthcare organizations have been limited in their ability to play with big data due to limitations in storage and security concerns around PHI handling. But solving these gaps is necessary.



Engaging in advanced analytics is necessary to make use of big data. Clinicians frequently raise concern about information overload when asked to engage with big data, especially from novel data sources such as consumer-generated data. Those concerns must be mitigated by engaging in advanced analytics that help organizations not only automate the processing of large data sets but also serve up actionable insights. An effective analytics solution should be accessible to end users, displaying relevant visualizations and hiding the complexity of the data from the provider unless they want access to it. Most healthcare organizations have used retrospective analytics, but predictive and prescriptive analytics are important tools to improve clinician efficiency while also better engaging patients. To access these unstructured data sources and get new insights out of your existing EHR data, modernize your analytics infrastructure and data warehouse to include a data lake that provides wider access to diverse data types.

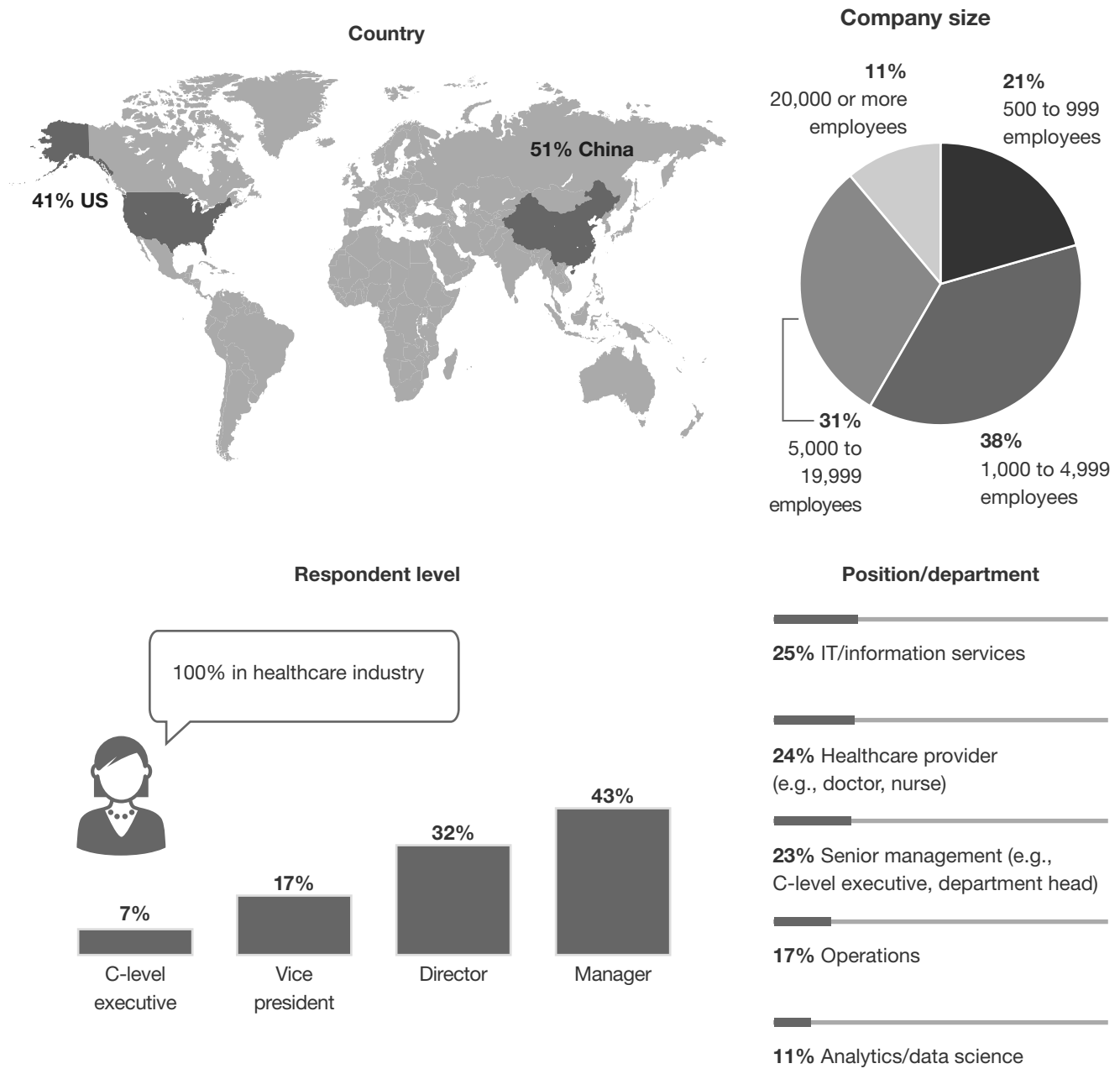


Healthcare organizations must leverage systems of engagement to see meaningful ROI. Healthcare business decision makers consistently remarked that patient engagement yielded the most meaningful improvements in cost and quality outcomes, but consistent deployment of systems of engagement lags other industries. Investments in engagement tools that meet patients and customers where they most want to interact are critical. Healthcare leaders should consider integrated, multifunctional platforms that can be leveraged across the care continuum, as well as enterprise health cloud vendors that can offer application development tools to deploy apps, mobility tools, and other engagement tools to personalize their offerings at scale.

Appendix A: Methodology

In this study, Forrester conducted an online survey of 308 business decision makers in the healthcare industry responsible for technology investments in the US and China. Survey participants included manager-level and higher decision makers in IT, senior management, operations, analytics, and healthcare provider roles. Questions provided to the participants asked about their goals, perceptions, and investment priorities, particularly in relation to analytics and patient engagement technologies. Respondents were offered a small incentive as a thank you for time spent on the survey. The study was conducted in February 2017.

Appendix B: Demographics/Data



Base: 308 BDMs in the healthcare industry responsible for technology investments in the US and China
 Note: Percentages may not total 100 because of rounding.
 Source: A commissioned study conducted by Forrester Consulting on behalf of Intel, February 2017

Appendix C: Supplemental Material

RELATED FORRESTER RESEARCH

“Vendor Landscape: Healthcare Analytics Q1 2017,” Forrester Research, Inc., February 9, 2017

“Artificial Intelligence Will Help Healthcare Understand And Engage Its Patients,” Forrester Research, Inc., February 6, 2017

Appendix D

ENDNOTES

¹ Source: “Vendor Landscape: Healthcare Analytics Q1 2017,” Forrester Research, Inc., February 9, 2017.

² Forrester asked respondents to self-assess their success against common healthcare metrics, as well as relative to their peers. We evaluated these responses against adoption plans for various types of analytics and found that those who rated patient engagement as “better than average” were 47 percentage points more likely to have metrics surrounding physician/network/contract performance when compared with those who rated their patient engagement as “worse than average.” Similarly, those with better-than-average patient engagement were 24 percentage points more likely to use value-based performance metrics than those with worse-than-average patient engagement. Finally, those who analyze disease registries were 8 percentage points more likely to have exceeded their goals for risk-adjusted mortality rates.

^{III} Source: “Artificial Intelligence Will Help Healthcare Understand And Engage Its Patients,” February 6, 2017.