



BEYOND
INTERVENTION

PERSONALIZED
VASCULAR CARE
THROUGH
TECHNOLOGICAL
INNOVATION

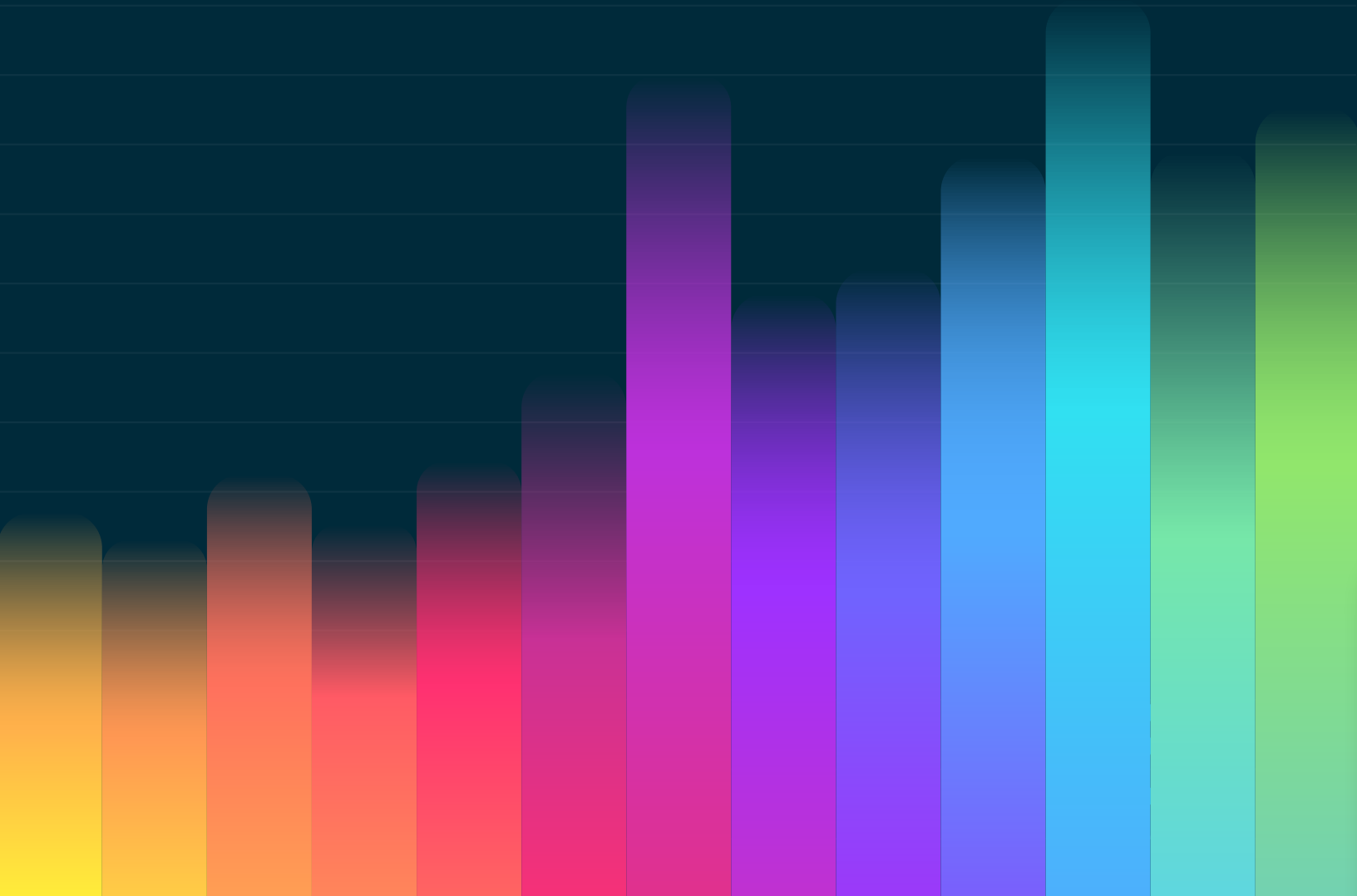


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INTRODUCTION

Cardiovascular diseases (CVD) remain the leading cause of death worldwide, claiming around 18 million lives annually.¹ This equates to over 300 million life-years lost and a further 35 million years lived with disability due to CVD.^{2,3} With a rapidly aging global population (by 2050, one in six people worldwide will be 65 or older⁴) and the explosion of CVD and its risk factors in low- and middle-income countries (where approximately 80% of global deaths occur),⁵ the burden of CVD will continue to grow.

At the same time, today's healthcare systems have never been more challenged: the fragmentation of teams and communications, economic challenges and disjointed data streams across the care continuum have resulted in care providers who feel overwhelmed and patients who don't believe their unique conditions are fully understood. **Further, healthcare systems tend to overemphasize “intervention” and “fixing things,” rather than harnessing the power of data to optimize care across the entire patient journey – before, during and after intervention.** These factors lead to diminished patient experiences and potentially poorer outcomes – driving even greater costs for health systems and society.

The treatment of CVD worldwide has therefore reached an inflection point with the convergence of these macro trends, presenting an urgent need for novel and innovative solutions. This problem is at the core of new research recently conducted by Abbott. **We asked over 1,400 patients, physicians and healthcare executives across nine different geographies to share their insights into the state of vascular disease care today – and into how technology could help remove the barriers to optimal, tailored, patient-centric care.**

Cardiovascular diseases (CVD) remain the leading cause of death worldwide, claiming around 18 million lives annually.¹

“Abbott continues to lead the development of transformative imaging technologies that increase visibility and limit the burden of vascular disease,” says Chuck Brynensen, senior vice president and president, Abbott's Vascular Division. “This new research studies the relationship between data, technology and patient outcomes. We uncovered how utilizing the latest data-driven technologies can increase visibility into patient care, allowing physicians to create a personalized treatment plan that will lead to better patient outcomes and, most importantly, improve their quality of life.”

Four high-level observations emerged from our study:

- 1 Patients are frustrated by the level of care they're receiving – they understandably want a *personalized* healthcare experience “tailored for me,” across the care continuum.
- 2 Physicians lament the lack of time they have to spend with patients, their limited visibility into patient adherence to treatment and lifestyle changes, and challenges with other key factors that influence the quality of care they can provide.
- 3 Administrators are pressured to deliver patient satisfaction and reduce costs across multiple departments.
- 4 Diagnostic and data-driven technology holds the promise to move care from a point-in-time, intervention-only focus to a more holistic “whole patient” view by improving the accuracy of diagnosis, appropriate interventions as required, and evidence-based post-procedural care.

By focusing on the *whole* patient, and by placing him or her at the center of the healthcare world, providers can see beyond the intervention *alone*. **As a result, rather than appealing to medical devices/tools or individual treatments, the industry can create an ecosystem that will benefit all stakeholders: better care for individuals, better efficiency for healthcare systems and more appropriate deployment of resources for governmental agencies (Figure 1).**⁶ Such mutual benefits can be attained only by sharing the inherent responsibilities: doctors providing the best care for their patients, including creating conditions that enable patients to adhere to prescribed treatments and lifestyle modifications; and both the broader healthcare networks and industrial partners sharing and facilitating this vision.

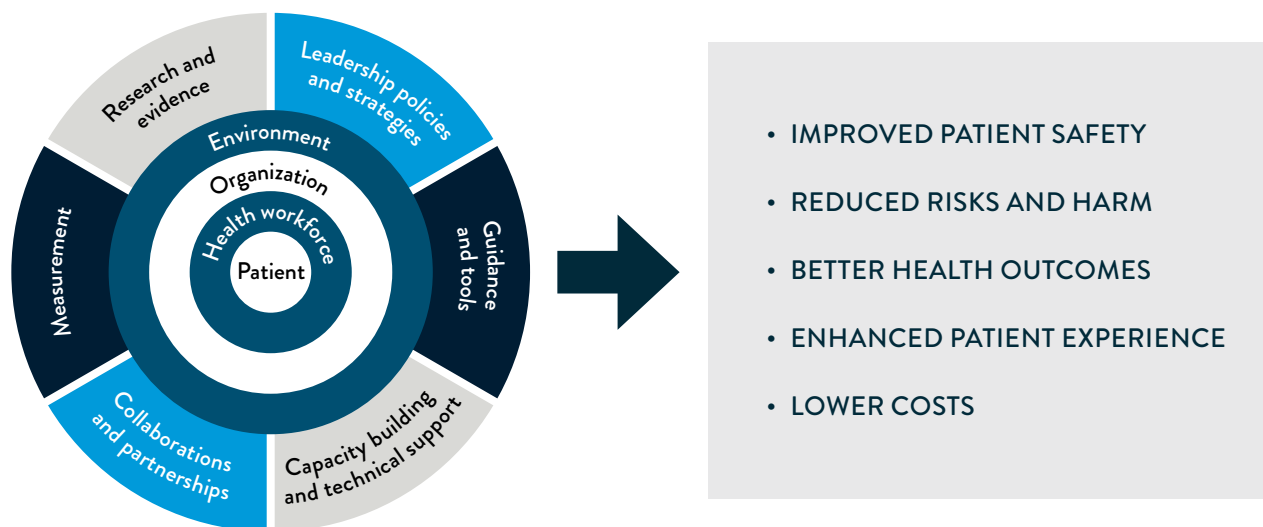


Figure 1: Patient-centric healthcare resonates throughout the care community, benefiting all stakeholders.

Source: World Health Organization

“Adopting a more holistic view of the healthcare world and putting the patient at the center of it gives us the unique opportunity to align all stakeholders’ needs,” commented Dr. Nick West, chief medical officer, Abbott’s Vascular Division. “Although device companies have traditionally focused on the device and its deployment/utility in an intervention, such a narrow vision does not adequately capture the diverse needs of individual patients, their treatment physicians and the healthcare systems that support them.”

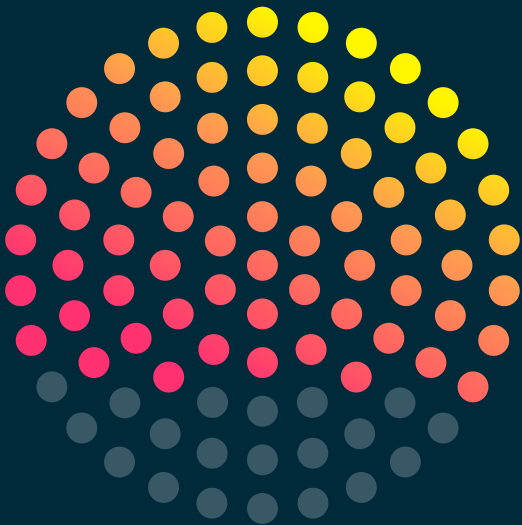
PATIENTS WANT MORE INDIVIDUALIZED, PERSONALIZED CARE

But what does “personalized” healthcare look like? From a vascular patient’s perspective, our survey suggests that “personalized healthcare” comprises the following five critical elements:

- 1** More face-to-face interaction and time with their doctor, so that patients feel confident that all of their concerns are being considered;
- 2** A consultative, two-way patient-doctor relationship, with the patient playing an active role in shared decision-making;
- 3** An individualized treatment plan based on the doctor’s ability to review relevant data pertaining to successes achieved with similar patients (“How did patients like me get better?”);
- 4** Effective and seamless information-sharing among the primary care provider, hospital specialists and healthcare systems, as well as with individual patients themselves via computer or smart applications; and
- 5** The ability for the doctor to monitor the patient’s progress remotely and provide information to verify that the personalized treatment is working, and to pick up early warning signs of relapse or deterioration.

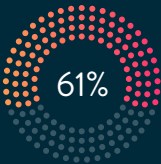
As seen in a 2018-2019 survey conducted by the brand consulting firm Monigle,⁷ “healthcare consumers’ emotional needs are just as important as their functional needs when it comes to decision-making. People don’t just want to feel cared for – they want to feel cared for on an individual level.”

Patients have confidence in physicians' decision-making, but they feel technology can help deliver more **personalized** care.



79% of patients believe that their doctor knows the correct treatment plan for them.

Doctors can take several steps to improve their patients' confidence in their decision-making abilities:



Using new technologies that monitor patients' progress and evaluate whether a treatment is working
selected by **61%** of patient respondents



Keeping up to date on the latest research
selected by **55%** of patient respondents

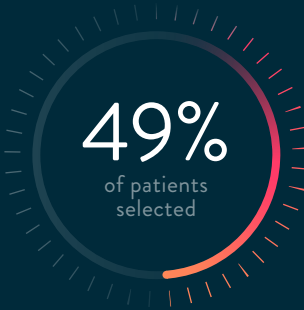


Having experience with similar situations
selected by **54%** of patient respondents

Areas where patients believe technology could be leveraged to deliver better care:



Helping the doctor understand all the latest approaches to treatment to see exactly what is **right for each patient**



Forming an understanding of a patient's **individual condition** and measuring their unique risks



Helping the doctor see **where** intervention is required



Supplementing the doctor's experience

“The ability to meet patients’ emotional needs is directly tied to physicians’ awareness of those patients’ underlying conditions,” explains Dr. Natalia Pinilla-Echeverri, interventional cardiologist at Hamilton Health Sciences/ Niagara Health and assistant professor at McMaster University. “There is therefore a real need for physicians to be aware of any baseline conditions that could contribute negatively to therapeutic plans, but unfortunately, most medical records are not unified even at a city level.”

Patients’ desire for personalized, highly tailored care could challenge healthcare administrators to rethink the one-size-fits-all programs they’ve designed to help control costs. **The ultimate goal for all stakeholders should be improving patient experiences, outcomes and value throughout the care continuum.** For their

part, 88% of administrators in our survey named “patient satisfaction” as highly important to the overall procedure experience in the hospital. The importance of maximizing patient satisfaction extends beyond hospitals – according to US healthcare industry estimates, the departure of a dissatisfied patient can result in a loss of more than \$200,000 over a practice’s lifetime.⁸ Of course, another emotional and functional driver of patients’ satisfaction is having confidence in their care provider’s ability to address their individual/personal situation. In Abbott’s survey, 79% of global patient respondents indicated that they either “strongly” or “somewhat” agree that their “doctor usually knows the treatment plan for me is absolutely correct.”

According to our survey, physicians can still take several steps to improve patients’ confidence in their decision-making abilities. The top three among global patient respondents are:

61% “Using new technologies that monitor my progress and provide information to show that the treatment is working”

55% “Keeping up to date on the latest research”

54% Being “experienced with similar situations”

“

“There is therefore a real need for physicians to be aware of any baseline conditions that could contribute negatively to therapeutic plans, but unfortunately, most medical records are not unified even at a city level.”

Dr. Natalia Pinilla-Echeverri
Hamilton Health Sciences/Niagara Health

”

When it comes to new diagnostic and treatment technologies, surveyed vascular patients view their biggest benefits to be:

55% “Helping the doctor to understand all the latest approaches to treatment to see exactly what is right for me”

54% “Helping the doctor to see where intervention is required”

49% Also high on vascular patients’ priority list is technology’s ability to improve a doctor’s “understanding of a patient’s individual condition and measure my risks”

40% “Supplement the doctor’s experience”

One thing is clear: regardless of their confidence level in their doctors’ decision-making, vascular patients strongly desire the ability to “weigh the options my doctor provided and express a preference” pertaining to their treatment (an opinion stated by 58% of patient survey respondents globally). Although patients would like to have more input on their treatment, this approach does introduce potential complications, according to Dr. Koen Deloose, head of the Department of Vascular Surgery at AZ Sint Blasius

Dendermonde (Belgium). “While it’s fine that patients want more collaboration with their doctor, this also means that they must accept responsibility for their actions, which may carry legal consequences,” he explained. “For example, an aftercare app might recommend walking exercises after treatment. If the patient’s leg develops critical limb ischemia, who’s to blame? Such legal responsibilities need to be addressed, and consent clearly defined.”



Legal responsibilities need to be addressed, and consent clearly-defined.

Dr. Koen Deloose

Head of the Department of Vascular Surgery at AZ Sint Blasius Dendermonde (Belgium)



ONE THING IS CLEAR:

Regardless of their confidence level in their doctors’ decision-making, vascular patients strongly desire the ability to “weigh the options my doctor provided and express a preference” pertaining to their treatment (an opinion stated by 58% of patient survey respondents globally).

From their standpoint, physicians and administrators acknowledge several barriers to providing the kind of personalized experience that vascular patients are seeking:

- Scarcity of *time available to spend with each patient* (not allowing a more consultative approach to care): selected by 55% of physicians and 44% of administrators globally;
- *Scarce resources for patients to make lifestyle changes* that could improve outcomes: named by 44% of physicians and 33% of administrators globally;
- Lack of appropriate tools to aid with *medication adherence and lifestyle changes*: mentioned by 43% of physicians and 47% of administrators globally;
- *Lack of insight into aftercare and patient adherence* with treatment: selected by 42% of physicians and 45% of administrators globally;
- *Lack of appropriate post-care facilities* for recovery, such as cardiac rehab centers: named by 41% of physicians and 31% of administrators globally.

Nevertheless, physicians and administrators (83% and 92%, respectively) primarily agree that advances in diagnostic and treatment technologies related to CVD in general (cardiovascular and peripheral arterial disease) have “translated”/“definitely translated” to tangible improvements in patient care.

Nevertheless, physicians and administrators (83% and 92%, respectively) primarily agree that advances in diagnostic and treatment technologies related to CVD in general (cardiovascular and peripheral arterial disease) have “translated”/“definitely translated” to tangible improvements in patient care. Such technology-driven benefits include reductions in the need for intervention, enablement of more accurate diagnoses, identification of patient risk factors and co-morbidities, and assurance that patients are treated correctly from the start, thereby reducing recurrent hospital admissions.

Technology and data have critical roles to play in enabling a patient-centric healthcare environment that benefits all stakeholders. This will require a shift from the current fee-based, intervention-driven approach to one that embraces value-based care through new, technology-fueled services provided by physicians.

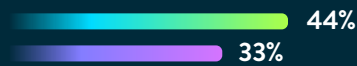
Physicians and administrators find technology has improved care, despite some persistent barriers.

● Physicians ● Administrators

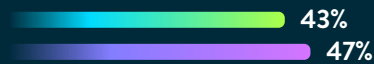
Barriers to better care



Scarcity of time available to spend with each patient (not allowing a more consultative approach)



Scarce resources for patients to make lifestyle changes that could improve outcomes



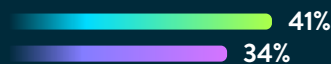
Lack of appropriate tools to aid with medication adherence and lifestyle changes



Lack of insight into aftercare and patient adherence with treatment



Lack of appropriate post-care facilities for recovery, such as cardiac rehab centers

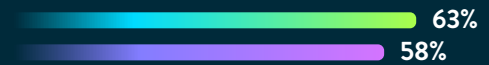


Lack of staff resources to enable patients to be treated earlier

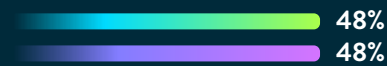


Misdiagnoses or inability to properly diagnose patients

How technology has improved care



Ability to provide more accurate diagnoses



Ability to treat the patient correctly from the start, reducing readmissions and costs



Pharmacological advancements that reduce intervention need



Earlier identification of co-morbidity risks



Better understanding of patient risk factors



Ability to personalize care based on data-driven insights



More patient involvement in their health through consumer digital health devices/wearables

PHYSICIANS LIVE IN A DATA WORLD – AND NEED BETTER WAYS TO HARNESS IT

Doctors' actions are guided by the data they have available to them at any given time. While technology innovations now enable anyone with a smart watch to determine when to seek cardiac care, the patient experience ultimately is defined by how their providers gather, integrate and interpret data.

However, while technological advances have improved physicians' ability to diagnose and treat CVD, their full potential has been blunted by persistent data gaps across the healthcare system. According to patient respondents in our survey, those gaps include “a lack of data on patients similar to themselves.” Patients also feel that their doctors are failing to leverage rapidly evolving technologies to effectively communicate and share data with other doctors and specialists. As a result, data-driven insights fail to deliver personalized care.

Our survey results highlight that patients especially worry about the lack of communication between care teams, citing this issue as a major cause of the data gap when it comes to improving care and patient experience – and physicians agree. One of our US physician survey respondents related, “The biggest barrier is the complex environment that is healthcare. Primary care providers [PCPs] of today aren't acting as the true quarterback [advocate] of the team. Hospitalists do much more of that function, yet they work shifts and do not know the patient the way the PCP does. We also order way too many consults for fear of litigation.”

There was no clear consensus from physicians in our survey about which data gap(s) need to be addressed soonest. Instead, they cited many, including the following:

43% “Treatment and outcomes data tied to genetic biomarkers”

42% “How different treatment techniques impact clinical outcomes”

42% “Total cost of care, including staff costs and cost of follow-up”

41% “Treatment plans based on soft measures such as lifestyle and medication adherence”

38% “Genetic mapping”

The following quote from a UK physician may paint the best picture of the data-driven patient journey: “We need to have data presented on all the options, with likely efficacy, cost, side effects, etc. The ‘art’ is then choosing which option the patient prefers and will suit them individually best.”

In the words of one of our surveyed US physicians: “You can have algorithms and flow charts, but each patient is different... Ultimately, it is the doctor’s responsibility to distill all information to come up with a personalized, tailored approach for a particular patient.”

Patients, meanwhile, have their own opinions about the kinds of data that they perceive as being most valuable to helping doctors determine a personalized treatment plan that delivers more successful patient outcomes. **According to our survey, “data that lets my doctor see my problem and act on it in a tailored-for-me-manner” was the No.1 overall choice among patient respondents (cited by 72% globally).** Also ranking near the top were “data results from specific procedures or treatments my doctor is recommending” (named by 62% globally); “data from clinical studies” (51%); and “data that monitors how others like me have gotten well” (49%).

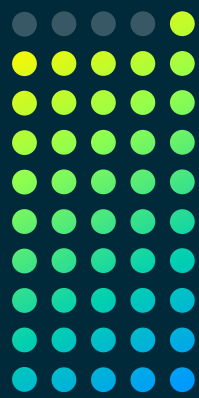
These high numbers generally point to patients’ comfort with having their personal health information collected anonymously for sharing with other patients: 92% agree or strongly agree that this capability is important for future generations, and 90% strongly agree or agree that “I think we can all benefit from data from other patients as science evolves.”

To effectively plug data gaps in the healthcare system, however, physicians and administrators will need to resolve a key issue: consumers and patients are increasingly wary about personal data protection. In our survey, 23% of patient respondents said they “strongly agree” or “agree” with the statement, “I don’t want my information shared, even if it’s private”; another 21% said they neither agreed nor disagreed with that sentiment.⁹

In our survey, 23% of patient respondents said they “strongly agree” or “agree” with the statement, “I don’t want my information shared, even if it’s private”; another 21% said they neither agreed nor disagreed with that sentiment.⁹

“Health data can now be found in organizations outside of healthcare itself – whether it’s patient-generated data from digital health sensors or even novel data sources such as social media posts or their conversations with chatbots,” explained digital health futurist Maneesh Juneja. “As a result, we must find a path that enables patients to trust that data sharing doesn’t put them at risk of harm. We need a health data ecosystem that is built upon truth, transparency and trust.”

Patients are overwhelmingly supportive of **sharing their data**, especially for personal and societal benefits.



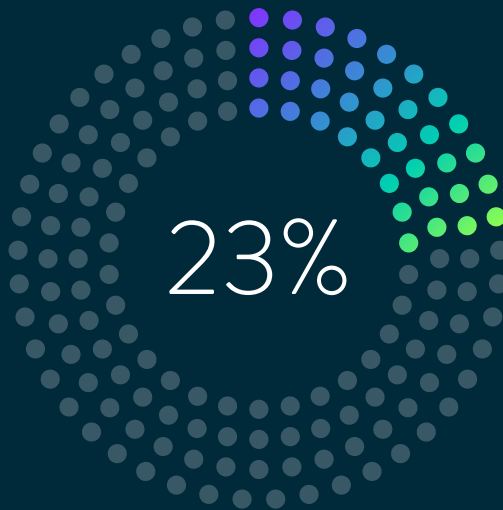
92%

of patients think sharing their personal health information is **important for future generations.**



90%

of patients think **we can all benefit** from shared patient data as science evolves.



23%

Only **23%** of patients would rather their information not be shared even if it's private.

The data for the three answers above total more than 100% as respondents could choose more than one answer

What data would you want your doctor to use in determining a treatment plan for you?



72% of patients selected

Data that lets my doctor see my problem and act on it in a tailored-for-me manner



62% of patients selected

Data results from specific procedures or treatments my doctor is recommending



51% of patients selected

Data from clinical studies



49% of patients selected

Data that monitors how others like me have gotten well

ADMINISTRATORS NEED TO DELIVER MORE VALUE—BY LOOKING ‘BEYOND INTERVENTION’

Without a doubt, administrators desire successful outcomes that boost the number of satisfied and healthy patients while reducing hospital readmissions and costs.

Perhaps not surprisingly, therefore, our survey showed that administrators place a greater priority on plugging data gaps pertaining to outcomes and total cost of care. For example, “treatment and outcomes data tied to genetic biomarkers” ranked No.1 for administrators globally (cited by 49% of respondents). Other key gaps were “outcomes data tied to total cost of care” and “total cost of care, including staff costs and costs of follow-up” (each named by 41% of administrators globally).

To fill these gaps and deliver maximum value, administrators must co-create an integrated care solution that can manage products and services across the entire patient journey – not just at the point of an intervention. As such, healthcare systems should emphasize “delivering wellness to patients” above all else.

However, greater change may be required to effect such a change: financial healthcare incentives typically are based upon “fixing things,” while benefits dedicated to preventative measures and medical therapies are small in comparison. A greater focus on wellness and prevention has the potential to lighten the burden on providers – and to deliver a higher quality of life for patients, also at lower cost.

One potential solution lies in administrators and physicians harnessing new technologies and targeted data to “see the whole patient” – to connect the dots across the care continuum before, during and after intervention for precise healthcare delivery.

“Too often, the focus is on refining the procedure, but less on the whole patient experience,” said Dr. Timothy D. Henry, medical director, The Carl and Edyth Lindner Center for Research and Education. “Research and innovation are critically important not just for the device or procedure, but for the entire process of care – from recognition to long-term follow-up.”

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Dr. Timothy D. Henry
Medical Director, The Carl and Edyth
Lindner Center for Research and Education

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Our survey indicates that administrators (and physicians) understand the importance of the “whole patient” approach:

In all markets, administrators and physicians believe that accurate decisions have the most impact either *at diagnosis* (named by 62% of administrators and 57% of surveyed physicians globally) or *when determining the treatment pathway* (administrators: 54%; physicians: 57%). They place less importance on the intervention itself (administrators: 39%; physicians: 22%).

- ▶ Administrators and physicians believe accurate decision-making has a lesser – but still significant – impact during the *aftercare* phases:
 - Immediately after procedure: administrators, 18%; physicians, 11%;
 - First 30 days post-procedure: administrators, 13%; physicians, 17%;
 - Ongoing care after first 30 days: administrators, 10%; physicians, 20%.
- Administrators view “at diagnosis” (56%) and “when determining the treatment pathway” (52%) as the points in time where technology can make the greatest impact on improving decision-making.
- Most physicians also believe that technology has the greatest potential to help improve decision-making *prior to intervention* – either at diagnosis (54%), when determining the treatment pathway (52%) or prior to diagnosis (42%).
- The points at which physicians feel they have “the most personal impact on patient outcomes” are “when determining the treatment pathway (57%)” and “at diagnosis” (54%); they would like to play an even larger role during these periods, as well as “prior to diagnosis” (37%) and in ongoing patient care beyond the first 30 days (24%).¹⁰
- Physicians would like to have more control (direct involvement) over patient care primarily prior to diagnosis (43%), when determining the treatment pathway (42%), at diagnosis (34%) and in ongoing patient care beyond the first 30 days (29%).

According to Dr. Pinilla-Echeverri, while precision medicine is the top priority for physicians and administrators, it remains a nebulous concept: “The idea is to tailor and target therapies that improve the ‘precision’ of therapeutic impact in a particular patient,” she explained. “Patients need to know the success rate and efficacy of the treatment they have been offered in order to truly share decision-making. The consent process entails informing patients of a procedure’s details, but critically also its success and complication rates, and this approach is not universally adopted.”

Physicians and administrators believe that several diagnostic and treatment technologies can help improve outcomes across the care continuum, led by imaging tools that enable more accurate interventions (named by 63% of physicians and 55% of administrators globally).

Other technologies perceived as most useful by surveyed physicians and administrators include:

PHYSICIANS	ADMINISTRATORS	
41%	44%	Monitoring tools for better understanding patient adherence to treatment
39%	34%	Telemedicine tools
21%	35%	AI technologies that allow case comparisons against broader populations

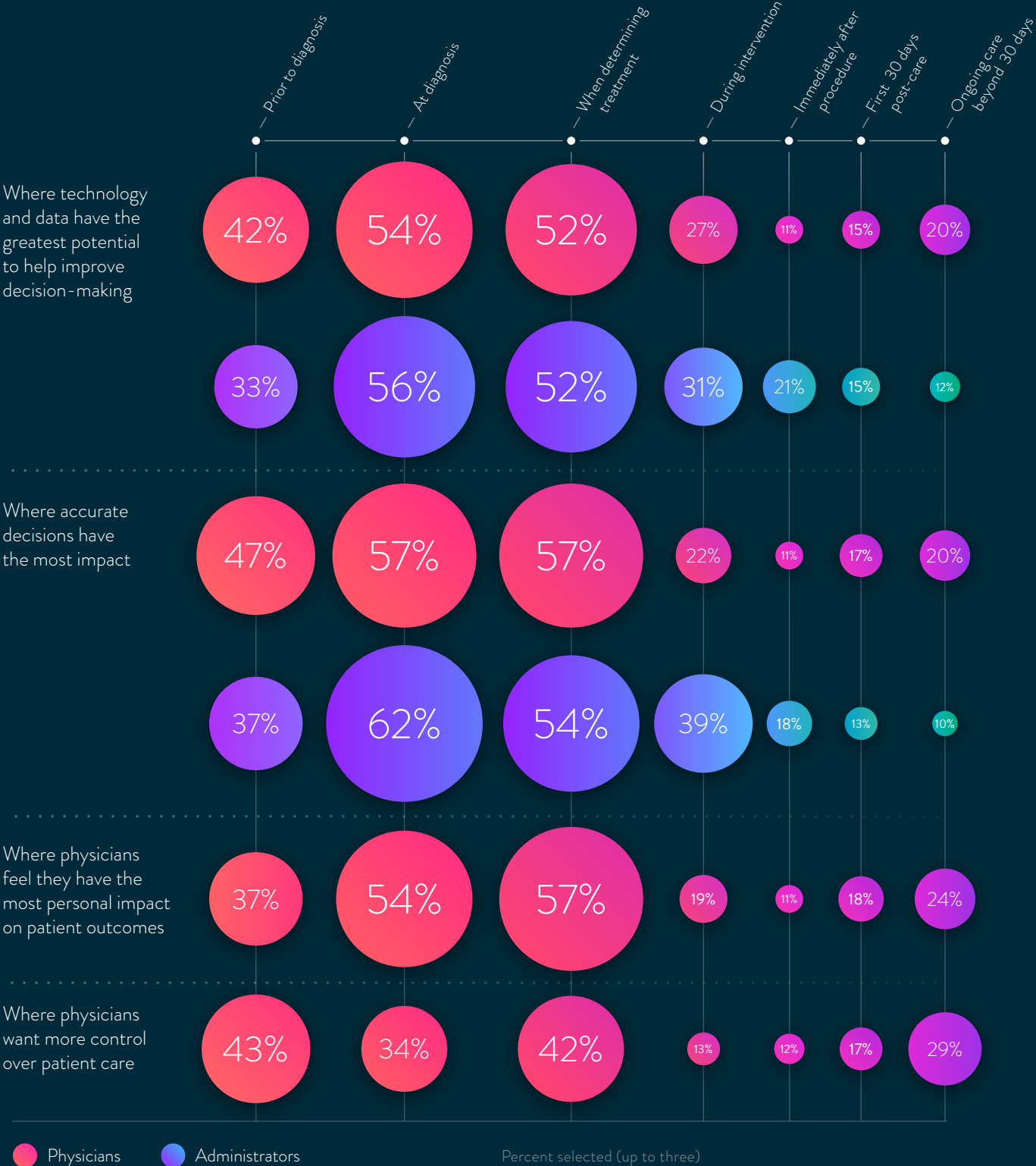
In particular, telemedicine technologies have dramatically increased patients' access to tailored medical advice. "The COVID-19 pandemic has given us the chance to practice medicine virtually as never before," explained Dr. Pinilla-Echeverri. "Telemedicine has proven a couple of very positive concepts. First, patients can now get more involved in their self-assessment (vitals, weight, diet, exercise) during virtual office visits thanks to new medical devices available on the market. And second, physicians now have increased availability, as telemedicine sessions aren't necessarily restricted by location or time. Of course, telemedicine could also create the expectation for 24/7 availability of their doctors, which isn't feasible long-term."

"The COVID-19 pandemic has revealed how physicians have used data to overcome the challenges of not being able to see the patient face to face," Juneja added. "It has accelerated a shift toward new models of care that had already begun. Now is the time to think beyond even standard telemedicine involving a video call. What sensors do patients need in their own home? How do we enable consistent care to be provided across modalities, whether it is from a human doctor, a chatbot or a smart speaker?"

Telemedicine, monitoring and AI technologies should be accompanied by adequate industry-sponsored training – something 39% of physicians and 37% of administrators globally believe is an underutilized resource that could assist in improving patient throughout and staff workflow. With proper investment in training and physician resources, these technologies could be a powerful key to help provide the individualized treatment patients crave while breaking down the silos of the fragmented care continuum.

With proper investment in training and physician resources, these technologies (telemedicine, monitoring and AI) could be a powerful key to help provide the individualized treatment patients crave while breaking down the silos of the fragmented care continuum.

Across the care continuum, physicians and administrators see the most opportunity for technology and accurate decisions before intervention.



To ensure healthcare accessibility for all populations, including the poor and underserved, technology companies must place greater emphasis on developing solutions optimized to reach them. For example, according to research conducted by the Pew Research Center¹¹ and the Commonwealth Fund,¹² mobile phone usage – with reliable Internet access – is high even among the poor and underserved. Why not prioritize this channel to deliver the healthcare technologies and services these communities so desperately need? This “inclusion first” approach makes far more sense than waiting for certain technologies to “trickle down” to underserved communities over time.¹³

A truly inclusive approach needs to extend beyond technology itself. “Many make the mistake that it’s just about investing in technology,” Juneja explained. “The reality is that people, process and policy have to move in tandem in order for the benefits of new technology to be fully realized. Technology is a tool, just an enabler. The question for all of us to answer is, what kind of future do we want technology to enable?”



The reality is that people, process and policy have to move in tandem in order for the benefits of new technology to be fully realized.

Maneesh Juneja
Digital Health Futurist



CONCLUSION

There appears to be little doubt that technology can bring doctors closer to each other and closer to patients. By providing the right technological assistance, when and where needed, the medical technology industry can enable more precise diagnoses, correct treatment strategies and lasting patient outcomes that promote wellness.

Imagine the possibilities that could be unlocked through improved data insights across a patient’s care journey. Data-driven decision-making has the potential to enable providers to consider and treat the patient more effectively – from understanding risk factors and co-morbidities, to providing precise diagnoses, to making the right treatment decisions, to ensuring post-treatment plan adherence.

The future involves departing from the past. The medical technology industry has an opportunity to foster greater involvement of patients in shaping the advances that are yet to come. This is an era where physicians, administrators and all other stakeholders can come together so that personalized patient experiences, improved efficiencies and high-quality care become the default standard. Together, we are on the verge of building a true care continuum for patients, rather than a series of unlinked episodes or interventions.

ABOUT THE RESEARCH

To obtain a global view of how cardiovascular treatments could be improved by employing technological advances and better data visibility, Abbott surveyed 1,432 physicians, administrators and patients between December 2019 and January 2020. Respondents to the online survey represent nine countries: the United States, the United Kingdom, China, Japan, France, Germany, India, Italy and Brazil. Characteristics of the respondents were as follows:

WHERE	PHYSICIANS	ADMINS/DECISION MAKERS	PATIENTS
	HOW MANY		
United States	n = 60	n = 31	n = 206
Brazil	n = 37	n = 21	n = 100
United Kingdom	n = 30	n = 5*	n = 100
France	n = 41	n = 3*	n = 100
Germany	n = 39	n = 6*	n = 100
Italy	n = 37	n = 9*	n = 100
China	n = 34	n = 21	n = 100
India	n = 25	n = 30	n = 100
Japan	n = 42	N/A	n = 55
TOTAL SAMPLE	345	126	961

FULL SAMPLE SIZE: 1,432

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Physicians quoted within the article received honoraria from Abbott.

* Sample sizes small, please view results directionally

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