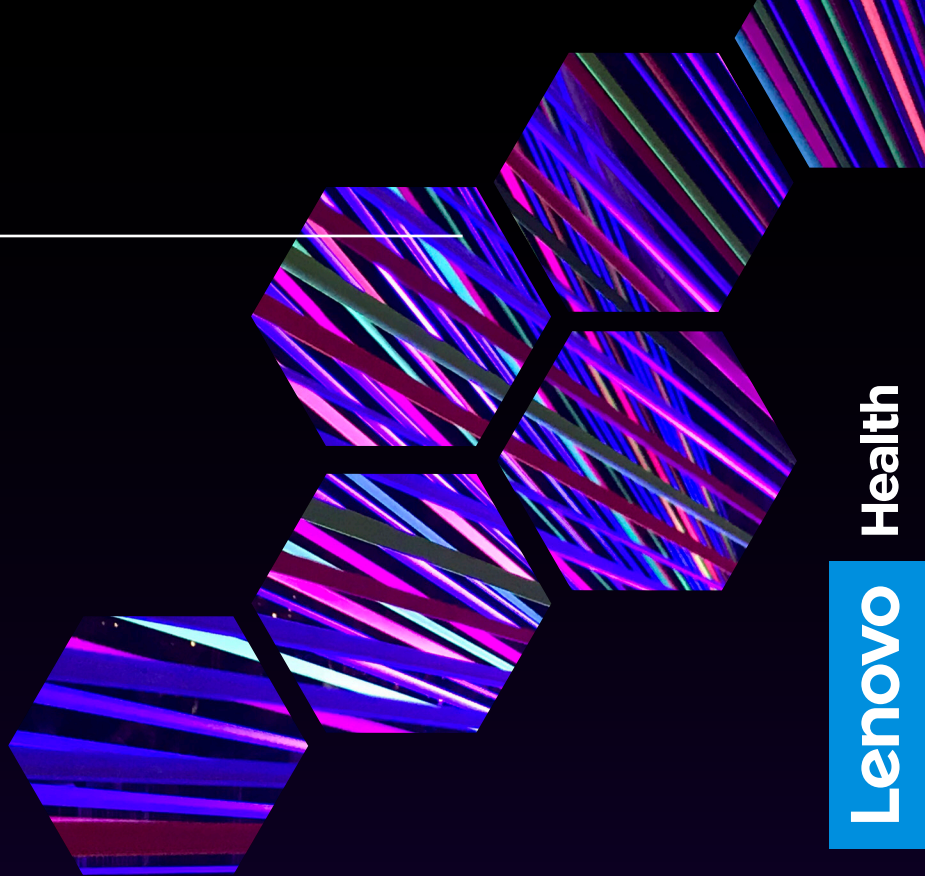


# VIRTUAL REALITY MEETS PROVIDER REALITY



Health  
Lenovo

**Will 2019 be the tipping point for healthcare-centered virtual and augmented reality tech, or a wait-and-see year reserved for early adopters? Three key indicators provide the clues and contextual evidence your organization needs to confidently pull the trigger on embracing augmented and virtual reality technology.**

Virtual reality (VR), augmented reality (AR), big data, and the internet of medical things (IoMT) are a few technologies challenging and changing the healthcare status quo. These technologies shape a new world of patient engagement, offering providers (and payers) clinically proven tools that deliver unexpected value.

Healthcare organization interest in leveraging tech-powered patient engagement is growing. Healthcare spending on virtual and augmented reality solutions will surpass \$1 billion this year and reach \$5 billion by 2025.<sup>1</sup> Some analysts track faster growth, showing VR/AR adoption reaching \$5 billion by 2023.<sup>2</sup>

Is 2019 the year healthcare leaders gear up their VR programs? This guide examines three market indicators that “green light” VR adoption as a mainstream modality. It also explores valuable patient engagement tools healthcare organizations successfully leverage to launch reality augmentation trials and proof-of-concept engagements.

## IT'S TIME TO MOVE YOUR VR PILOT FORWARD

VR is a versatile technology that significantly impacts healthcare education and patient engagement. These leading indicators signal mainstream market readiness for augmented and virtual reality adoption and are your signal to get your pilot underway!

- **Proven efficacy.** VR has moved beyond patient distraction to deliver a range of proven, accessible, and transformative therapeutic solutions. A growing body of evidence is creating the momentum needed to drive widespread clinical adoption.
- **Broad market adoption.** Changing patient demographics, more sophisticated clinical expectations, and a growing number of digitally savvy consumers are fueling market demand.
- **Measurable patient and provider benefits.** In addition to transforming patient engagement, AR/VR technologies offer healthcare delivery organizations real value by reducing costs, improving outcomes, and expanding access to care.

# 1 VIRTUAL REALITY, REAL-WORLD RESULTS: PROVING EFFICACY

*Think Beyond Gaming Stereotypes*

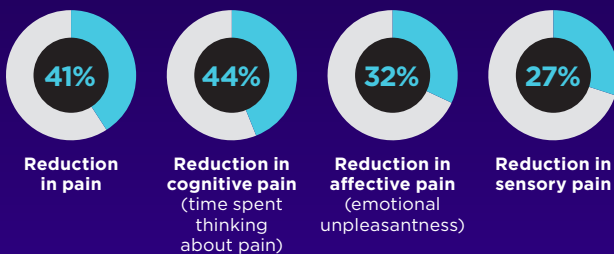
VR is going mainstream. For organizations just beginning VR evaluations, timing is great.

The rapid expansion of treatment studies and application-level implementations signals that immersive experiences are no longer an early-adopter, research-phase technology. New adopters have access to a robust and growing number of use cases and evidence-based clinical results, all signaling broad application and sustainable, demonstrable value. The wide range of applications, from chronic care management and pain attenuation to behavioral health and post-discharge instruction, make an investment in immersive experiences a positive step toward value-based precision care delivery.

## VR Delivers Real Value and Positive Patient Impacts

Valuable proof points now demonstrate VR's ability to improve the care experience, increase comprehension, and heighten self-efficacy across a wide range of patient populations. Augmented and virtual reality disrupt the patient engagement status quo to deliver true value.

**Pain management, pediatric distraction, patient compliance with discharge instruction, and behavioral health therapy represent the most significant growth opportunities for reality augmentation. In a study of pediatric burn victims, when using VR patients reported:**<sup>3</sup>



## VR Advances Mental Health Therapy

VR is being used to help desensitize patients suffering from Post-Traumatic Stress Disorder (PTSD) and social phobias. A meta-analysis of fourteen clinical trials found that VR treatment is effective for tackling spider and flying phobias. VR also has therapeutic value when treating patients suffering from anxiety disorders and depression.<sup>4</sup>

## VR Turns Frightening into Familiar

In addition to distraction and pain management therapy, healthcare teams leverage VR to reduce patient anxiety with unfamiliar hospital surroundings or unfamiliar medical procedures. Adaptive learning research shows that familiarizing a patient with the hospital setting and the upcoming medical procedure significantly reduces anxiety and improves overall satisfaction.<sup>5</sup> VR provides a patient with an immersive experience that transforms an unfamiliar experience or setting into a familiar and more realistic one.

Leveraging VR, patients can repeat an experience to build familiarity. Research shows that repeated exposure leads to continued reductions in stress and anxiety and increases in preparedness and satisfaction.

Pain management, mental health and behavioral health are all great examples, where patients slowly learn to cope or practice awareness techniques that usually require real-world scenarios. Research finds that VR's impact lasts beyond headset removal creating greater persistence of pain relief for patients.<sup>6</sup>

More clinical trials are needed, but it's clear that VR technology has an important role to play in patient engagement.<sup>7</sup>

## Market Investment Assures VR Tech Growth

Investment in VR is growing. VR's proven human factor impact and patient value has piqued the interest of venture capitalists and startup fund managers.<sup>8</sup> A rapid rise in funding interest is prompting hospitals and third-party companies to take notice and plan investment. Providers and administrators budgeting for VR/AR pilots and trial implementations often skip through early-stage evaluations, moving quickly to systemwide deployments.<sup>9</sup>

According to Deloitte, more than 150 companies across multiple industries — including more than 52 of the Fortune 500 — entered testing and/or deployment programs with AR/VR solutions.<sup>10</sup> Venture capital and corporate investments in AR/VR startups are increasing by orders of magnitude year over year.

Most market indicators point to a continued burgeoning investment opportunity for augmented and virtual reality in healthcare. Analyst Goldman-Sachs forecasts the market for AR and VR in healthcare is second only to gaming.<sup>11</sup> Its report estimates the healthcare AR/VR market will reach \$5.1 billion and foresees 3.4 million people adopting this new technology by 2025.

## 2 MARKET ADOPTION — ARE PATIENTS READY?

*Think Beyond the Traditional Demand Drivers*

### Patient Satisfaction Scores Soar with VR

User acceptance and adoption are critical to the success of any emerging technology. Nearly three in four patients (74.1%) have a positive perception of reality augmentation used in a healthcare setting.<sup>12</sup> Researchers evaluated VR used for pain and stress reduction; bed-bound individuals; women during labor; and patients undergoing chemotherapy, dialysis, radiation, and imaging procedures.

### Tailored Experiences Lead to Greater Patient Satisfaction

One of the most exciting aspects of VR is the flexibility it provides clinicians to deeply customize experiences helping to treat, educate and engage patients in the most personalized and impactful ways possible. Across all age groups, patient response to VR is positive and formative. Research shows that after two weeks, we remember 20% of what we hear, 30% of what we see, and up to 90% of what we do or simulate. VR improves a patient’s ability to understand, manage and live with their medical conditions reducing future interventions or delays in healing.

The quality of off-the-shelf VR content has also dramatically improved, and with it, the ability to transport patients away from a hospital room or doctor’s office to explore a world-famous art gallery, meet animated characters, practice new skills, enjoy on-demand concerts or visualize healthy behaviors.

### The Power of Rising Patient Satisfaction Scores

Studies show patient satisfaction increases with the use of virtual technology engagement, contributing to both acceptance and adoption. Following therapy that includes VR technology, patients consistently report positive experiences and reduced anxiety, and score up to 30% higher on treatment satisfaction surveys.<sup>13</sup>

As healthcare organizations plan point-of-care engagement strategies, patient satisfaction initiatives should be top of mind. The Centers for Medicare and Medicaid Services (CMS) link reimbursement rates to Consumer Assessment of Healthcare Providers and Systems (CAHPS) scores. Yet tailored engagement and improved satisfaction are not achieved simply through enhanced technology. Precision digital engagement breaks new ground in reaching patient satisfaction goals — a key performance indicator healthcare leadership teams measure and track.

### Changing Consumer Demographics

As population demographics change, virtual and augmented reality therapy offers additional care “tools” to providers that tailor engagement to patients. From millennials and digital natives to seniors with mounting chronic conditions, augmented reality therapy offers providers a new way to engage, improve compliance, and manage costs.

**In the U.S., 3.7 million seniors turn 65 annually. In 2019 and 2020, that number is expected to climb to 3.8 million.<sup>14</sup> Additionally, 90% of the growing 65+ population has at least one chronic condition.<sup>15</sup> Pair these two trends, and the need for flexible, cost-effective technology for care delivery becomes an obvious necessity.**

As an alternative to prescription drug therapy for pain management or to ease intensive chronic condition management, access to virtual reality technology opens new patient treatment and education pathways.

These data points illustrate the need for healthcare systems to prepare for a changing, tech-ready patient population. The market is ready, and 2019 is shaping up to be the year healthcare organizations embrace immersive technology to improve the health and well-being of the healthy, the sick, and the aged.

### 3 ADVANCE CARE DELIVERY GOALS THROUGH MEASURABLE PATIENT AND PROVIDER BENEFITS

*Think Beyond Reimbursement Question Marks*

In addition to transforming patient engagement, AR/VR technologies offer healthcare delivery organizations real value by reducing costs, improving outcomes, and expanding access to care.

#### Immersive Technology Improves Outcomes and Reduces Costs

Advancing common provider and payer goals (e.g., patient engagement, satisfaction, compliance) requires cooperative alignment. There are signs of progress that signal a bright future for VR as an effective vehicle to help providers reach key engagement and care delivery goals.

Most private insurers now cover e-visits, as required by 34 states and the District of Columbia.<sup>16</sup> Given VR's impact on chronic care management and patient satisfaction, the focus may rightly turn from a reimbursement discussion to the engagement and therapeutic benefits VR offers. Mounting evidence demonstrates that immersive technology improves patient satisfaction, reduces prescription drug use, shortens length of hospital stays, and achieves better health outcomes.<sup>17,18,19</sup>

The proven positive impacts of augmented therapy may be compelling enough to convince providers to move augmented reality technology deployment to the front burner.

#### Near-Early Adopter Advantages Still Exist

For providers still on the fence about VR technology, a *Harvard Business Review* study<sup>18</sup> may hold a final compelling financial key: Only 27% of companies and healthcare organizations proactively pursue an early-adopter advantage, but up to 20% of those who do experience growth rates of more than 30%. While VR adoption isn't quite mainstream, the early-adopter phase is closing. Near-early adopters may still have an opportunity to increase their revenue at twice the rate of followers and three times faster than late adopters.<sup>21</sup>

The most successful health organizations will adopt VR technology early and think broadly. As more augmented and mixed reality capabilities evolve, the use of the technology will be further diversified, making augmented reality a more mainstream, everyday opportunity for care delivery.

You don't need a crystal ball to see the future — but a virtual reality headset wouldn't hurt.

#### AR or VR? Yes, there is a difference.



**Augmented reality (AR)** is an overlay of digital objects and information into the user's field of view that does not occlude the visual field and permits unrestricted interaction with the real world.



**Virtual reality (VR)** is a completely digital immersive visual — and often auditory and tactile — experience that completely occludes or removes the user from sensing elements of the real world.

## Citations

<sup>1</sup> Grand View Research, “Augmented Reality (AR) & Virtual Reality (VR) in Healthcare Market Analysis by Component (Hardware, Software, and Service), by Technology (Augmented Reality, Virtual Reality), and Segment Forecasts, 2018 – 2025,” May 2017. Last referenced December 2018. <https://www.grandviewresearch.com/industry-analysis/virtual-reality-vr-in-healthcare-market>

<sup>2</sup> “The Augmented and Virtual Reality In Healthcare Market Was Valued At USD 769.2 Million In 2017 And Is Expected To Reach USD 4,997.9 Million By 2023, At A CAGR Of 36.6%,” November 2017, PR Newswire. Last referenced: <https://www.prnewswire.com/news-releases/the-augmented-and-virtual-reality-in-healthcare-market-was-valued-at-usd-7692-million-in-2017-and-is-expected-to-reach-usd-49979-million-by-2023-at-a-cagr-of-366-300560088.html>

<sup>3</sup> Julieta Dascal, BA, Mark Reid, PhD, Waguih William IsHak, MD, FAPA, Brennan Spiegel, MD, FACC, Jennifer Recacho, MA, Bradley Rosen, MD, and Itai Danovitch, MD, MBA, “Virtual Reality and Medical Inpatients: A Systematic Review of Randomized, Controlled Trials,” February 2017, Innovations in Clinical Neuroscience. Last referenced: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5373791>

<sup>4</sup> D. Freeman, Ph.D. and J. Freeman, “How Virtual Reality Could Transform Mental Health Treatment,” Psychology Today, 2016. Last referenced: <https://www.psychologytoday.com/us/blog/know-your-mind/201605/how-virtual-reality-could-transform-mental-health-treatment>

<sup>5</sup> T. Maddox, Ph.D. and T. Fitzpatrick, “The Brain Science of Patient Satisfaction and Why VR Provides an Ideal Solution,” Association for Talent Development, December 2018. Last referenced: <https://www.td.org/insights/the-brain-science-of-patient-satisfaction-and-why-vr-provides-an-ideal-solution>

<sup>6</sup> Lucile Packard Children’s Hospit, “Hospital-wide access to virtual reality alleviates pain and anxiety for pediatric patients,” Stanford Children’s Health, August 2017. Last referenced: <https://www.stanfordchildrens.org/en/about/news/releases/2017/virtual-reality-alleviates-pain-anxiety>

<sup>7</sup> dotHealth, “Virtual Reality in Medicine: It’s Reality,” Get Health Blog, April 2018. Last referenced: <https://get.health/blog/virtual-reality-in-medicine-its-reality/>

<sup>8</sup> Mark Metry, “5 Accelerators for Funding your VR Startup,” Vudream, March 2017. Last referenced: <http://www.vudream.com/5-accelerators-for-funding-your-vr-startup/>

<sup>9</sup> Ibid.

<sup>10</sup> Ryan Kaiser and David Schatsky, “For more companies, new ways of seeing,” Deloitte Insights, April 2017. Last referenced: <https://www2.deloitte.com/insights/us/en/focus/signals-for-strategists/augmented-and-virtual-reality-enterprise-applications.html>

<sup>11</sup> Bellini, et al., “Profiles in Innovation Virtual and Augmented Reality,” Goldman Sachs, January 2016. Last referenced: <https://www.goldmansachs.com/insights/pages/technology-driving-innovation-folder/virtual-and-augmented-reality/report.pdf>

<sup>12</sup> Michelle Sophie Keller, “Public Perceptions Regarding Use of Virtual Reality in Health Care: A Social Media Content Analysis Using Facebook,” Journal of Medical Internet Research, December 2017. Last referenced: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5750416/>

<sup>13</sup> “How VR Tours Increase Patient Satisfaction – A Case Study,” EEEVO, January 2017. Last referenced: <https://blog.eevo.com/how-vr-tours-increase-patient-satisfaction-a-case-study-200cee8a8d61>

<sup>14</sup> “Turning 65,” National Council on Aging, NCOA analysis of U.S. Census Bureau, Population Division, Interim State Population Projections, 2005, File 3. Interim State Projections of Population by Single Year of Age: July 1, 2004 to 2030. Pub 2012. Last referenced: <https://www.ncoa.org/wp-content/uploads/Sept-2012-webinar-Turning65.pdf>

<sup>15</sup> Ibid.

<sup>16</sup> Ibid.

<sup>17</sup> Cacau, Ld. A. P. et al. “The use of the virtual reality as intervention tool in the postoperative of cardiac surgery.” Braz. J. Cardiovasc. Surg. 28, 281–289 (2013).

<sup>18</sup> Dascal, J. et al. “Virtual reality and medical inpatients: A systematic review of randomized, controlled trials.” Innov. Clin. Neurosci. 14, 14 (2017).

<sup>19</sup> Lee, A., Chan, S., Chen, P. P., Gin, T. & Lau, A. S. “Economic evaluations of acute pain service programs: a systematic review.” Clin. J. Pain. 23, 726–733 (2007).

<sup>20</sup> Harvard Business Review Analytic Services Report, “The Digital Dividend: First-Mover Advantage,” Harvard Business Review, Last referenced: [https://hbr.org/resources/pdfs/comm/verizon/18832\\_HBR\\_Verizon\\_Report\\_IT\\_rev3\\_webview.pdf](https://hbr.org/resources/pdfs/comm/verizon/18832_HBR_Verizon_Report_IT_rev3_webview.pdf)

<sup>21</sup> Ibid.

## About Lenovo Health

**Lenovo is a trusted provider of healthcare technology with a 20+ year history of world-class innovation, industry leading partnerships, and more than a decade of proven healthcare experience. Lenovo Health powers tailored care delivery in 160 countries and 1,300 healthcare organizations across North America.**

**Lenovo Health’s vast portfolio supports the administrative, clinical, and remote care needs of healthcare facilities with cloud, security, and mobility solutions and accessories that streamline workflow and bring data closer to the patient and clinician. Learn more about Lenovo Health: [www.lenovo.com/health](http://www.lenovo.com/health)**