Into the "Medi-Verse": Virtual and Augmented Reality in Health Care

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I s the metaverse the next home of digital health?

The *metaverse*, by its current definition, is a virtual environment where users can interact with computer-generated objects/characters and digital representations of other people (called *avatars*). It includes aspects of both virtual reality (VR) and augmented reality (AR), the difference between which is illustrated in Figure 1. Contrary to some first impressions, it is not solely associated with or facilitated by Meta (formerly known as Facebook).

There is certainly fun to be had, but users can also carry out significant parts of their lives. They can conduct business and attend meetings, visit friends and, of course, play a video game or two—perhaps with those same friends! Many employers are racing to figure out how they can integrate metaverse platforms into their workflows as a result, but it's likely that few (if any) have considered the potential impact these technologies could have on health care. Opportunities abound in the metaverse for any number of sectors—But what's in store for the future of health care and benefits?

There are already strong signals of the future of health care in a world where VR and AR are more common/accessible. The past two years have shown us that the world is ready for digitally enabled health care—as long as you can afford it. VR headsets tend to run between $300 for a low-end device and $1,500 or more for a high-end model. What's more, most goggles on the market today require a connection to a computer or gaming console (another $300+) and high-speed internet. The augmented reality glasses referenced in Figure 1 are forecasted to retail for somewhere between $750 and $1,750. As with most nascent technologies, costs should trend downward as time marches on and mass production ramps up.
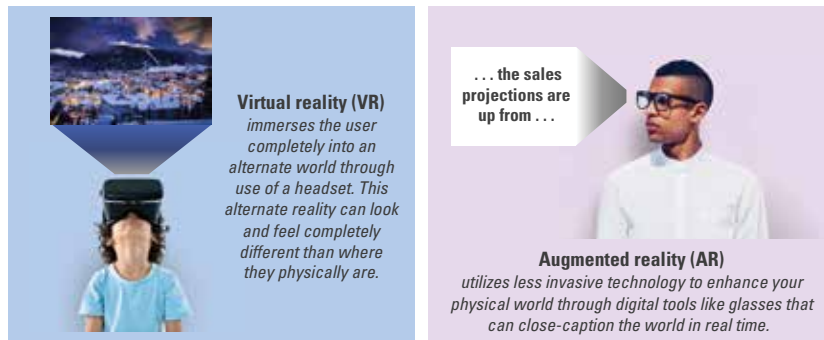
The rapid ascent of telemedicine has not only laid a foundation for the metaverse to build on but has also set new expectations for the pace of health care innovation and technological advancement. Considering the rapid pace of innovation and the investments that health care companies are making in the

AT A GLANCE

- The era of digital health care has only just begun; telemedicine's expansion has been impressive but represents only a small fraction of the potential for technology to transform care delivery.
- Augmented and virtual reality applications empower providers to be more effective and patients to be more engaged with their health.
- Before "the metaverse" can reshape health care, employers and plan sponsors must work to address disparities in access to technology.

FIGURE 1

Comparing VR With AR

Virtual reality (VR)
immerses the user completely into an alternate world through use of a headset. This alternate reality can look and feel completely different than where they physically are.

. . . the sales projections are up from . . .

Augmented reality (AR)
utilizes less invasive technology to enhance your physical world through digital tools like glasses that can close-caption the world in real time.

Source: "Teen inventors create live closed-captioning glasses for the deaf," *Smithsonian Magazine,* December 16, 2015.

metaverse, the time to get ready for its impact on health care is now.

What Can the Metaverse Do for Health Care?

While this article will not venture to list all of the metaverse-related opportunities in the health care space, there are a few that will have an impact on employers sooner rather than later.

Telepresence: Think Telehealth Appointment, But With a Virtual Reality Headset

A lot of health care can be delivered virtually using today's technology of voice/video chat, but telepresence expands those possibilities dramatically by empowering patients to effectively "be in the same room" as their doctor using a VR headset. As new tools that facilitate at-home monitoring and share data with providers in real time come to market, the subset of visits that can be conducted virtually will only continue to grow. As

just one example, one virtual health care device extends doctors' reach with a connected stethoscope, otoscope and thermometer. Physical scans and tests that are required can be carried out at a local facility, then analyzed by top-flight experts and specialists—regardless of where they are in the world. This concept has exciting potential to reduce health care gaps and deserts but, without the right strategies in place, it has the potential to further exacerbate issues like health care disparities based on technology access. Employers would be well-advised to make sure their employee population has robust internet connectivity and eliminate other barriers to access now so that they are positioned to take full advantage of new opportunities down the line.

Health and Safety in the Workplace: Bringing Work and Video Games Together . . . Kind Of

VR goggles may be an obstruction in some work environments, but AR

is rife with opportunity to revolutionize the way people work together in person. AR glasses can be used to superimpose virtual "guides" that help new employees learn on the job and more tenured ones stay sharp on their industrial hygiene. AR also presents some fantastic opportunities for inclusion in the workplace through tools like live closed captioning, which can enable employees with hearing challenges to operate and communicate in their work environment at a much lower cost than (like a sign language interpreter). Implementing these programs at scale may be more affordable than a full-out metaverse tool, to boot. AR glasses, by virtue of their lower tech profile, are generally less costly than VR headsets. Research has shown that engaged employees are generally healthier than their less-engaged counterparts, so investing in a richer employee experience could ultimately pay dividends in the form of lower claims costs.[1]

Virtual Hospitals: All of the Recovery, None of the Hospital Food

Almost anyone who is staying at a hospital wants to go home and rest in their own bed. Virtual hospitals are a step in the right direction toward making that happen. It's expected that patients will begin to be "hospitalized at home" by the end of 2023. Patients who are discharged to recover at home experience better outcomes and, in some cases, their employers can also save 30% or more compared with the cost of traditional hospital recovery.[2] Better outcomes, lower

FIGURE 2

Opportunities and Challenges of the Metaverse

OPPORTUNITIES		CHALLENGES
Strong signals indicate that the cost of care delivered in the metaverse will be lower than that delivered traditionally.	**COST**	The cost of necessary technology and high-speed internet access must be considered.
Location and proximity may no longer influence plan members' access to quality health care.	**QUALITY**	Guardrails must be established to ensure that the site of care is appropriate and high-quality care is delivered.
The metaverse is accessible from any home . . .	**ACCESS**	. . . as long as the member has access to technology and high-speed internet.
The metaverse can address health care deserts by connecting patients with high-quality providers regardless of where they live.	**DIVERSITY, EQUITY and INCLUSION**	Lessons must be learned from the unequal adoption of telehealth by age, ethnicity, etc., to ensure that care is not disrupted by the metaverse.*
Care delivery in the metaverse presents a new opportunity to solve for interoperability challenges.	**DATA, PRIVACY and SECURITY**	Personal health information in the metaverse must be protected to the same standards as other protected health information (PHI).

*"HHS: Video Visit Use Less Likely Among Non-White, Older Americans," M Health Intelligence, February 4, 2022.

costs and a more positive patient experience sound like a true win-win-win. As an added bonus, virtual hospitalization could relieve strain on the already-taxed health care system and free up resources to treat cases that truly require an inpatient stay. In the future, patient-monitoring technology will continue improving and further expand the cross-section of cases where this strategy is appropriate and feasible.

Behavioral Health: What If the Best Safe Space Isn't Even a "Space" at All?

The COVID-19 pandemic has wrought havoc on individuals' behavioral health. The incidence of depression, anxiety and other disorders—as well as the treatment and medication of them—expanded rapidly during the early days of the pandemic as social isolation and the weight of extraordinary risk took their toll worldwide. Unfortu-

nately, this growth has not receded in tandem with the pandemic, and continued geopolitical/economic uncertainty looms large.[3] Connected VR presents several opportunities to expand behavioral health treatment accessibility (by way of enabling telepresence) and efficacy. The metaverse will support more advanced methods for delivering traditional treatments like group therapy (from the privacy of a patient's home and behind the anonymity of a virtual avatar) or exposure therapy, which exposes a patient to their fear slowly in an effort to break the pattern of avoiding what they are afraid of. Providers need to ensure that care is delivered safely and appropriately since some valuable signals (like tics or tremors that may clue a counselor in on their patient's withdrawal from a recent relapse) can be lost with inferior implementation, but the future of behavioral health treatment largely lives in the metaverse.

Digital Twins: Where Clinicians Get Up Close and Personal With Health Scans

Did you know that the first time a commercial pilot flies a new type of aircraft, there are passengers on board? As scary as that sounds, it really is not. That same pilot has logged thousands of hours of (incredibly realistic) flight simulation time, and they have also likely flown other similar aircraft. This training approach—through simulation—bears significant opportunity in the health care space with both the ability to visualize scan results in three dimensions (3D) and leverage "digital twins," or virtual 3D renderings of the human body. Researchers from Sweden's Linköping University at the forefront of this latter field have only recently used digital twin technology to predict the effect of a medication on mice.[4] In the near future, clinicians across the globe should be able to use these new tools to develop more informed care plans (e.g., analyzing a tumor in 3D via a VR headset) for their human patients, which could potentially end up saving a life, reducing the invasiveness of surgery or otherwise improving patient outcomes.

Fitness and Wellness: The Activities Might Be Virtual, But the Sweat Is Definitely Real

AR is already heavily present in the fitness space. You can have a personal coach through your Mirror or Peloton Guide correct your form and cheer you on while you work out in your living room. Recent ad spots for the Oculus Quest (one of the most popular VR headset models for personal use) open on several bored-looking exercisers, who are dreading the weather and barely finishing their workout. The commercial gets considerably more exciting a few seconds in when the subjects thereof don their goggles and take off into a world of virtual excitement and endless possibilities. Throughout the spot, the camera cuts back and forth between gameplay footage and shots of the (increasingly sweaty) users engaging with the platform before declaring that "unbelievably fun fitness is ready," which begs a few questions. Are users ready to transform how they engage with their fitness and well-being? Are employers ready to capitalize on this new and exciting technology? The rise of gamified fitness and increasingly engaging/robust wellness incentives suggests that the answer is "yes" on both counts, but only time will tell whether VR

and the metaverse can finally crack the member engagement conundrum.

In addition to the possibilities described previously, there are also endless ways that VR and AR technology is already influencing health care delivery—like the use of AR in operating rooms to assist doctors by effectively giving them x-ray vision into the patient's anatomy before they make a cut.[5] This technology adoption within the health care delivery environment should result in better outcomes and, ideally, lower costs for employers.

Impacts of Health Care's Metaverse Expansion on Employers

There are countless opportunities in health care when it comes to the metaverse—but there is no opportunity without challenges that must be considered and addressed as well.

What can employers do to prepare for this next frontier of virtual health care?

- Ensure that employees have access to and can afford high-speed internet, which is considered one of the top social determinants of health.
- Consider adding tools that help members choose doctors based on cost and quality.
- Conduct an analysis of unmet employee needs, including asking members about access to technology to engage with today's tech-heavy health care system.
- Continue making concerted efforts to reduce and eliminate health care disparities in the workforce.
- Ask vendors and carriers about technology advancement and adoption within their services, including how they are currently using (or planning to use) VR and AR technology in their service delivery. Include questions on patient outcomes, cost impacts, and data privacy and security in this line of questioning.

Conclusion

The metaverse is quickly changing how people engage with digital health care and will become more integral in many of the digital health offerings you see today—from your appointment with your therapist to how your doctor consults with other experts on treatment plans. However, not everyone is prepared for this new frontier of digital health care. Before

the health care system can completely tap into the potential of the metaverse, all Americans need access to the resources necessary to prevent the metaverse from exacerbating health care disparities and inequities that already exist. Lastly, when preparing for the metaverse's arrival on the health care scene, all efforts must be made to protect the privacy and security of member data. So grab your goggles, fire up your computer and let's get ready to enter the "medi-verse." BQ

Endnotes

1. "Engaged Employees Less Likely to Have Health Problems," Gallup, December 18, 2015.
2. "'Hospital at Home' Programs Improve Outcomes, Lower Costs But Face Resistance from Providers and Payers," The Commonwealth Fund. www.commonwealthfund.org/publications/newsletter-article/hospital -home-programs-improve-outcomes-lower-costs-face-resistance.
3. "COVID-19 pandemic triggers 25% increase in prevalence of anxiety and depression worldwide," World Health Organization, March 2, 2022.
4. "Digital twins—an aid to tailor medication to individual patients," Linkoping University, July 30, 2019.
5. "Johns Hopkins Performs Its First Augmented Reality Surgeries in Patients," Hopkins Medicine, February 16, 2021.

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