![Microsoft]

Transforming healthcare: modern Virtual Wards enhance patient outcomes and improve access

A closer look at Virtual Wards

February 2024

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How modern Virtual Wards can improve health care delivery & patient outcomes

By extending a hospital's reach and capacity outside its walls, modern virtual wards can improve both the patient's experience and health outcomes while boosting productivity and saving costs.

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The genesis and evolution of virtual wards

Invaluable during the global pandemic and now here to stay.

Virtual wards are transforming how healthcare is delivered, with NHS England having set a "national ambition" for there to be around 25,000 virtual beds across England. Developed originally in Croydon, South London in 2006, the concept gained significant traction during the Covid-19 pandemic. Their value is now growing even more quickly as healthcare providers look ahead at rapidly aging populations with a rising tide of long-term conditions such as Chronic Obstructive Pulmonary Disease (COPD) and heart failure that require careful monitoring and rapid responses should acute, adverse events occur.

These wards function by replicating the structures, processes, and daily routines typical of a traditional hospital ward, yet they have a unique aspect: the patients are not confined within hospital walls but stay in the comfort of the place they call home.

This innovative model has demonstrated its efficacy as a viable alternative to conventional hospital-based in-patient care. It can also improve the environmental sustainability of healthcare by reducing carbon emissions caused by travel to and from clinical settings by patients, caregivers, and visiting friends and family.

Hospital wards

The pedigree of the traditional hospital wards goes back hundreds of years. Hospitals across the world are organised into wards that typically consist of around 10 to 40 beds. Each ward is staffed by a dedicated team responsible for the care of patients assigned to those beds.

These teams include diverse healthcare professionals, from nurses and doctors to physiotherapists and pharmacists, each playing a vital role in delivering patient care. The daily routines on these wards are well-structured and include ward rounds, observation rounds, and medication rounds, ensuring that each patient receives the necessary attention and treatment for their condition. These routines make certain that no patient is overlooked, fostering a secure and coordinated environment for patient care.

A vital component of a hospital ward is the "nursing station," which serves as a communications hub. It's also where staff members coordinate care, make key decisions, and collaborate on patient treatment plans. The nursing station also facilitates the collaboration of multidisciplinary team members, enabling them to share insights and updates on patient progress, which is essential for providing comprehensive, joined-up care.
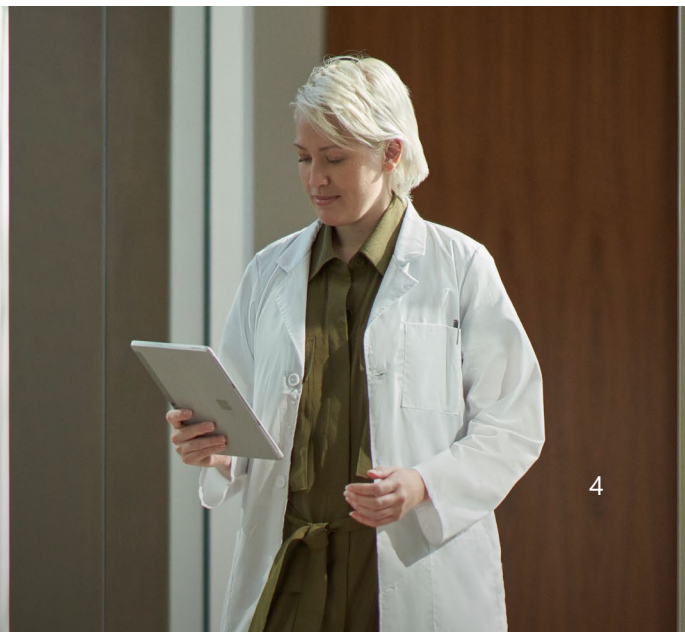
Virtual wards aim to recreate this hospital ward experience as seamlessly and safely as possible in a home setting. They require technological foundations in connectivity, and data privacy compliance, so that clinicians can remotely monitor and communicate securely with patients, manage their treatment plans, and ensure they receive the same care they would in hospital.

Many patients, especially those with chronic conditions or in recovery phases, can get the care they need outside of hospital settings. This observation has led to the concept of the "step-up/down" patient pathways. These types of virtual ward aim to balance the intensity and coordination of hospital-based care with the benefits of receiving in-patient type care in more comfortable settings with lower risk of healthcare acquired infections.

There are three approaches to selecting patients for admission to virtual wards:
1. **Predict and prevent**, which uses a predictive model, also known as a risk stratification tool, to identify patients at high risk of unplanned admission. These patients are admitted to the virtual ward for observation and their care plan is optimised, with the aim of reducing their risk of unplanned admission to hospital.
2. **Step-up ("diversion")**, which provides an alternative care setting for patients who were otherwise going to be admitted to a hospital bed.
3. **Step-down ("early discharge")**, which allows patients to be sent home early from hospital when their condition has improved yet still requires close monitoring.

The use of telemedicine, remote monitoring devices, and digital communication platforms is integral to the operation of virtual wards. These technologies enable healthcare professionals to conduct virtual ward rounds, monitor patients' clinical observations in real time, and provide timely medical interventions when necessary.
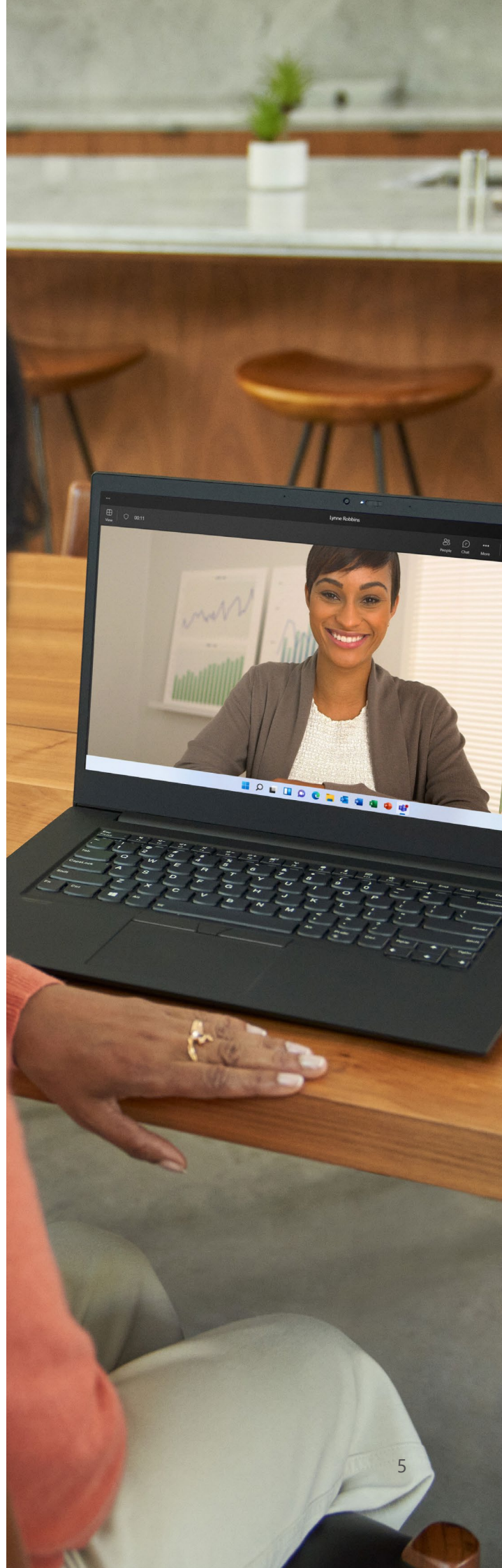
Secure, coordinated 24x7 patient care outside hospitals and other care settings

The primary advantage of virtual wards is in providing a secure and coordinated approach to patient care, reflecting the best features of traditional hospital wards. For example, patients in virtual wards can benefit from continuous monitoring and regular communication with their clinicians, ensuring their medical conditions are closely observed and managed.

This model also supports a high degree of collaboration among healthcare team members, who can remotely discuss and devise patient care plans, just as they would on a physical ward.

As advancements in telehealth continue to progress, virtual wards provide a safe platform for new technology to be deployed for improving patient treatment and the healthcare journey overall. They are where failsafe routines, patient comfort, and technological innovation converge to create more efficient and patient-centered care pathways.

Optimising health care system capacity, both inside and outside hospitals

In recent years, healthcare systems across the developed world have increasingly concentrated on expanding their capacity to provide care for patients with complex needs.

> As the population ages and the prevalence of chronic diseases increases, healthcare organisations are reevaluating and adapting their delivery models to ensure the greatest efficiency and effectiveness.

Traditional hospital wards have long been the primary settings to care for patients with severe or acute conditions. But, more and more, healthcare providers are realising that not all such patients need to be physically in a hospital. In fact, hospital in-patients are subjected to greater infectious risks, and may experience other harms such as muscle deconditioning, confusion from unfamiliar surroundings, and sleep deprivation caused by noisy wards at night.

The advent and evolution of several technologies have been instrumental in enabling this shift towards more flexible healthcare delivery models, such as virtual wards.

Virtual wards utilise technologies across five domains:

Patient selection
Innovative tools and algorithms are used to assess patient risks, especially to identify which patients are likely to have an unplanned hospital admission. These risk-stratification tools can be used to offer preemptive admission to a virtual ward, ensuring timely and appropriate care. Similarly, algorithms can suggest which current in-patients can be safely transitioned to virtual ward care, optimising the utilisation of hospital capacity and resources.

Home-based monitoring
The foundation of virtual wards at home includes the rapid deployment of high-speed broadband for those who do not have it already and devices such as tablets. This technological setup ensures that patients have access to the necessary digital platforms for their care and communication with clinicians.

Hospital ward integration
Virtual wards need to use or integrate with technologies commonly found on hospital wards, such as patient administration systems (PAS), electronic patient records (EPR), and order communications systems. This integration ensures continuity and consistency in patient care and record-keeping.

Clinician-patient interaction

Technologies like videoconferencing and remote medical devices (e.g., Bluetooth oximeters, stethoscopes, and otoscopes) bridge the physical gap between clinicians and patients. They allow for real-time consultations, clinical examination, and monitoring, replicating the interactions that happen in a hospital ward. Several startups are opting to take advantage of the near-ubiquity of smartphones to develop medical-grade patient-monitoring services. Their apps use biometric video scans and other methods to record multiple physiological parameters, including vital signs, blood oxygenation, and even atrial fibrillation detection from a phone's camera.

Risk Mitigation

To address the additional risks associated with patients not being physically present in a hospital ward, virtual wards should employ continuous monitoring systems and algorithms designed to detect early signs of clinical deterioration. When paired with a fail-safe patient call button for summoning help, these systems provide an additional safety net for ensuring patient safety.

The deployment of these technologies in virtual wards represents a significant improvement in healthcare delivery. By balancing the need for in-hospital care with the advantages of at-home care, virtual wards can lighten the growing, demographic-driven loads on healthcare systems.

In addition, they provide a way to manage the increasing demand for healthcare services more effectively, catering to the needs of diverse patient populations while optimising the use of hospital resources. This approach not only enhances the patient experience by offering them care in the comfort of the place they call home but also improves the overall efficiency and efficacy of healthcare systems.

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Today's virtual wards must modernise to optimise further and simplify

The concept of virtual wards, a breakthrough in healthcare delivery, has undergone significant evolution since its inception. Initially reliant on basic tools like Excel spreadsheets and landline phones, today's virtual wards are on the cusp of a new era marked by technological sophistication and integration.

Today, virtual wards stand at a pivotal point, aiming to achieve a high degree of maturity across all five of these technological domains. This evolution is not just a leap forward in healthcare technology but a redefinition of patient care and healthcare management.

At the same time, the proliferation of diverse medical devices for remote monitoring can complicate the management of virtual ward technologies. Because a high proportion of virtual ward patients have complex needs, the devices themselves must be easy to use and simple to manage remotely. Otherwise, clinicians will not achieve the monitoring levels needed to provide safe and effective care.

Deploying AI to achieve healthcare's "quintuple aim"

The integration of artificial intelligence (AI) is central to this modernisation. AI has the potential to revolutionise virtual wards, contributing significantly to every element of the quintuple aim of healthcare, namely: enhancing patient outcomes; reducing costs; minimising inequalities; improving patient experiences; and bringing joy and efficiency to the workplace for healthcare staff. AI is becoming a pivotal tool in monitoring patient conditions, offering levels of convenience and personalisation previously unattainable.

> The role of AI in this context is multifaceted and transformative. For example, NHS England reports that Birmingham Community Healthcare NHS Trust is experimenting with AI to forecast the top 5% of individuals at risk of potential hospital visits or admissions. The objective of the initiative is to avert 4,500 unneeded accident and emergency visits, reduce 17,000 overnight stays in hospitals, and make 23,000 GP appointments available in the next two years.[1]

[1] **NHS trials AI in Birmingham to prevent thousands of GP visits in effort to tackle waiting lists., ITVNews – November 2023.**

Actionable insights from mountains of patient data

For healthcare staff, AI can offer summarisation tools that distill large volumes of patient data into concise, actionable insights. Such technology can help in managing the vast amounts of information generated in virtual wards, allowing healthcare professionals to make more informed decisions quickly and efficiently. This capability saves time and reduces the cognitive load on staff, enabling them to focus on critical aspects of patient care.

Scheduling is another domain where AI offers the potential for significant improvements. By optimising the scheduling of virtual ward rounds, it can ensure that patients get the attention they need in timely and coordinated ways. It can predict the best times and frequencies for consultations based on the patient's condition and the availability of healthcare professionals, thereby enhancing the efficiency of care delivery.

Personalised monitoring and alerts for earlier interventions

AI can also help caregivers with developing personalised patient monitoring regimens. By analysing patient data, AI can recommend monitoring schedules and clinical alert systems tailored to each patient's unique health needs—and do so at scale. This personalised approach can lead to earlier intervention in cases of rapid deterioration in a patient's health, ultimately improving patient safety.

Overcoming language barriers in a globalised world

In a globalised world, AI can help overcome language barriers with patient translation services. This feature is especially important when patients may not always speak the primary language of the healthcare team. AI-powered translation can ensure that patients understand their health conditions and treatment plans and communicate effectively with their caregivers, leading to better health outcomes and increased patient satisfaction.

The modernisation of virtual wards with AI will shift healthcare toward more efficient, patient-centered, and equitable delivery models. Underpinning this AI, global cloud technologies like Microsoft Azure are ensuring data-privacy compliance and cybersecurity.

As these technologies evolve, they promise to reshape the healthcare landscape, making it more accessible, personalised, and effective for everyone.

Indeed, some innovations pioneered in virtual wards, like routine measurement of symptoms, are finding their way back into traditional hospital settings. This cross-pollination of technology signifies a shift in the healthcare paradigm, where learnings from virtual care are enhancing in-hospital care, leading to a more integrated and dynamic healthcare system.
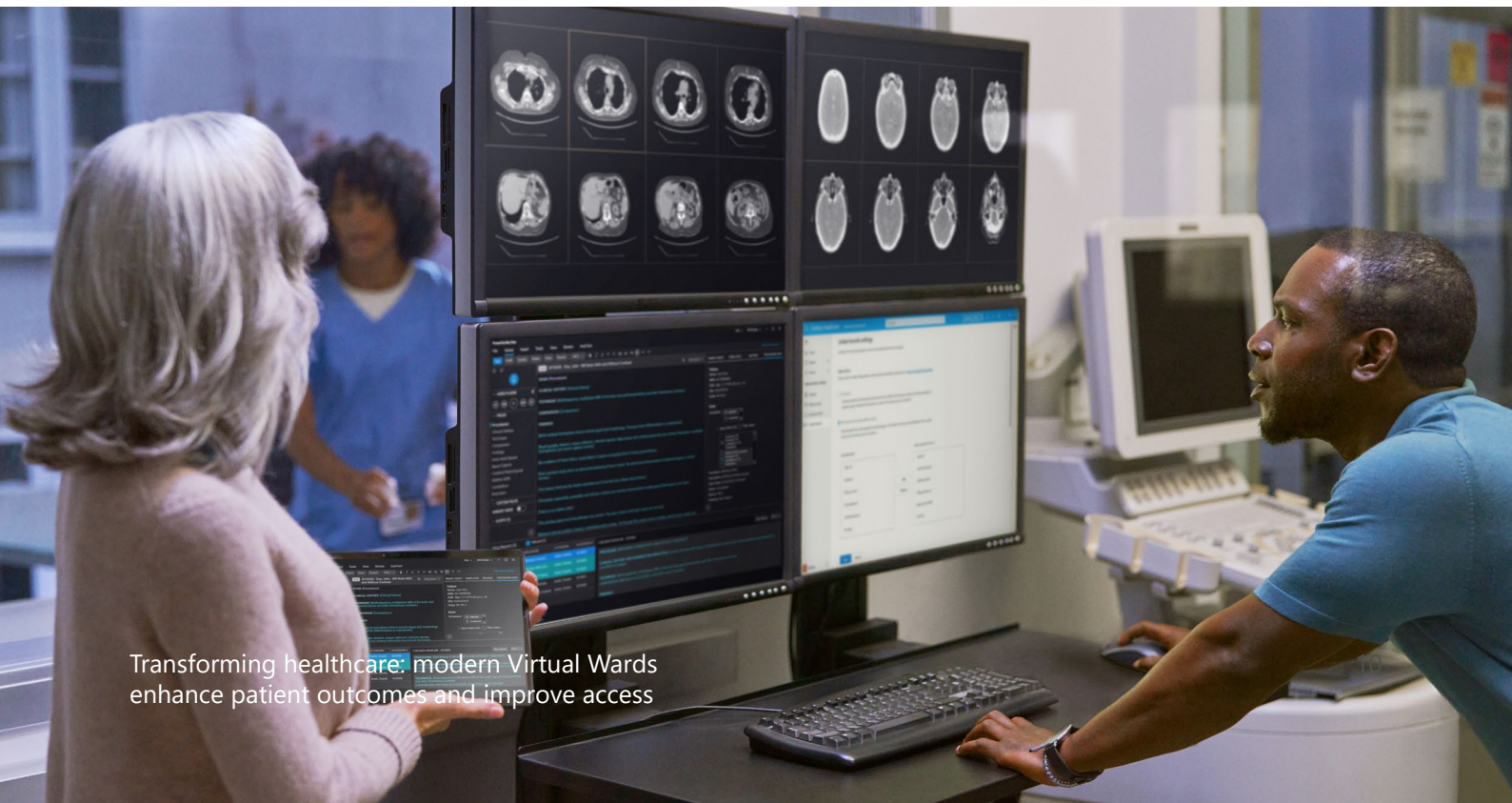
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Microsoft Cloud for healthcare & ecosystem partners

As NHS Trusts open virtual wards, they should assess their digital maturity across the five domains of patient selection, home-based monitoring, hospital ward integration, clinician-patient interaction, and risk mitigation. NHS England's Digital Technology Assessment Criteria highlight where organisations should focus their attention regarding clinical safety, data protection, technical security, interoperability, usability and accessibility.

The good news for many Trusts is that they can take advantage of existing capabilities within the Microsoft Industry Cloud for Health to operate their virtual wards. This Azure cloud platform supports safe collaboration and engagement and enables data and AI to come to life.

In addition to these first-party solutions, Microsoft works with over 600 health technology partners whose products improve clinician and patient experiences and help their customers to benefit from scalable, agile technology innovations.

Many of Microsoft's customers already have capabilities within their existing investments that can be used today. For example, the NHS Virtual Wards Power App is enabled on NHS Mail to configure Microsoft Teams to make it suitable for running a virtual ward. This tool includes a patient discharge tracker, as well as links to a web-based remote monitoring platform and web-based electronic patient record system (EPR). Likewise, file storage systems support virtual visits, the rostering of shifts, and the ability to share approved applications centrally.

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Microsoft's platform also supports connectivity to wearables and internet of things (IoT) devices. It provides an interoperable, secure and compliant environment for data storage and future innovation including cognitive services and AI.

To create and design a virtual ward environment, experts from different fields need to work as a team and share their perspective and, more importantly, feedback from their patients, to achieve a truly patient-centered design. Microsoft Teams, PowerApps and Microsoft Forms can all support collaboration and help integrate the views of clinicians and patients in the co-creation of the clinical service.

It is essential that the virtual ward environment meets the needs of all service users – especially those from disadvantaged and socially excluded groups. Paying attention to accessibility and inclusivity are a core component of Microsoft's approach, ensuring that no patients or staff are left behind.

Teladoc Health, the world leader in whole-person virtual care

For more than 20 years, Teladoc has pioneered personal virtual care and telehealth for individuals, employers, health plans, and hospitals and health systems. Its connected services portfolio spans more than a dozen nations with a potential reach of more than 2.2 billion people.

Teladoc integrates healthcare, technology, data science, clinical expertise, consumer behavior, and more to transform people's healthcare experiences.

Its Solo™ virtual care platform can enable virtual wards just about anywhere the company operates, utilising Microsoft Cloud for Healthcare technology based Microsoft Azure. Patient interactions are conducted via Microsoft Teams. And Microsoft + Nuance AI solutions hold potential for automating the clinical and pathology documentation of patient conditions and therapies.

Ed Percy, Teladoc's vice president for hospitals and health systems in Europe, the Middle East, and Africa, sees the virtual ward model rapidly expanding worldwide in the coming years.

"Our biggest future challenges are around keeping end-user technologies—on both patient and clinician sides—transparent, accessible, and easy-to-use, so their respective user experiences are always the best," he says. "We're confident our partnership with Microsoft will help us meet those challenges."

System C, facilitating integrated patient-centric care

With a focus on serving healthcare as well as social care and education providers across the UK and other regions, System C supports 400 customers with more than 700,000 users. Its CareFlow healthcare and Liquidlogic social care and education platforms allow for services integration spanning whole care communities.

To enable these platforms, System C has developed a strategic partnership with Microsoft to foster innovative solutions based on cloud and machine learning technologies. The company aims to revolutionize health and social care while improving the user experience. It does this by linking data from multiple disparate systems, integrating workflows across care settings, and supporting the reporting and analytics outputs from many different providers.

Using the Microsoft cloud, System C solutions offer a secure, mobile-friendly environment and promote greater system interoperability. "Our cloud and internet-first approach aligns the needs of our clients with the aims of the NHS and our other private customers providing healthcare," says Dr Jonathan Bloor, Medical Director of System C. "In short, we facilitate services delivery in ways that meet the expectations of both patients and clinicians."
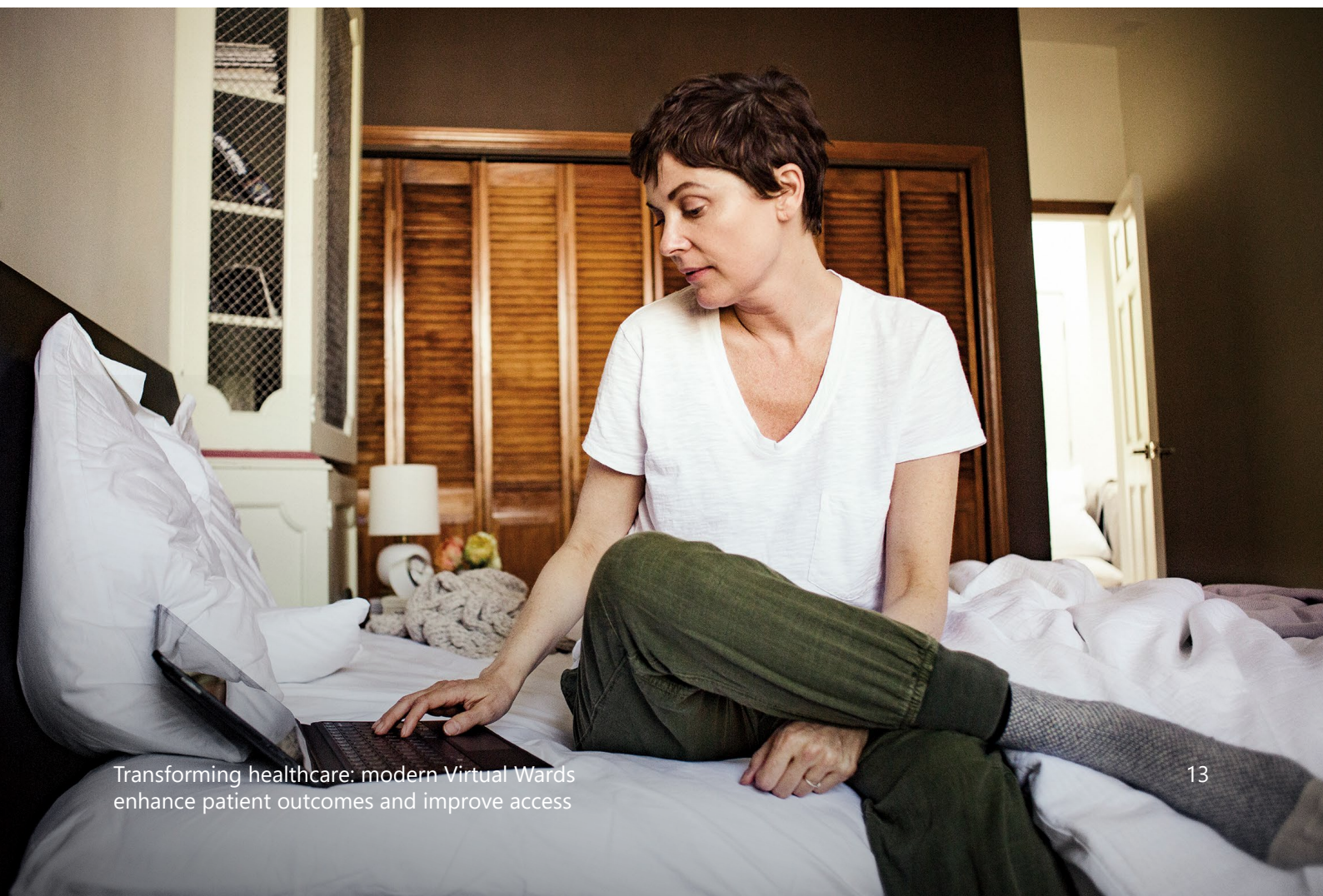
Regarding virtual wards, Bloor sees them as harbingers of more patient-centric healthcare delivery models in contrast to the institution-centric models of traditional hospitals. "Patients, possibly those with multiple co-morbidities, will be surrounded by a closed loop of these healthcare and social care services interconnected with data and augmented with AI-enabled monitoring and decision support," he says. "The result will be more predictive, proactive service delivery with better patient outcomes."

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The future of virtual wards starts today

Virtual wards play a crucial role in transforming healthcare delivery by replicating traditional hospital structures and processes at home. They can improve patient outcomes, satisfaction, and environmental sustainability while reducing costs and hospital strain. The speed at which virtual wards are transforming healthcare delivery is remarkable. This innovative care model has demonstrably enhanced efficiency, grown capacity, and boosted clinician productivity.

Advances in technology, such as telemedicine, remote monitoring, and digital communication, enable continuous and coordinated care for patients. With the advent of AI, the future of virtual wards is expected to continue expanding and evolving, developing new ways to enhance the experience and delivery of services.

The next steps for healthcare systems should involve developing strategies for making the most of the continuous evolution of relevant technologies, training healthcare professionals to take advantage of new tools, and adapting supportive healthcare policies accordingly. The goal is clear: to create more efficient, effective, and patient-centered healthcare systems.

Your next steps

Microsoft is invested in supporting your development of virtual wards and can offer you support in this area, including:

1. Reviewing your current estate with our team of Customer Success Advisors to look at the Microsoft solutions you have already procured and how these could be used more effectively.

2. Providing a review and recommendation of the gaps in your estate with recommendations of next steps and approaches.

3. Provide a staged approach to ensuring your Trust is best positioned to take advantage of technology now and in the future, including AI, that can help you continue to build your virtual wards - envisioning what the future may look like for you, your clinicians, and your patients.

To learn more about the virtual ward concept or any of its underlying technologies, please contact your Microsoft representative.