The Smart Hospital of the Future
Connecting Systems, People and Technology

Smart hospitals represent the future of how clinicians will work and how patients will experience care

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Introduction

Hospitals across the country are redefining what it means to deliver care in a digital era. While the term smart hospital can vary by organization, the common thread is a connected ecosystem in which data, devices and clinical workflows operate seamlessly. In these environments, technology doesn't replace the clinician — it strengthens how teams work, how information moves and how patients experience their care.

At the center of this transformation is an IT infrastructure capable of linking systems that once functioned independently. Through cloud-based platforms and interoperable tools, hospitals can integrate emerging technologies, exchange data securely and maintain the reliability needed for always-on clinical operations. This foundation enables clinicians to work more efficiently, patients to engage more actively and organizations to evolve toward a more connected and proactive model of care. ●

# The internet of medical things

For years, most clinical information has lived in separate platforms, such as the electronic health record (EHR), bedside monitors and lab and imaging systems. Now, hospitals are connecting these systems through interoperable infrastructure that collects data from medical devices, sensors and software platforms.

This digital foundation supports what is known as the internet of medical things: a network of connected medical and environmental devices that continuously collect and share data. For example, sensors can locate equipment and monitor air quality or room occupancy; infusion and ventilator systems can send dosage and alarm information; and wireless sensors can detect movement, temperature or pressure changes. Together, these connections give care teams a real-time view of patient status, staff activity and safety conditions across the hospital.

These capabilities are increasingly converging at the bedside — giving rise to the smart patient room, where interconnected devices, sensors and digital tools work together to support safer, more efficient and more patient-centered care. ●

Inside the smart room
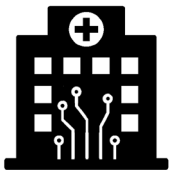
Inside today's smart patient rooms, a coordinated suite of technologies is reshaping how clinicians deliver, document and coordinate care. Motion and pressure sensors track patient activity and help nurses detect fall risks across multiple rooms, while patient-controlled lighting, entertainment and care-plan access support comfort and engagement. Increasingly, these systems are paired with ambient listening and documentation tools — AI-enabled platforms that capture clinician-patient conversations and automatically generate draft notes in the EHR. Together, these connected capabilities streamline clinical workflows, reduce manual data entry and enhance the overall patient experience.

"When clinicians can document ambiently and pull up vitals quickly on a screen or app, it makes their work more efficient," said Monica Coley, DHI, MPH, health informaticist and senior business development manager for state and local government health care providers at Amazon Web Services. "Smart rooms also give patients more control during their stay and create a more connected care experience."

Ambient listening systems work alongside these monitoring technologies to reduce the administrative burden often associated with documentation. For example, The Permanente Medical Group states that its use of ambient AI scribes save its physicians an average of one hour a day at the keyboard.[1]

According to a report from the American Medical Association, 22.5% of physicians spent more than eight hours on the EHR outside normal work hours, up from 20.9% in 2023.[2] Another 13.6% spent six to eight hours on the EHR, down from 14% in 2022. These listening and documentation systems capture clinician-patient conversations and automatically generate clinical notes in the EHR, drawing on contextual information from prior notes, labs and imaging.

These systems also support clinicians before the visit by generating AI-based summaries of prior records. "That way, the doctors can see what they need before they walk in and not have to go look for it themselves," said Norm Schrager, director of content at DeepScribe , a company specializing in ambient AI documentation.

Some ambient-listening products also suggests appropriate billing and diagnosis codes, which are particularly valuable in complex cases where accurate coding affects both care continuity and reimbursement. Coley noted that these capabilities become even more powerful when systems work together: "When you're able to integrate various systems — nurse call, the EHR, even Alexa-trained properties — into one platform, it provides more robust reporting." ●

Extending the smart hospital beyond the hospital walls

Hospitals are expanding the smart, connected care environment well beyond their physical walls. Through virtual platforms, automated digital tools and remote monitoring technologies, clinicians can remain continuously linked to patients at home — strengthening engagement, improving follow-up and reducing avoidable complications.

Virtual visits are now functioning as natural extensions of in-person care. Integrated directly with the EHR, these platforms allow clinicians and specialists to meet with patients in real time while maintaining the same documentation workflows used inside the hospital. Patients can review their care plans, discuss symptoms or adjust medications without needing to travel, while clinicians have access to the full clinical record during each encounter.

But significant opportunities for connected care emerge between visits. Many health systems are using automated, chat-based check-ins to maintain contact with patients and help them stay on track with medications, appointments and self-care.

"Health happens between visits," said Cynthia Horner, M.D., chief medical officer at Amwell, a virtual care company. "Most health care decisions — what people eat, whether they take their medi-
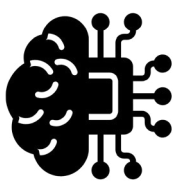
cations, how they manage their conditions—are made outside the doctor's office."

Horner noted that Amwell and other health systems are deploying these automated digital touchpoints to support ongoing engagement. By helping patients stay connected to their care teams throughout their daily routines, hospitals are reducing missed appointments and avoidable readmissions while easing the administrative load on staff.

Remote patient monitoring builds on this connection by extending clinical visibility into the home. With sensors and devices that track vital signs such as blood pressure, glucose or heart rhythms, clinicians can identify concerning trends early and intervene before issues escalate. Studies show that home-based monitoring can reduce readmissions, lower emergency department visits and improve management of chronic diseases.[3]

As hospitals strengthen these digital connections, they are also beginning to draw insights from the growing volume of data generated across both in-person and virtual care. These real-time signals — from the bedside, the home and every layer in between — are helping clinicians detect risks earlier and extend advanced expertise to more patients.

Improving outcomes through connected intelligence

Smart hospitals are beginning to harness the power of connected data and virtual technologies to identify problems earlier and extend specialty expertise to patients who might otherwise go without it. By integrating information from EHRs, monitoring devices, imaging platforms and communication tools, hospitals can see patterns that were previously buried in siloed systems. These insights help clinicians act sooner — whether that means adjusting a treatment plan, preventing deterioration or avoiding unnecessary readmissions.

Advances in predictive analytics and digital imaging build on this foundation. AI-enhanced imaging tools flag subtle changes that may indicate disease progression, while predictive models analyze real-time clinical and environmental data to identify patients at higher risk for complications. Together, these capabilities give care teams a clearer picture of patient needs and help streamline resource allocation, workflow design and daily operations.

This connected approach also expands access to specialty care, particularly for rural and underserved communities. Telehealth platforms enable real-time consultations with cardiologists, neurologists, critical care physicians and other experts who may be hours away. Smaller hospitals can stabilize more patients locally,

reduce transfer rates and improve continuity of care. At systems like Wellstar MCG Health in Georgia, statewide virtual networks allow clinicians to guide complex cases remotely, helping rural hospitals manage high-acuity patients close to home.

Across these efforts, the goal is the same: to use integrated data, digital tools and virtual connectivity to deliver earlier and more effective care wherever patients live.●

Securing the connected environment

As hospitals connect more devices and digital systems, they need a foundation that can securely move, store and analyze large volumes of information. Cloud-based infrastructure makes this possible, providing the scale and reliability needed to link applications, manage data across environments and support continuous analytics. HIPAA-compliant cloud environments have the computing power and storage to handle thousands of clinical interactions each day — capturing voice data, streaming sensor readings and transmitting images or video consultations in real time. Cloud-based AI services allow hospitals to run advanced tools — such as large language models used in documentation, analytics and clinical summarization — within secure, HIPAA-compliant environments. The same architecture lets organizations scale connected technologies quickly as adoption grows.

Cloud infrastructure also strengthens data security. Hospitals can set strict access controls, encryption and permissions so that they — not the vendor — retain full ownership of their data. Because these safeguards are built into the architecture rather than added later, many experts consider cloud environments more secure than traditional on-site data centers. This is one reason even highly regulated organizations, including the Department of Defense, have moved critical systems to the cloud.[4]

Hospitals also can avoid outages by distributing their systems through cloud infrastructure. Traditional hospital data centers lack redundancy; when they fail, hospitals can be offline for days. With cloud infrastructure, hospitals can store and run their applications across multiple data centers simultaneously.

"When you run on the cloud, you can spread workloads across different data centers and regions. If one goes down, another can pick up instantly and keep patient care going," Coley said.

The following case studies illustrate how three health systems are leading the way toward improving care through automation, data integration and virtual connectivity. ●

Purpose-built AI services

HealthLake

This is a fully managed, HIPAA-eligible service that transforms fragmented health care data into a unified FHIR-based repository at petabyte scale. It provides high-throughput APIs that meet compliance requirements like CMS and ONC while maintaining sub-millisecond latency. By seamlessly working with AWS's health care and AI services, AWS HealthLake provides a comprehensive data infrastructure for health care applications, advanced analytics, machine learning (ML) models and generative AI innovations, all while maintaining enterprise-grade security and eliminating infrastructure management overhead.

HealthImaging

Designed for builders who develop cloud-native medical imaging applications, HealthImaging ingests data in the DICOM P10 format and provides APIs for low-latency retrieval and purpose-built storage.

HealthScribe

This is a HIPAA-eligible service empowering health care software vendors to build clinical applications that use speech recognition and generative AI to automatically generate preliminary clinical documentation. Using a single API, AWS HealthScribe automatically identifies speaker roles, classifies dialogues, extracts medical terms and generates rich preliminary clinical transcripts and notes. AWS HealthScribe removes the need to integrate and optimize separate AI services, allowing you to expedite implementation. Powered by Amazon Bedrock, AWS HealthScribe makes it faster and easier to integrate generative AI capabilities, without needing to manage the underlying ML infrastructure or train health care-specific large language models.

HealthOmics

This is a HIPAA-eligible service that accelerates clinical diagnostic testing, drug discovery and agriculture research by fully managing the complex infrastructure behind your bioinformatics workflows. HealthOmics supports industry-standard workflow languages (WDL, Nextflow, CWL) and seamlessly scales bioinformatics infrastructure to support data from tens of thousands of tests per day — all with predictable cost per sample. HealthOmics handles the technical complexities like managing compute resources and maintaining workflow engines so you can focus entirely on scientific breakthroughs.

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Ochsner Health reduces documentation time with ambient AI

SNAPSHOT

Ochsner Health, the largest nonprofit health care provider in the Gulf South, partnered with DeepScribe in early 2024 to reduce the documentation burden on its 4,700 physicians and improve the quality of patient care.

CHALLENGE

Ochsner Health, operating 46 hospitals and more than 370 health centers, employs 4,700 physicians who collectively spent thousands of hours daily documenting patient visits. Clinicians were spending hours each day charting. When they documented manually during patient visits, the time spent typing reduced eye contact and negatively impacted their rapport with patients.

Specialists faced an additional challenge: ophthalmologists, nephrologists and oncologists each structure their notes differently and use distinct clinical terminology. A retinal ophthalmologist documents procedures and findings differently than does a corneal specialist, even though both work in the same department.

STRATEGY AND SOLUTIONS

After testing several ambient AI platforms, Ochsner's leadership selected DeepScribe in early 2024 based on its ability to accommodate these varying documentation styles. Physicians could adapt the system to match how they already structured their notes, rather than forcing all specialists to use a single template. The system captures clinician-patient conversations and generates clinical notes automatically, which physicians then review and finalize.

RESULTS

Within the initial launch period, 78% of eligible clinicians adopted the technology. One nephrologist reduced daily documentation time from two to three hours to three to four minutes per note. Physicians reported that the system captured their conversations accurately, used appropriate medical terminology and improved the clarity of notes.

Patient satisfaction remained high throughout implementation, with 96% saying they would recommend their provider after visits where clinicians used the technology. Based on these outcomes, Ochsner's leadership plans to expand DeepScribe across the entire health system. Leaders say the technology not only has improved documentation but also has restored clinicians' time, attention and energy to the work that matters most — caring for patients. ●

Reducing transfers and readmissions through hybrid care

SNAPSHOT

Wellstar MCG Health, a nonprofit regional health system based in Augusta, Georgia, uses a hybrid care model to expand access to specialty care and support rural hospitals across the state. By combining virtual consultations, home-based monitoring and in-person services, the organization has lowered hospital transfer and readmission rates while improving efficiency and preserving access to care in underserved communities.

CHALLENGE

Rural hospitals in Georgia face persistent financial and staffing pressures. Since 2010, nine rural hospitals have closed and another 18 remain at risk of closure.[5] Many operate with limited budgets and staff, making it difficult to provide specialty services or manage high-acuity patients. As a result, smaller hospitals often transfer patients to larger regional centers.

STRATEGY AND SOLUTIONS

In 2019, Wellstar MCG Health partnered with Amwell to create the MCG Center for Digital Health, which connects rural hospitals, clinics and patients through a hybrid care network built on Amwell's virtual care platform. The system integrates directly with hospital workflows and EHRs, enabling secure video consultations and remote monitoring across multiple care settings.

Patients are referred through Wellstar MCG Health's own hospitals and affiliated rural partners, with care delivered by Wellstar clinicians using Amwell's platform to connect across sites. Through this infrastructure, specialists at Wellstar MCG Health provide real-time support for emergency, critical care and stroke cases in smaller hospitals, allowing local clinicians to manage more complex patients close to home.

The partnership also powers Post-admit at Home, a program offering short-term remote monitoring for patients recently discharged from Wellstar facilities. Patients are provided with monitoring devices and temporary Wi-Fi support to ensure reliable communication with care teams, even in areas where internet access is limited.

RESULTS

Since implementing the program, Wellstar MCG Health has cut patient transfer rates from 80% to 35% and reduced hospital readmissions from 15% to 7%. These improvements have saved an estimated $454,000 per month and freed roughly six inpatient beds each day. Partner hospitals also reported higher patient satisfaction and improved care continuity. ●

Testing AI assistant app to ease nurse documentation

SNAPSHOT

Cedars-Sinai, a nonprofit academic medical center based in Los Angeles, serves one of the largest and most diverse patient populations in the country. Known for early adoption of emerging technologies, the hospital is piloting an AI-powered documentation tool designed to reduce nurses' administrative workload and give them more time for direct patient care.

CHALLENGE

Nurses at Cedars-Sinai spend a significant portion of each shift on documentation, leaving less time for patient interaction and contributing to burnout. Hospital leaders wanted to test whether AI could help nurses document more efficiently, similar to how AI tools already assist physicians.

STRATEGY AND SOLUTIONS

Cedars-Sinai is piloting Aiva Nurse Assistant, a mobile application that uses conversational AI to streamline nursing documentation. The app allows nurses to use hospital-issued mobile phones to dictate patient updates in real time. The AI transcribes these voice notes, converts them into structured data and maps them into fields in the EHR. Nurses review and confirm each entry before it is submitted, maintaining accuracy.

The pilot is underway on a 48-bed surgical unit and builds on Cedars-Sinai's earlier experience using voice-enabled

AI tools for physicians. The project was developed in collaboration with the hospital's nursing and enterprise information services teams and Aiva Health, a company that participated in the Cedars-Sinai Accelerator program.[6]

Hospital leaders said the pilot reflects Cedars-Sinai's broader effort to support nurses through technology designed to make their work more efficient and sustainable. "This AI-driven technology furthers our commitment to our incredible and dedicated nursing staff by reducing administrative burdens, allowing for increased efficiencies and innovation," said Craig Kwiatkowski, senior vice president and chief information officer at Cedars-Sinai. "As we consider advancing this pilot program, we hope to make the day-to-day role of our nurses easier and more efficient, building on the progress we have made with our physicians."

RESULTS

Early feedback from nurses has been strongly positive. Participants say the system shortens documentation time and reduces cognitive load, allowing them to focus more on patient care. Nurses report that charting feels less burdensome and that documentation is completed more promptly and accurately. Cedars-Sinai plans to evaluate the pilot's impact on efficiency and satisfaction before expanding it across additional inpatient units and clinical disciplines. ●

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The AHA's Market Scan thanks the following people and organizations for their insights, support and contributions to this Trailblazers report:
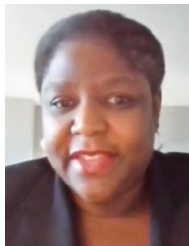
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Footnotes

[1] Robeznieks, Andis. "AI scribe saves doctors an hour at the keyboard every day." American Medical Association News Wire.

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[6] "Artificial Intelligence Lightens Administrative Burden on Nurses," (2024) Cedars-Sinai Newsroom.