

WHITE PAPER



# Digital Paper in Smart Hospitals: Upgrading the Patient Experience

*“This technology is helping us improve patient care,  
save time and reduce errors.”*

Sara Laporte | VP of Orthopedics and Surgical Services | Landmark Hospitals

Written and Produced by: Captains of Industry®

**CAPTAINS**®  
of INDUSTRY

Sponsored by: E Ink Corporation®

**Eink**®



Today's healthcare industry, compared to the not too distant past, is a marvel of digitalization—from Electronic Health/Medical Records (EHR/EMR) to Predictive Analytics—with data playing an ever more important role in patient care.

Now more than ever, sharing accurate information across the care continuum is mission-critical, so much so that the position of Chief Information Officer is arguably at the same level as Chief Medical Officer.

The drive for digitalization was designed to improve workflow efficiency, enhance the accuracy of communications, mitigate risk and improve safety for the benefit of patients. After all, “patient centered care” is the mantra of today's healthcare industry. Which makes it all the more ironic that the one communication tool most visible to patients in hospital rooms is based on a manual, error-prone technology in use since the days of the Greek physician Hippocrates (460-370 BC), author of the Hippocratic Oath: First, do no harm. Namely, writing or printing on paper.

A range of traditional signage systems still in use in today's hospitals are holdouts from a previous era, involving analog and time-consuming processes. Patient room door signs that show the room number and the assigned physician are usually printed and often affixed outside rooms using clips or tape. Bedside patient care signs showing everything from the name of the patient to their diagnosis, DNR information, allergies and contact isolation notes are likewise printed or handwritten. Whiteboards, with their elusive erasable markers, show information including goals of the day, the care team, the weather, and the time family members are expected to visit.

Doing things “the same old way” has run headlong into the urgent realities of the digital era. Issue number one is that anything handwritten or printed is by nature more prone to human error, which is all the more problematic given that these signs are geared towards care team and patient communications. Communication errors with patients or administrators are cited as one of the top three core factors underlying hospital sentinel events.<sup>1</sup> In addition, anyone in a rush is more likely to input the wrong information, or scribble something that can easily be mistaken by another caregiver. Nurses rank work overload as the number one reason<sup>2</sup> they are stressed on the job, and yet they are the ones usually tasked with keeping signs up-to-date *by hand*.

The information nurses are inputting onto these signs is exactly what’s already in their database. Having to access the data and re-input it manually amounts to grunt work that distracts nurses from what they do best, which is caring for patients. This wasted time adds up. Over any given twenty-four hour period, manually re-inputting information can amount to forty-five minutes to an hour of precious time — potentially more if the patient’s condition is complex. The time crunch is stressful for nurses, and an issue for administrators seeking greater efficiency and profitability. After all, the average salary of registered nurses in the United States<sup>3</sup> is \$73,550.

### **The Whiteboard TV Screen — Right Idea. Wrong Technology.**

Whiteboards have been shown to substantially improve patient satisfaction,<sup>4</sup> an important consideration given that HCAHPS scores have a direct impact on a hospital’s reimbursement and bottom line. Some companies have introduced digitized whiteboards, with EHR/EMR data automatically updated onto a TV-like screen (LCD) in patient rooms. The light pollution from these screens, however, is a significant concern. Studies have shown that the bright lights of LCD screens can disrupt a person’s circadian rhythm,<sup>5</sup> essentially resetting their personal clock to disrupt sleep patterns. Circadian rhythm disorders are linked to serious health issues such as insulin resistance, cancer, cognitive dysfunction and obesity – not exactly what doctors and administrators are looking for to improve the patient experience and enable positive outcomes.

### **The Growing Role of Digital Paper in the Patient Care Environment.**

There is a new solution coming to market in the United States that allows hospitals to bring digital signage into the 21<sup>st</sup> century, without taking a step back with light pollution: Signs made with digital paper instead of typical TV screen LCD technology. Unlike LCD, screens made with digital paper do not emit light.

Known by most people as the screen in their eReader, digital paper mimics the look of printed paper, yet provides the advantages of digital media. Made by E Ink,<sup>®</sup> digital paper has particles within microcapsules or microcups that are coated onto a thin film layer that act as a form of ink, but instead of ink being pressed permanently upon paper (which ultimately must be recycled or dumped in landfills), the ink particles in digital paper are automatically recycled to form new letters and images when the display image is updated.



Today this technology has come of age in healthcare, with companies launching innovative solutions for patient/provider information sharing. E Ink screens are now available in a range of formats, from about 5 inches to up to 42 inches, for applications ranging from medical admission forms, to patient door signs, to bedhead and bedside patient care signs, to large-format patient communication boards.

E Ink-enabled signage is linked to hospital databases, allowing for automatic information updates without the need for manual updates by time-pressed nursing staff. Each individual sign integrates with the system as a whole, so information on the patient care signs, door signs, and patient communication boards is always up-to-date and consistent. Having signage that's automated is a huge time saver that also helps reduce the risk of sentinel events due to communication errors.



Made with E Ink digital paper, DCI Health Technology's patient room door signs are automatically updated with accurate information.

*“What the digital paper technology lets us do is bring caregivers back to the bedside instead of staring at computer screens. It’s a truly easy way to identify patients and their issues and help our staff provide better care.”*

Sara Laporte | VP of Orthopedics and Surgical Services at Landmark Hospitals

### **Sustainable Health**

Digital paper screens require 99 percent less power to operate than LCD screens, helping hospitals add the value of digitalization in a sustainable way. Most hospital signs made with digital paper require only small batteries to operate, making them easy to deploy without special wiring or cleaning considerations.

Viewing screens made with E Ink is a healthy experience. Researchers at the Canadian Concussion Center did a study<sup>6</sup> of patients recovering from concussions and found that patients reading from digital paper screens were better able to focus, and experienced less pain than those attempting to read from traditional LCD screens. E Ink screens can be on continuously in patient environments, all day and night, with the comforting look and feel of paper and no light pollution.

### **Instant Translation**

Another advantage of digital signage is that it's multilingual at the touch of a button, helping solve a major challenge for today's hospitals. Twenty percent of Americans speak a language other than English at home,<sup>7</sup> while nearly half of Americans in the top five most populous cities speak a language other than English at home.<sup>8</sup> To solve for this, 42-inch patient communication boards made with E Ink digital paper can be changed instantly to show information in any number of languages, from Spanish to Urdu.

### **Conclusion**

With reimbursements based on HCAHPS patient satisfaction scores, hospitals need to explore every possible avenue to enhance each patient's perception that they are receiving excellent care. Communications signage made with digital paper creates a visible statement that hospitals are dedicated and responsive to patient needs as well as respectful of the heavy workload of their nursing staff.

If hospitals are going to invest in upgrades to their IT infrastructure and bring the whiteboard and other signs into the 21<sup>st</sup> century, it makes sense to adopt the most contemporary technology. Displays made with E Ink digital paper have the future built in, providing the benefits of digital media without light pollution.

The push to digitize healthcare isn't slowing down. It will only accelerate as companies such as Amazon push the boundaries of what's possible. Today, Amazon's Alexa voice-activated smart speakers can help us order cat food. Soon, Alexa's new healthcare "skills"<sup>9</sup> could provide patients with a comforting voice to answer questions, let them know when relatives will be arriving, or provide information on their prescriptions.

Ultimately, however, digital technology in healthcare isn't about technology at all. It's about people in beds who are trying to heal, and the nurses and doctors doing their absolute best to care for them. In this environment, digital paper will play a growing role in the sharing of information in the most healthy, sustainable and efficient way possible for patients and caregivers.

---

## About the Author

Ted Page is a Co-Founder and Principal of Captains of Industry. Page has worked with numerous healthcare and high-tech clients, and wrote the script for *First, Do No Harm*, a video series that helped raise awareness of patient safety issues in hospitals.

---

## About the Sponsor

E Ink is the originator, pioneer and commercial leader in ePaper technology. The company delivers its advanced display products to the world's most influential brands and manufacturers, enabling them to install extremely durable, low power displays in previously impossible or unimaginable applications and environments.

E Ink encompasses the combined E Ink Corporation, which was spun out of the MIT Media Lab in 1997 to commercialize electronic ink and EPD technology, and Prime View International, which was established in 1992 as the first TFT LCD company in Taiwan, focusing on high quality small-to-medium sized TFT LCDs. In 2009, Prime View acquired E Ink Corporation to further integrate and expand the EPD supply chain and the new combined companies were branded as E Ink.

E Ink's corporate philosophy centers around delivering revolutionary products, excellent user experiences, and environmental benefits through advanced technology development.

---

## Sources:

- 1) Joint Commission
- 2) National Institutes of Occupational Safety and Health
- 3) Stanford University Medical Center study (2013)
- 4) Bureau of Labor Statistics (2017)
- 5) Medical News Today
- 6) Science Daily
- 7) U.S. Census Bureau
- 8) Center for Immigration Studies
- 9) Amazon