

USA

From barriers to benefits: enhancing patient-centered care through digital labeling in healthcare

Challenge

Transitioning from packaged paper-based delivered information to digital content is a significant shift for the healthcare industry, requiring careful management of patient hesitation and ensuring that digital content remains easily accessible. Regulators must prioritize patient needs by establishing clear standards for identifying both physical products and digital information, while also facilitating understanding and access to data throughout the change process. Moving too quickly without fully addressing these barriers risks the success of the transition, making patient-centered focus essential for a successful transformation.

Approach

To effectively navigate the challenges of digital transformation in the healthcare industry, a collaborative approach is key. This involves healthcare companies, providers, technology developers, regulators, and most importantly, patients. Core strategies include improving the usability of digital labels, promoting the use of GS1 DataMatrix barcodes and scanning, prioritizing patient onboarding and education and harmonizing regulations to best support our global patient. A phased implementation, guided by GS1 standards, supports gradual adoption, allowing stakeholders to learn and adjust along the way.



Achieving seamless data exchange across healthcare systems



Patients struggle with accessing and navigating technology



Advocate for standard approach across different countries



Educate and involve patients throughout the transition process

Introduction

In the evolving landscape of healthcare, it's becoming increasingly important to place patients at the center of care. As technology continues to transform how health information is delivered and accessed, digital labeling is emerging as a promising solution. Accessing digital labeling may be most effectively achieved through using a single barcode, such as the GS1 DataMatrix, which has been shown to enhance traceability and reduce errors (GS1 New Zealand, 2024). It could help simplify medication management, support regulatory compliance, and potentially empower patients to participate more actively in their care (Smith & Lee, 2022).

However, transitioning from packaged paper-based information to digital information represents a significant shift for the industry—

one that requires careful navigation of challenges such as patient hesitation, data accessibility, and standardization. Achieving this transformation hinges on a collaborative effort among healthcare companies, providers, technology developers, and patients. Emphasizing usability, promoting GS1 DataMatrix scanning, and prioritizing patient onboarding are critical to driving adoption and addressing disparities in technology access.

Central to this approach is a phased, standards-based implementation process that ensures a seamless, equitable, and patient-centered healthcare experience. Proactively managing these elements is essential for realizing the full benefits of digital labeling, fostering interoperability, and building a more connected, efficient, and patient-focused future in healthcare.

Supporting a smooth and harmonized digital transition through regulation

Effective regulations play a pivotal role in facilitating a smooth transition to digital labeling in healthcare. Regulators should consider promoting flexibility by allowing a phased implementation approach, enabling healthcare organizations to gradually adopt new technologies while managing potential risks and ensuring continuous patient safety.

A phased approach helps address varying levels of system readiness and supports iterative improvements based on real-world feedback. Lessons learned from the successful phased roll-outs of unique device identification and serialization systems show that establishing standards, infrastructure, and compliance in manageable stages leads to stronger outcomes. Leveraging GS1 standards ensures interoperability and data consistency across systems and regions, reducing integration challenges and building confidence in the adoption of digital labeling while safeguarding patient safety and system integrity.

To make digital labeling regulations both practical and effective, collaboration between health authorities and the healthcare industry is essential. Harmonized regulations and requirements, clear guidelines, interoperable systems and enforceable standards are needed for both physical products and digital content.

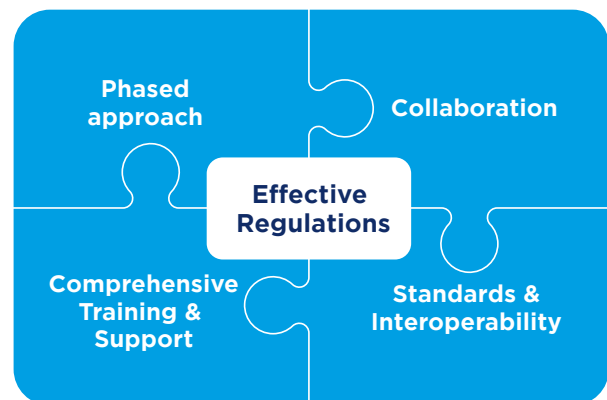
Johnson & Johnson plays an active role in shaping these regulations by working with regulators and industry peers through workgroups, forums, pilots and position papers. These engagements allow us to share insights from real-world implementation, promote interoperability across markets and support the development of clear, consistent guidelines. By working side by side with health authorities and other stakeholders, we help shape standards that protect patients, streamline compliance and enable innovation.



Equally important is creating a harmonized customer experience supported through comprehensive training for healthcare providers, technical assistance and integrated systems that align

with established standards. Such an approach fosters consistent quality and usability across different systems and regions. It also encourages faster adoption, building trust and confidence among stakeholders.

Together, these strategies will help ensure that digital adoption is effective, sustainable and firmly centered on the patient.



Navigating the challenges of a single barcode solution

The potential of a single barcode system, such as the GS1 DataMatrix, to transform patient care is highly promising. It may offer benefits such as increased product identification accuracy and improved efficiency across supply chains and regulatory processes. With native scanning capabilities, where devices like smartphones can directly read and interpret barcodes, healthcare professionals could access critical information quickly and reliably at the point of care (WHO, 2017). This could possibly empower healthcare providers and patients alike, support real-time inventory control, and foster more active patient engagement (Kumar & Saini, 2020).

While the journey to widespread adoption presents some complexities, these challenges unlock opportunities for innovation and collaboration. Ensuring interoperability across diverse healthcare systems, upgrading infrastructure, and bridging digital literacy gaps are hurdles that industry leaders are actively addressing through concerted efforts. Advances in standards and technology, coupled with robust security protocols, are paving the way for a future where digital tools enhance safety, efficiency, and trust.

The concept of “One Product, One Barcode” is gaining momentum, and Johnson & Johnson supports the GS1 DataMatrix as the single automated identification and data capture (AIDC) on the label. It is the preferred barcode for product identification and for launching digital content, as it reduces the need for additional space and changes to artwork. “Our journey began in 2015, and we have learned that success comes from

taking it one product at a time. Today, approximately 80% of our Innovative Medicine products carry the GS1 DataMatrix as the only barcode,” says Blair Korman, Senior Director, Digital Identification & Traceability, Global Trade Controls.

By proactively working together—regulators, healthcare providers, technology developers, and patients—we can build a unified, secure, and patient-centric healthcare ecosystem.

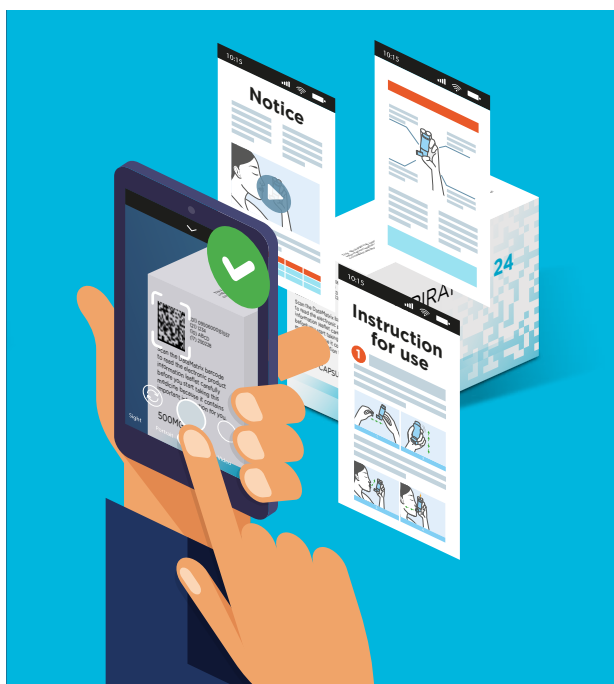


Fig1 : One Product, One Barcode, One Scan

Overcoming interoperability challenges in healthcare systems

One of the biggest challenges in advancing a single barcode solution is the fragmentation of healthcare systems, particularly the lack of interoperability among electronic healthcare record platforms. “Different healthcare platforms often can’t “talk” to each other, creating data silos. They can’t seamlessly share or interpret information, creating obstacles to unified, real-time access to critical data,” says Shekhar Nambi, Director Digital Solutions, Digital Identification & Traceability, Global Trade Controls. “To overcome this hurdle, standardization is essential. Achieving true interoperability requires the development and adoption of standardized protocols, data formats and communication frameworks.”

The good news is that meaningful progress is emerging. Industry stakeholders, including health authorities, technology companies, and manufacturers, are working together to define these standards and ensure compatibility across platforms. They are establishing common protocols and data formats that allow different

systems to communicate with one another. This collaborative approach is critical to enabling the integration of a single barcode system across diverse platforms, ultimately leading to a more cohesive healthcare ecosystem.

Empowering patients through technology and education

The technology gap, often referred to as the digital divide, presents a significant challenge to the successful implementation of barcode technologies and other digital solutions in healthcare. While these innovations offer tremendous potential, not all patients are equally equipped to benefit from them. Underserved populations, including those with limited internet access or lower digital literacy, may find it challenging to engage with digital platforms (U.S. Department of Health & Human Services, Health Resources & Services Administration, 2022). According to a survey conducted by the PEW Research Center, 43% of adults with household incomes below \$30,000 lack home broadband services and 24% do not own a smartphone. Seven percent of U.S. adults do not use the internet at all (Vogels, 2021).

In response, Johnson & Johnson is actively advocating for educational initiatives to improve digital literacy, ensuring that all patients can benefit from advances in healthcare technology. Johnson & Johnson is collaborating with industry peers to explore alternatives to traditional packaged paper-based information, seeking innovative and accessible ways to deliver essential health content digitally.

To better understand patient needs, Johnson & Johnson initiated a patient survey focused on their experiences and preferences with digital health tools. The results were encouraging. A majority of respondents view the transition to digital as a positive development, with many highlighting its eco-friendly benefits. Notably, over 60% of participants expressed support for replacing traditional paper product labels with electronic product labels (Ipsos, 2025).

“As we move forward, enhancing the user experience remains a top priority,” says Guido Cammarota, Head of Italy Regional Demand and Supply, Johnson & Johnson Innovative Medicine. “One key insight from our work is the value of including a clear call-to-action alongside the barcode. This not only supports our patients but also fosters trust by clearly communicating what information they’ll receive and how to engage with the technology effectively.”

By combining inclusive design, patient education and strategic collaboration, the aim is to bridge the digital divide and ensure that digital innovation supports every patient, regardless of age, background, or level of tech confidence.

Ensuring trust through data privacy, system reliability and safe access

As healthcare information becomes more centralized around a single barcode, concerns around data privacy, technology failures and potential misuse must be addressed. Patients and healthcare professionals need to trust that digital tools not only work consistently but also protect sensitive information and support clinical decision-making.

To mitigate these risks, Johnson & Johnson is establishing robust protocols for monitoring, timely issue reporting and rapid resolution. These measures help maintain system reliability and ensure that any disruptions are addressed swiftly. In addition, contingency plans are being developed to maintain uninterrupted access to product information in the event of technical failures because patient care cannot afford delays.

Another risk today is that many users, in the absence of clear official digital access points, are scouring the internet for healthcare product information. This can lead to misuse of outdated, inaccurate, or unofficial content, which poses real threats to patient safety and trust. By offering direct digital access through secure, standardized labeling, our solution ensures that patients and healthcare professionals receive accurate, real-time product information they can trust right at the point of need.

Ultimately, ensuring patient safety and data integrity remains a top priority. Through proactive risk management, communication and trusted access to information, Johnson & Johnson is building a safer, more resilient digital health environment for all.

Conclusion

The potential of using a single barcode to enhance patient care is promising, offering a pathway toward a more connected, accessible, and patient-centered healthcare system. However, realizing this promise requires overcoming several critical challenges, including interoperability, the digital divide, consistent adoption,

and the risk of misuse. Addressing these issues proactively through stakeholder collaboration, ongoing education, and robust technology safeguards will be essential.

As digital labeling becomes increasingly adopted, the expectations around digital information sharing will expand. For example, launching electronic leaflets could naturally lead to expectations for electronic submission of product complaints, drug recall information, verification processes, and instructional videos. Therefore, scalable solutions that leverage GS1 standards will be vital to efficiently meet the growing, evolving needs.

Moreover, as digital adoption spans across borders, there will be a need for regulatory frameworks that facilitate the acceptance of global standards rather than country-specific mandates. This approach will help prevent regulatory complexities from shifting and support broader access to digital healthcare solutions worldwide, always with patient safety and interests at the forefront.

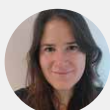
By fostering collaboration, embracing continuous innovation, and promoting interoperability on a global scale, we can ensure that digital labeling fulfils its full potential—transforming healthcare into a more seamless, reliable, and patient-centric experience for all.

Next steps

The active involvement of all stakeholders is essential to ensure the success of this digital information. While change management is never easy, it is a critical step toward building a more modern, efficient and patient-focused healthcare system.

Johnson & Johnson continues to work closely with GS1, participating in industry forums and engaging with health authorities to drive alignment around patient-centric digital labelling solutions. Together, we are helping pave the way for a future where a single barcode empowers better access to trusted health information, improving care for everyone (GS1 Healthcare, 2020).

About the author



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Tinne Pauwels leads Digital Labeling initiatives for Johnson & Johnson. She is responsible for spearheading initiatives related to digital labeling regulations with a focus on customer compliance, standards and emerging digital technologies. Tinne executes global strategies, identifies new opportunities and manages proof of concepts. Her mission is to shape and enhance industry and regulatory requirements for digital labeling, ensuring that our strategies maximize benefits for our patients.

About the organisation



At Johnson & Johnson, we believe health is everything. Our strength in healthcare innovation empowers us to build a world where complex diseases are prevented, treated, and cured, where treatments are smarter and less invasive, and solutions are personal. Through our expertise in Innovative Medicine and MedTech, we are uniquely positioned to innovate across the full spectrum of healthcare solutions today to deliver the breakthroughs of tomorrow and profoundly impact health for humanity.

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