One Product, **One Barcode**

November 2024

The report was produced by Deloitte as an evidence-based assessment, not setting out to lobby, or advocate a particular position.

The barcodes in images in this report are for illustrative purpose only and are not scannable.

Contents

*For questions regarding the report, 'One Product, One Barcode' approach, or any other inquiries related to GS1 standards, please contact the GS1 Healthcare team at **healthcare@gs1.org**.*

Foreword

GS1 Healthcare is a voluntary, global user group comprised of leading manufacturers, distributors, solution providers, healthcare providers, and other actors to develop and implement global standards to enhance patient safety and supply chain efficiencies.

GS1 Healthcare continuously adapts its standards to meet evolving industry needs. Central to its strategy is supporting healthcare's digital transformation for better patient outcomes. Understanding the industry need for a simplified barcode scanning approach, the 2023-2027 GS1 Healthcare Strategy includes the strategic priority 'Single barcode', now referred to as 'One Product, One Barcode', championing and supporting the elimination of multiple barcodes on a healthcare product pack at the point of scan/care, working with industry to move towards a single GS1 barcode.

Having only one, instead of multiple, barcodes on healthcare product packs would make the scanning process along the supply chain clearer and simpler, enabling more accurate data capture with just one scan (e.g. eliminate medication errors, optimise interoperability, automated capture of data in Electronic Health Record (EHR), enable access to digital content, facilitate recalls whilst improving inventory management and reduction of waste). This approach could benefit every stakeholder across the healthcare supply chain, leading to reduced errors, better operational efficiency and improved patient safety.

In 2024, GS1 Healthcare engaged Deloitte to conduct a study to assess market readiness to reach the 'One Product, One Barcode' goal and act as catalyst for change. This study serves as a baseline and similar studies can be conducted in the future to measure progress and refine the actions needed. GS1 Healthcare and Deloitte are grateful to all stakeholders for their time and contributions to this study.

Executive summary

Art of the possible

Imagine a future where a single barcode at the point of scan or care allows access to a seamless flow of product information, facilitating a more efficient, transparent supply chain and a safer, more engaging and informative experience for healthcare providers and patients. This is a vision of a future that 'One Product, One Barcode' (1P1B) has helped to bring about.

For manufacturers, 1P1B simplifies compliance and improves product traceability. Distributors benefit from a clear chain of custody, ensuring the integrity of distributed healthcare products. For healthcare providers and patients, 1P1B eliminates confusion, minimises errors, and provides easy access to vital product information.

This single barcode acts as a digital gateway, linking the physical product to a wealth of data and enabling seamless information exchange between different healthcare systems. This leads to streamlined inventory management, real-time healthcare products tracking, and improved product authenticity verification.

By fostering collaboration and data exchange across the healthcare landscape, 1P1B paves the way for a future where technology empowers better care and enhanced patient safety.

To achieve this future of enhanced patient safety, we need to act today. Recognising 1P1B as an important component of this transformation, each stakeholder would need to take steps, to make this aspiration a reality.

GS1 is here to facilitate and guide the way.

Growing potential of 1P1B

The presence of multiple barcodes on healthcare products can contribute to medical errors, creating confusion during scanning, increasing the likelihood of mistakes in product data capture, ultimately impacting the 'five rights' of medication administration: right drug, right dose, right route, and right patient, at the right time. Half of the healthcare providers surveyed in this study reported that they experience barcode-related challenges due to multiple barcodes, either sometimes or frequently.

Having listened to industry feedback and, recognising the needs of its stakeholders and the inaccuracies and inefficiencies caused by multiple barcodes, GS1 Healthcare has put forward a vision: 'What if there were only one barcode on healthcare product packs?' This has led to the formulation of the 'One Product, One Barcode' (1P1B) initiative, and further exploration of its potential to enable scanning accuracy and improving overall efficiency across the supply chain.

Realising the benefits of 1P1B requires stakeholders to make changes, such as to their organisation and technology capabilities, securing funding, aligning other supply chains partners, and taking steps to progressively harmonise industry and regulatory environment.

Some organisations have already embarked on the journey to 1P1B, and this transition is gaining momentum. As more organisations adopt 1P1B, its value increases through a 'network effect', where the benefits grow as more participants join. Widespread adoption of 1P1B approach could unlock enhanced efficiency and cost savings for all healthcare supply chain stakeholders. Those who delay may, conversely, risk facing disadvantages, including higher costs and reduced competitiveness.

Objectives of the report

This report summarises the study Deloitte conducted on behalf of GS1 Healthcare across a diverse set of healthcare supply chain* stakeholders, including pharma and medical device manufacturers, distributors, solution providers, healthcare providers and development partners to identify challenges related to multiple barcodes, examine the potential of 1P1B approach, assess the healthcare industry's readiness for transition to 1P1B and develop actionable recommendations for GS1 Healthcare and the healthcare community.

Key benefits identified that would be realised through 1P1B include: ease of use for everyone and clarity on what to scan; harmonised compliance and streamlined operations across the healthcare industry; enhanced traceability of products throughout their entire journey and improved product authenticity verification.

By stakeholders identifying their needs related to barcode scanning and defining potential opportunities, this study has also established key 1P1B principles to guide the transition journey. At the heart of this is Patient Safety, the overarching principle guiding the design and implementation of 1P1B.

This report outlines an aspirational goal and seeks to provide a foundation for driving the industry towards 1P1B and establishes a baseline for measuring progress towards its progressive adoption into the future. This report, therefore, also aims to:

- Raise awareness and drive action through highlighting the scale of the multiple barcode challenge and showcase potential opportunities of 1P1B.
- Guide implementation and deliver clear, actionable recommendations to progressively eliminate multiple barcodes on healthcare product packages and enable the shift to 1P1B.
- Foster stakeholder collaboration across the healthcare ecosystem to ensure successful adoption of 1P1B.

Path forward: overall recommendations for the healthcare industry

While healthcare stakeholders recognise the potential benefits of 1P1B, we found varying levels of preparedness:

- Multiple stakeholders acknowledge the need for technology and process changes to fully support 1P1B. This includes adapting packaging lines, upgrading legacy systems, and ensuring system interoperability. These adjustments are considered achievable by the majority of the interviewed and surveyed stakeholders.
- Securing funding for the required technology and process changes is, however, seen as a potential obstacle for some stakeholders, particularly for resource-constrained healthcare providers. Demonstrating the financial and clinical safety benefits of 1P1B is important justification for the investment required.
- The lack of global harmonisation and appropriate agreement on regulations, data practices and information sharing poses a challenge for the smooth and efficient transition.

Overcoming these challenges requires a collaborative, multi-stakeholder effort, with specific actions from each stakeholder group:

- GS1 Healthcare should play a role in facilitating the transition, coordinating actions, and acting as a key liaison across stakeholder groups, fostering open dialogue, engaging with partners, and creating collation of the 'willing'.
- Individual stakeholder actions should include addressing technological barriers through a phased approach, improving system interoperability, optimising internal processes and gathering robust data to support value case.
- All stakeholders collectively benefit from contributing to standards development and collaboration, engage in cross-industry dialogue, and advocate for 1P1B adoption with regulators.

**In this report 'healthcare supply chain' refers to all stakeholders involved in the journey of healthcare products, including pharma and medical device manufacturers, distributors, solution providers, healthcare providers (e.g., hospitals, clinics), development partners and patients.*

1. Introduction

'One Product, One Barcode' (1P1B) – *one barcode per healthcare product package, visible to and accessible at the point of scan/care, acting as a gateway to a wealth of product data and facilitating seamless information flow across healthcare systems* - offers a vision of a safer and more efficient healthcare ecosystem, with streamlined operations and improved patient safety. While this vision is compelling amongst the interviewed stakeholders, the healthcare industry is still on a journey towards fully realising its potential. Addressing the current challenge of multiple barcodes on healthcare products is a crucial step in this journey, paving the way for 1P1B – a more harmonised and effective approach that could benefits all healthcare stakeholders.

To establish a clear baseline understanding of current multiple barcode usage, its impact within the healthcare ecosystem, and stakeholder readiness for 1P1B transition, this study engaged through interviews and/or digital surveys with representatives from approximately 80 healthcare supply chain organisations, including GS1 Member Organisations, across North America, Europe, Asia-Pacific, Latin America, and Middle East, Mediterranean and Africa.

The gathered insights were then analysed and used to inform the development of recommendations for a transition to 1P1B, ultimately shaping this report.

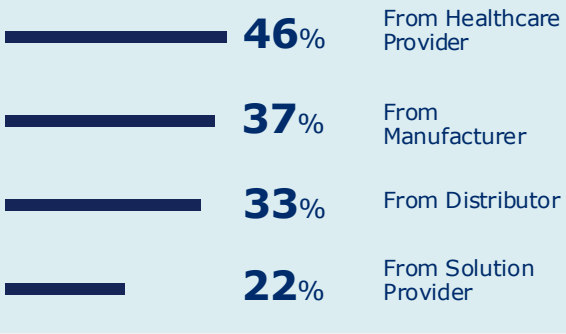
The report focuses specifically on efforts towards the universal adoption of 1P1B. While acknowledging the considerable merits and benefits of barcode scanning itself, this report avoids discussing those details except where the act of barcode scanning is an integral enabler of 1P1B.

Challenges associated with multiple barcodes

The prevalence of multiple barcodes on healthcare product packages stems from a combination of factors: diverse regulatory requirements, specific needs for different product types, and historical development of technologies. Various stakeholders, including manufacturers, distributors, and healthcare providers, have operational needs that are often met by different practices, ways of working and hence barcode types.

Handling multiple barcodes creates confusion over which barcode to scan, leading to inaccurate and incomplete data capture and increasing the risk of errors, potentially impacting patient safety and supply chain integrity.

GS1 Member Organisations (MOs) regularly hear about the challenges related to multiple barcodes from across different stakeholder groups. Almost half (46%) of the surveyed GS1 MOs (n = 28) reported hearing about challenges related to multiple barcodes from healthcare providers sometimes, frequently or almost always.



Beyond scanning: the need for barcode simplicity

As technological advancements like barcode scanning might enhance patient safety, the burden of managing multiple barcodes on a single product becomes increasingly apparent: the more barcodes on a given product the greater the risk of errors and inefficiencies.

The urgency of addressing multiple barcodes is underscored by the recent evolution of the healthcare industry, which demands innovative solutions to address emerging challenges and priorities:

- The COVID-19 pandemic highlighted the importance of strong and resilient healthcare supply chains.
- The increasing emphasis on product security and combating counterfeit healthcare products necessitates reliable traceability at the individual product level.
- There is a drive to embrace sustainability by transitioning to digital product information, providing transparency into the product journey and its environmental footprint (amplified by regulations, for example, similar to the EU Green Deal).
- There is a growing demand to empower patients with greater control over their health information and provide them with secure access to verified product information.

1P1B imperative

One barcode per product would eliminate the complexities and inefficiencies caused by multiple barcodes. 1P1B could effectively address the key needs of stakeholders, enabling more accurate data capture, allowing better operational efficiency and becoming an important step towards ensuring better patient outcomes. Evolving healthcare landscape also underscores the timeliness and relevance of 1P1B, highlighting the importance of transitioning to 1P1B now.

While 1P1B represents a straightforward, yet aspirational goal for a safer and more efficient healthcare system, it is essential to recognise that it is one piece within a larger set of efforts that would need to come together in order for benefits to be fully realised*. Factors like robust master data management, widespread industry adoption, and harmonised regulatory frameworks are also required and assumed for the purposes of this report to have been addressed.

1P1B is an enabler, a foundation upon which further advancements can be built. It's a part of the journey to unlock the potential for streamlined data capture, improved inventory management, and enhanced patient safety.

*acknowledging, at least for the time being, that multiple barcodes may remain necessary in certain situations due to existing industry practices and regulatory requirements.

Building on momentum: accelerating the shift to 1P1B

The healthcare industry is already taking steps towards making 1P1B vision a reality - early adopters of 1P1B are demonstrating its feasibility and the transformative potential. This momentum should be harnessed to foster a network effect - the more healthcare stakeholders adopting 1P1B, the more beneficial it becomes for everyone, becoming increasingly robust, reliable and cost-effective.

Increasingly widespread adoption amongst stakeholders is, therefore, necessary to fully unlock the benefits and contribute to a more connected, resilient and safe healthcare ecosystem.

Initial movement in healthcare industry

Several manufacturers are already applying single barcodes to their products, demonstrating the feasibility and value of 1P1B adoption:

As one interviewed pharmaceuticals manufacturer states, about **50% of their products have One Barcode only - GS1 DataMatrix.** They apply this barcode on pharmaceutical products in the EU to comply with the Falsified Medicines Directive (FMD) for serialisation and traceability. They have also standardised all their internal production lines and contract manufacturers to accommodate GS1 DataMatrix.

"With one barcode I can do everything internally: logistics, inventory management, traceability … That's how we leverage one barcode"
.

Another pharmaceuticals and medical device manufacturer, Johnson & Johnson (J&J), **achieved steady adoption of the GS1 DataMatrix for its pharmaceutical products**, with complete adoption in the U.S., driven by the Drug Supply Chain Security Act (DSCSA).
As Pavan Heda, Vice President for Small Molecule Value Chain at J&J points out, *"Globally, 80% of our pharmaceutical products utilise only the GS1 DataMatrix, with 100% adoption across the U.S. market. Some additional markets are also 100% due to serialisation regulations. When it comes to pharmaceutical products, the GS1 DataMatrix is the first step in reaching 1P1B"*.

Global medical device manufacturers, such as the one interviewed during this study, are **demonstrating commitment and taking steps towards the 1P1B approach**. While components and sub-assemblies often arrive with internal tracking barcodes, this manufacturer aims to remove these internal barcodes during assembly, striving to ensure **the final product leaves the factory with only one barcode** – a GS1-compliant barcode, demonstrating the feasibility of and highlighting their dedication to harmonised 1P1B approach.

Hospitals that are already experiencing benefits from receiving products with **one** barcode:

A Brazilian hospital partnered with a local manufacturer to implement 1P1B approach using GS1 DataMatrix on the primary packaging of pharmaceuticals. This collaboration, even starting from a point of no barcodes, has yielded traceability and operational benefits. The hospital eliminated manual labelling, saving labour costs and freeing up resources. Embedding lot numbers and expiry dates in one barcode enhanced inventory control and enabled complete traceability. This facilitated safer logistics processes across receipt, distribution, dispensing, and administration, allowing verification of the medicine dispensed as ordered, right up to the point of administration. This comprehensive tracking also allowed for the quick identification of patients who received specific batches of medicines in case of recalls, further minimising errors and enhancing patient safety. This experience demonstrates the intertwined opportunities of barcode scanning and 1P1B, showcasing how having only one barcode per product can contribute to improving efficiency, accuracy, and patient safety.

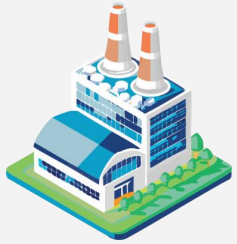
A similar experience is emerging in a French hospital, where approximately 20% of surgical implants now feature a single barcode on the secondary packaging. This initiative aims to prepare for future traceability of implants directly in the operating room, leveraging the benefits of UDI regulations. While scanning linear barcodes is possible, the hospital advocates for a single GS1 DataMatrix containing all regulatory information, accompanied by a human-readable version for clarity.
These examples, while limited in scope, highlight the opportunities 1P1B can bring and its transformative potential to improve healthcare settings by enhancing efficiency, accuracy, and patient safety.

2. Navigating the multi-barcode landscape

Achieving 1P1B hinges on understanding the diverse needs of healthcare stakeholders who rely on effective barcode scanning. While each stakeholder group utilises barcode scanning for different purposes, they all share the common goal of ensuring patient safety, a goal to which they expect 1P1B to significantly contribute. Numerous benefits stem from efficient and reliable scanning process, and a harmonised 1P1B approach could act as an enabler, streamlining this process across the healthcare ecosystem.

Healthcare supply chain stakeholder needs

Manufacturers (pharma and medical device manufacturers) apply barcodes to comply with evolving regulatory requirements, as more and more regulations are asking globally unique device identifiers captured in barcodes, or the use of GS1 DataMatrix for serialisation and traceability of medicines. Furthermore, manufacturers utilise barcode scanning for efficient production, inventory management, and traceability. They need a system that streamlines these processes, minimise errors, and enables them to track products throughout the supply chain.



Distributors depend on barcode scanning for accurate order fulfilment, efficient warehouse management, and timely delivery. They need a system that ensures the right products reach the right destinations at the right time.

Solution providers aim to provide reliable and effective solutions, that integrate effectively with the various systems used throughout the healthcare supply chain.

Healthcare providers utilise barcode scanning for safe medication dispensing, accurate inventory control, and efficient patient billing. They need a system that minimises errors, improves patient safety, and streamlines their clinical workflows.

Patients, increasingly empowered to manage their own health, are beginning to use barcode scanning to access product information, verify medication authenticity, and track their medication usage. They need an approach that is user-friendly, accessible, and provides them with reliable information.

The interviews suggest that stakeholders see barcode scanning as a key enabler of efficient product identification, with the potential to improve patient safety. A robust barcode scanning approach can help prevent medical errors, ensure product authenticity, and facilitate timely product recalls, ultimately safeguarding the patient.

Landscape of multiple barcodes

The proliferation of multiple barcodes on healthcare product packaging stems the existing differences in daily needs of stakeholders across the supply chain, each adapting barcode scanning to fit their specific requirements, from diversity in regulatory requirements and specific requests from the downstream stakeholders, such as healthcare providers. This has led to a variety of scanning approaches and combinations of several barcodes applied to product packs.

Major **reasons for adding additional barcodes** based on the interviews and survey insights:

1

Regulatory variations

Regulatory requirements for barcodes differ across countries, further contributing to the multiplicity of barcodes. Parallel trade within the EU, for instance, can necessitate different barcodes on the same package to meet specific requirements in different countries. A product might need a barcode with a French national product code (CIP) for sale in France and a different barcode with a German pharmaceutical registration number (PZN) for sale in Germany. Further illustrating this regulatory variation, some countries, such as Brazil, require QR codes on medication packages, adding another layer of complexity to the barcode landscape.

2

Internal manufacturing processes

Manufacturers often use additional barcodes for internal processes, such as tracking components, managing work-in-progress, or controlling production lines. While they attempt to conceal these barcodes from end-users, they can still create confusion if inadvertently scanned.

3

Enabling access to online product information

Manufacturers are increasingly adding additional barcodes to healthcare product packages to provide patients / consumers with easy access to digital product information, including e-leaflets and other commercially driven content.

4

Downstream stakeholder process & capability limitations

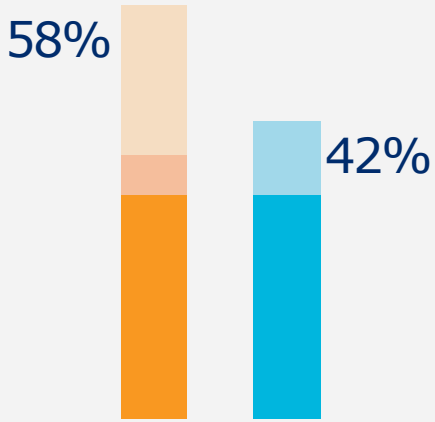
Downstream stakeholders, such as healthcare providers, often require different barcode formats or data elements to accommodate their internal system and processes limitations. This is especially true where interoperability is lacking, forcing manufacturers to apply multiple barcodes to satisfy these varying demands. For example, manufacturers may add peel-off labels to product packaging to accommodate healthcare providers who still rely on manual processes. A nurse or clinician might peel one label off for the paper record and another for invoicing and billing sheets. Recognising that not all hospital systems have achieved interoperability, manufacturers continue to include these additional labels to support these legacy workflows.

Highlighting the scale of multiple barcodes

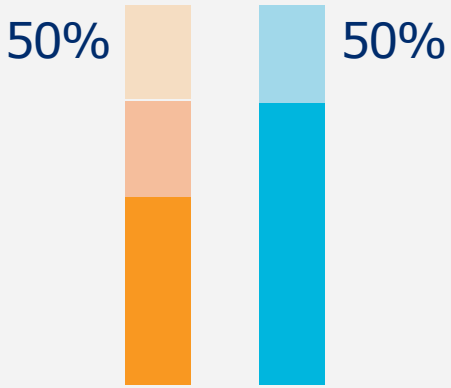
As part of the study, manufacturing and downstream (i.e. healthcare providers, distributors) healthcare organisations were surveyed to better understand and quantify findings from the interviews. Among other topics, the survey examined the application of multiple barcodes to healthcare product packages. Here, we present the results for secondary packaging, given that multiple barcodes are most commonly found here. The results indicate that, compared to using a single barcode or no barcodes at all, **applying multiple barcodes to healthcare product packaging is more prevalent.**

How frequently do manufacturers **apply** more than one barcode on **secondary packaging**?

- **Almost always** - 81% to 100% of products
- **Frequently –** more than 50% up to 80% of products
- **Sometimes –** between 21% and 50% of products
- **Rarely –** less than 20% of products
- **Never –** no products have more than one barcode

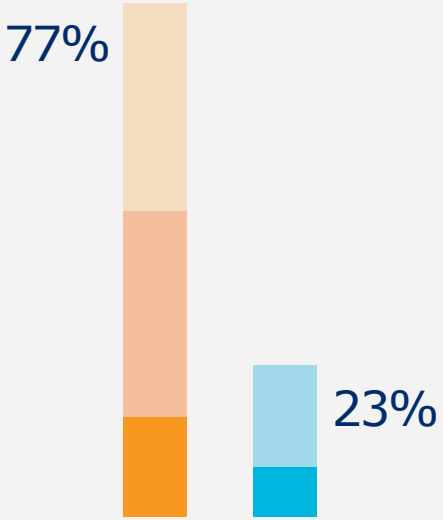


Pharmaceutical products
Secondary packaging (e.g. carton, inner carton)
Based on n = 22

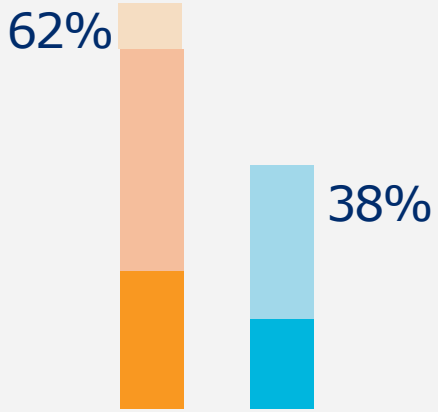


Medical devices
Secondary packaging (e.g. carton, tray)
Based on n = 26

How frequently do downstream healthcare stakeholders **find** more than one barcode on **secondary packaging**?



Pharmaceutical products
Secondary packaging (e.g. carton, inner carton)
Based on n = 15



Medical devices
Secondary packaging (e.g. carton, tray)
Based on n = 17

Survey responses collected from the **downstream healthcare stakeholders** (i.e. healthcare providers, distributors) revealed that more than a half of downstream healthcare stakeholders surveyed **report encountering multiple barcodes on secondary** packaging either almost always, frequently, or sometimes.

Interestingly, manufacturer responses differed from those of the downstream stakeholders, reporting a lower number of barcodes on healthcare products than downstream healthcare stakeholders indicated seeing. A preliminary analysis suggests this discrepancy may arise from a higher response rate among smaller, regional manufacturers with limited product lines, compared to larger manufacturers potentially distributing a wider array of multi-barcode products.

This difference could also be attributed to additional barcodes being applied as products move through the supply chain. These additional barcodes may be added by distributors or healthcare providers as workarounds to address limitations in their systems or processes.

This area requires further investigation in future research to gain a more comprehensive understanding.

Responses categorised as "I am not sure" and "N/A" were not included in these charts to enhance clarity and avoid obscuring the interpretation of the presented data.

The consequences of barcode proliferation

This practice of applying multiple barcodes leads to confusion, scanning errors, resulting in difficulties in achieving interoperability, product traceability and efficient medication administration and medical device application.

Ultimately, the proliferation of multiple barcodes has a risk of undermining the very goal that all healthcare supply chain stakeholders share: **ensuring patient safety.**

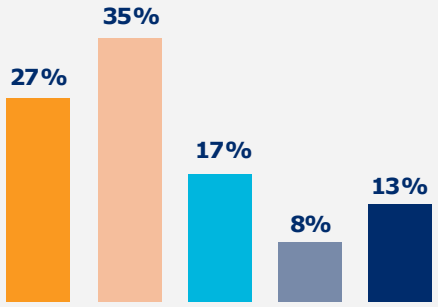
This is echoed by survey results showing that **62% of respondents agree or strongly agree that multiple barcodes increase risks to patient safety** due to reduced data accuracy and confusion.

"The presence of multiple barcodes complicates our process. We need to inspect all sides of the packaging to find the correct barcode to scan, which adds extra work. When there are too many barcodes, our staff might have to scan two of them to retrieve all the required information. This problem extends to the nursing staff, who also encounter various types of barcodes. It's really frustrating for them because they have to keep scanning until they find the right one, and it takes time. This shouldn't be about making the process more complex; it should be about making it easier," a Brazilian healthcare professional claims.

To what extent do surveyed stakeholders agree with the following **challenges** being **caused by the presence of multiple barcodes** within their organisation?

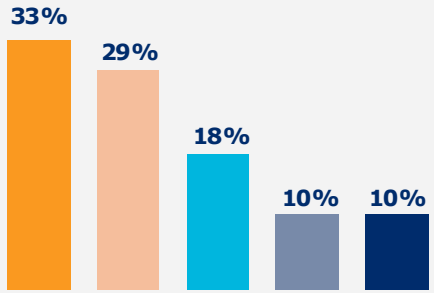
- **Strongly agree**
- **Agree**
- **Neither agree nor disagree**
- **Disagree**
- **Strongly disagree**

The presence of multiple barcodes has made it **difficult to maintain traceability and visibility, reducing operational efficiency** within my organisation, leading to delays, increased complexity and processes inefficiencies



Based on n = 48

The presence of multiple barcodes has **increased risks to patient safety**, such as reduced accuracy and completeness of data capture and confusion over which barcode to scan



Based on n = 51

Most frequently cited consequences of multiple barcode proliferation identified during the interviews

1. **Increased risk of errors**
   Healthcare professionals could face a higher risk of scanning the wrong barcode, leading to potential medication errors, inaccurate or missing data captured in patient records and incorrect billing.

2. **Compromised traceability**
   Tracking products through the supply chain could become more difficult when multiple barcodes are present, hindering efforts to ensure product authenticity and facilitate timely recalls.

3. **Frustration and inefficiency**
   The need to identify and scan the correct barcode could slow down workflows, potentially creating frustration for healthcare providers, and reducing overall efficiency.

"Every extra click, every added process, has a real impact on care delivery. In a hospital or GP surgery, every second spent navigating a technology solution instead of interacting with a patient detracts from the care experience. On a larger scale, it reduces the overall number of patients that healthcare professionals can see. Those seconds accumulate throughout the day and week, ultimately resulting in hundreds of patients not being seen over the course of a year simply because of that extra time spent on technology," a representative from a digital health agency states.

3. The opportunities for stakeholders arising from adopting 1P1B

The shift towards 1P1B presents opportunities for the healthcare industry, allowing to address existing challenges associated with multiple barcodes.

Opportunities for manufacturers

Simplifying compliance and optimising labelling

Manufacturers face varying regulatory and customer barcode requirements across different markets. This necessitates packaging and labelling adaptions for each region, increasing production costs and lead times. As one pharmaceuticals manufacturing representative stated, "the more complex the pack, the slower the process." This complexity can impact manufacturers' ability to respond quickly to market demands, potentially delaying patient access to critical healthcare products.

1P1B could offer a solution by providing a single global approach, simplifying compliance, reducing costs associated with varying regulations and potentially accelerating product launches. By eliminating multiple barcodes, 1P1B could free up valuable space on packaging for essential product information, such as recycling details and branding, enhancing clarity for both healthcare providers and patients.

Streamlining operations

Multiple barcodes complicate accurate and efficient product tracking. This leads to operational inefficiencies, including avoidable alerts triggered by end-user scanning errors due to barcode confusion. Some manufacturers have dedicated teams to investigate these alerts, highlighting the wasteful allocation of valuable employee time to preventable issues.

1P1B could enable streamlined and accurate product tracking from manufacturing to the point of scan/care. This enhanced traceability could provide valuable insights into product journeys that identify bottlenecks, optimise distribution networks, and respond effectively to disruptions. By minimising confusion and ensuring accurate data capture, 1P1B could reduce avoidable alerts, freeing up valuable employee time.

Opportunities for distributors

Streamlining inventory management and order fulfilment

While not reporting widespread challenges directly related to multiple barcodes, distributors recognise that managing products with different barcode formats require more complex systems and make it more time-consuming to identify and pick the correct product for an order, potentially leading to stockouts, delays, and incorrect shipments.

1P1B could simplify their operations, particularly when unpacking, repackaging, or performing labelling functions for manufacturers. 1P1B would make labelling process more intuitive and potentially less expensive due to less customisation required, as well as simplify barcode scanning process, reducing potential confusion and scanning errors.

Enhancing supply chain integrity

With multiple barcodes, establishing a clear chain of custody and verifying the proper handling of sensitive healthcare products during transit becomes more complex. As was mentioned during the interviews, this lack of a harmonised tracking approach also increases the likelihood of counterfeit or adulterated products infiltrating the supply chain, potentially jeopardising patient safety.

With 1P1B complete product data could be captured with a single scan, enabling more effective tracking of the product throughout its journey, improve counterfeit detection and make verification of proper handling and storage easier, enhancing supply chain integrity and contributing to better patient safety.

Opportunities for solution providers

Improving system reliability, usability and trust

While not fully explored in this study, solution providers mentioned moving to 1P1B would reduce the volume of 'false positive' alerts received by solution providers stemming from incorrect scanning cause by multiple barcodes. Investigating these avoidable alerts not only strains solution provider resources but also risks harming their reputation and wider system adoption, as clients may as a result have the mis-perception that the system is causing these issues.

Opportunities for healthcare providers

Improving usability and reducing errors at the point of scan/care

Multiple barcodes create ambiguity about which barcode to scan, leading to scan errors where scanners reject incorrect attempts. This reduces confidence in the technology and leads to abandoned scans: an interviewed medical device manufacturer reported 40% scan failure rate in hospitals, due to staff abandoning the process after an unsuccessful attempt. Similarly, Stephen Bush, medical director for operations at Leeds Teaching Hospitals Trust, put it: *"packaging typically arrives with multiple barcodes, and the challenge is knowing which one to scan. You often encounter a 'failed scan' message…and there is a loss of integrity."*

As was stated by the interviewed healthcare providers, 1P1B could offer an opportunity to eliminate the confusion at the point of scan/care, improving accuracy of data obtained with the single scan. This, in turn, would enable correct product data being recorded against the patient in the health record file. 1P1B could simplify scanning experience for healthcare providers and allow them to focus on what matters most – providing high-quality patient care.

Enhancing traceability and supply chain security

The uncertainty over which barcode to scan can also cause health care professionals to bypass the scanning process altogether, which compromises accuracy of product traceability through the healthcare supply chain. As Olivia Chauvel, a healthcare professional at Rothschild Foundation Hospital & IHF, expressed regarding which barcode to scan *"[it] becomes a bit cumbersome…when you have a lot of devices to scan, there is a real risk of scanning the wrong one"*, which leads to incomplete data in patient records, compromising traceability. As was also highlighted by a healthcare professional from Portugal, *"the complexity of the multiple barcodes means you cannot guarantee the traceability"*, which, in turn, prevents efficient tracking down of products in case of the recall.

1P1B could improve transparency and trust throughout the healthcare supply chain. It could remove ambiguity, ensuring accurate data capture and establishing a clear, reliable link between products at hand and their data embedded in the barcode. This enhanced traceability could provide real-time visibility into product journeys, increase confidence in product authenticity and enable swift and efficient product recall in a response to arising safety concerns.

Simplifying staff training and onboarding

Staff turnover amongst frontline healthcare professionals coupled with the complexities of multiple barcodes increases the need for training to achieve consistent barcode scanning in hospitals.

1P1B presents an opportunity to simplify training in this area, reducing training time and costs for staff and improving consistency in scanning practices, even with high staff turnover.

Streamlining inventory management and billing

Managing products with multiple barcodes complicates inventory management process for healthcare providers. As a healthcare SME highlighted, *"each of these barcodes might contain specific information, so if someone only scans one, they might only get the expiry date, for instance, and not scan the product information as that's in the other barcode."*

By ensuring that all necessary data is captured directly, or indirectly via master data, through a single scan, 1P1B could enable optimised stock levels, just-in-time inventory management, leading to better asset utilisation and allowing for more accurate and efficient billing.

Opportunities for patients

Enhancing patient engagement and addressing confusion

Insights from healthcare supply chain stakeholders suggest that moving from multiple barcodes to one could positively impact patient experience. Currently, multiple, similar-looking barcodes on product packs can create confusion for patients, impacting their ability to easily scan for valuable information.

1P1B could present an opportunity to improve patient experience and empower them to actively manage their health by eliminating confusion and enabling them to confidently access digital resources (e.g. electronic product information ePI, instructional videos, etc.) with a single scan.

In summary, 1P1B presents opportunities for every stakeholder in the healthcare supply chain

Over three-quarters of the **surveyed healthcare supply chain stakeholders** agreed or strongly agreed that the following **opportunities arising from 1P1B** were important for their organisation:

- Ease of use for everyone, understanding what to scan, from clinicians to patients;
- Easier compliance and a consistent approach across the industry;
- Clear visibility of products throughout their entire journey;
- Effective product authenticity and supply chain security

Manufacturers: eliminating barcode proliferation would support innovation in packaging and information delivery, freeing up space for clearer branding, sustainability information, and patient-friendly instructions. This streamlined approach could lead to cost savings, improved brand perception, more efficient inventory tracking and a stronger commitment to patient safety.

Distributors: 1P1B would enable smoother operations, less confusion and a reduced risk of errors. This could translate to improved efficiency, lower costs, and a stronger reputation for reliability.

Healthcare providers: a harmonised, intuitive barcode approach would mean less time spent on admin and more time focused on patient care. This could reduce the risk of errors, improve efficiency and ultimately contribute to a safer healthcare environment.

Patients: 1P1B could eliminate confusion and empower patients. With just one barcode to scan, patients could confidently access accurate and up-to-date electronic product information (ePI), verify authenticity, and potentially, if enabled, connect to support services.

As Pavan Heda, Vice-President small molecule value chain at J&J points out:

"Hospitals are required to capture data, but often don't know which barcode to scan. Instead of adding more barcodes, we aim to make it easier for users to read and scan."

It's important to acknowledge that the opportunities and benefits presented by 1P1B might not be equally distributed across all healthcare stakeholders initially. As one healthcare provider aptly noted, certain stakeholders, such as healthcare providers themselves, may experience more immediate benefits. However, as more organisations adopt 1P1B, the benefits will inherently expand across the entire ecosystem. This is because the power of 1P1B lies in its ability to foster mutually beneficial outcomes, such as enhanced supply chain transparency and efficiency, improved data accuracy, and ultimately, better patient safety.

As Pavan Heda also emphasises: ***"Patient safety and patient care remain top priorities for us."***

4. Recommendations and path forward towards 1P1B

Exploring stakeholder readiness and obstacles impacting the transition to 1P1B

Moving fully to 1P1B is a journey for both individual organisations and for the healthcare ecosystem.

Understanding the current state of readiness of different stakeholder groups is helpful for developing a successful transition strategy and actionable recommendations. A readiness framework was used during the study, encompassing technology, organisation, and external environment to encourage stakeholders think holistically about the transition.

Whilst it was understood that the foundational elements needed for 1P1B are in place, our assessment revealed varying levels of readiness across different stakeholder groups, geographies and supply chains. Some have already embraced 1P1B, at least in part, while others are just beginning to explore the concept.

Manufactures (who generate and apply barcodes to their products)

Technology:
Pharmaceutical and medical devices manufacturers generally expressed confidence in their ability to achieve **technical and systems (IT, scanning hardware, equipment)** readiness for 1P1B, but acknowledged that adapting their packaging lines, printing systems, and internal data management to fully support the standard will require effort and investment. Survey results reinforce this, with approximately 65% of manufacturing respondents agreeing or strongly agreeing that implementing and managing the necessary equipment, packaging, and printing line changes for 1P1B adoption is achievable.

Organisation:
Regarding organisational readiness, manufacturers (over 85%) indicated confidence in their ability to **train personnel** for 1P1B transition, suggesting that upskilling is not a major concern. However, they emphasised the importance of internal and external **process alignment**, particularly with supply chain partners like contract manufacturing organisations (CMOs), to ensure a consistent approach to 1P1B. While approximately 65% of manufacturers agree or strongly agree they can implement the necessary changes across their products and processes, 55% expressed similar confidence in managing the transition across markets, CMOs, and subsidiaries. This perhaps points to the complexities of coordinating 1P1B adoption across the network.

Securing funding for the technology and process changes required for 1P1B emerged as a more challenging area. This was reflected in the survey results, where 40% of manufacturers either agreed or strongly agreed that they would be able to make a business case within their organisation for transitioning to a 1P1B approach. This figure, lightly lower than other readiness indicators, suggests that more exploration and effort may be required to ensure readiness in building a compelling business case for 1P1B compared to other capabilities.

Downstream stakeholders (distributors, healthcare providers, who use barcodes on healthcare products)

Technology:
Downstream stakeholders, including distributors and healthcare providers, generally acknowledged the need for **technology upgrades** to support 1P1B adoption. Distributors anticipated needing new scanners, updated software, and potential retrofitting of automated systems like robotic picking machines. Healthcare providers similarly highlighted the need for scanner acquisition and upgrades to legacy technologies, systems, and integrations. A key concern for healthcare providers was ensuring their existing Electronic Health Records (EHR), Enterprise Resource Planning (ERP) and dispensing systems could handle 1P1B data and facilitate timely data exchange. Approximately 62% of surveyed downstream organisations expressed confidence (agreed or strongly agreed) in their ability to implement and manage the necessary adjustments to scanning equipment and supporting infrastructure.

Organisation:
While downstream stakeholders acknowledged that 1P1B adoption may necessitate adjustments to their core **operational processes**, they expressed strong confidence in their ability to implement these changes. Approximately 80% indicated agreement or strong agreement that adapting their organisations' processes to enable the transition to a 1P1B approach is achievable. This confidence extended to training as well, with over 80% of respondents expressing confidence in their ability **to train employees** for 1P1B implementation.

However, **securing funding** for these technology and process changes requires a focused effort to build a compelling business case. Demonstrating the value proposition of 1P1B is key, and while 58% of downstream stakeholders currently express confidence in their ability to create a successful business case, there's an opportunity to further strengthen this confidence by providing robust evidence of the financial and clinical benefits associated with 1P1B adoption.

Common factors impacting the readiness to transition to 1P1B

The need for individual organisations to **develop a business cases** for senior leadership, decision makers and budget holders was mentioned in the majority of interviews and across all stakeholder groups. The financial and clinical safety benefits of moving to 1P1B need to be assessed against the costs of barcode scanners, equipment changes, software, and maintenance in order to form a compelling business justification. Reasons given for not having been able to develop sufficiently compelling business cases were common amongst the interviewees. While 1P1B could offer quantifiable opportunities such as improved efficiency and cost savings across in both manufacturing and downstream in the supply chain, companies often lack the tools, concrete data and benchmarks to quantify these benefits due to the complexity and potential variability of the supply chains involved, making it harder to aggregate data and assess the full impact of a 1P1B transition. The major benefit of improved patient safety is also seen as hard to quantify in financial terms.

The rapid pace of **technological advancements** in the healthcare industry adds another layer of complexity to 1P1B transition. Solution providers are enablers of this change across the end-to-end healthcare ecosystem for all stakeholders. Given their role in facilitating 1P1B adoption, further research is needed to assess solution providers' readiness and identify potential barriers they might face. Understanding their capabilities and limitations is essential for successful 1P1B implementation, ensuring its feasibility, affordability, and ultimately, realising its full potential to transform healthcare. It will be vital for solution providers to maintain their focus on exploring innovative solutions for 1P1B, such as native scanning capabilities for 2D barcodes and other emerging technologies.

External factors

The interviews revealed a lack of **harmonisation in regulatory and data practices, and inconsistencies in information sharing**. Interviewees expressed a need for agreement on data quality and exchange standards. This presents a challenge, but also an opportunity for multinational organisations to support alignment and implement a consistent 1P1B methodology across their remit of operations. One distributor summarised the desired outcome: *"The ideal situation is to have one common barcode requirement with fixed scope, in compliance with all global standards, which is well accepted by all statutory and regulatory bodies in the world."*

The healthcare industry also faces **two related issues potentially impacting widespread 1P1B adoption**. Healthcare providers and distributors are hesitant to invest in new systems and processes until manufacturers demonstrate a firm commitment to delivering 1P1B. Manufacturers are reluctant to invest in 1P1B-required labelling and packaging changes without clear demand from the healthcare sector: the survey revealed that manufacturers view downstream readiness as a blocker. Achieving widespread 1P1B adoption requires overcoming these issues, fostering cross-industry collaboration to unlock the full potential of a unified barcode system and its associated network effects.

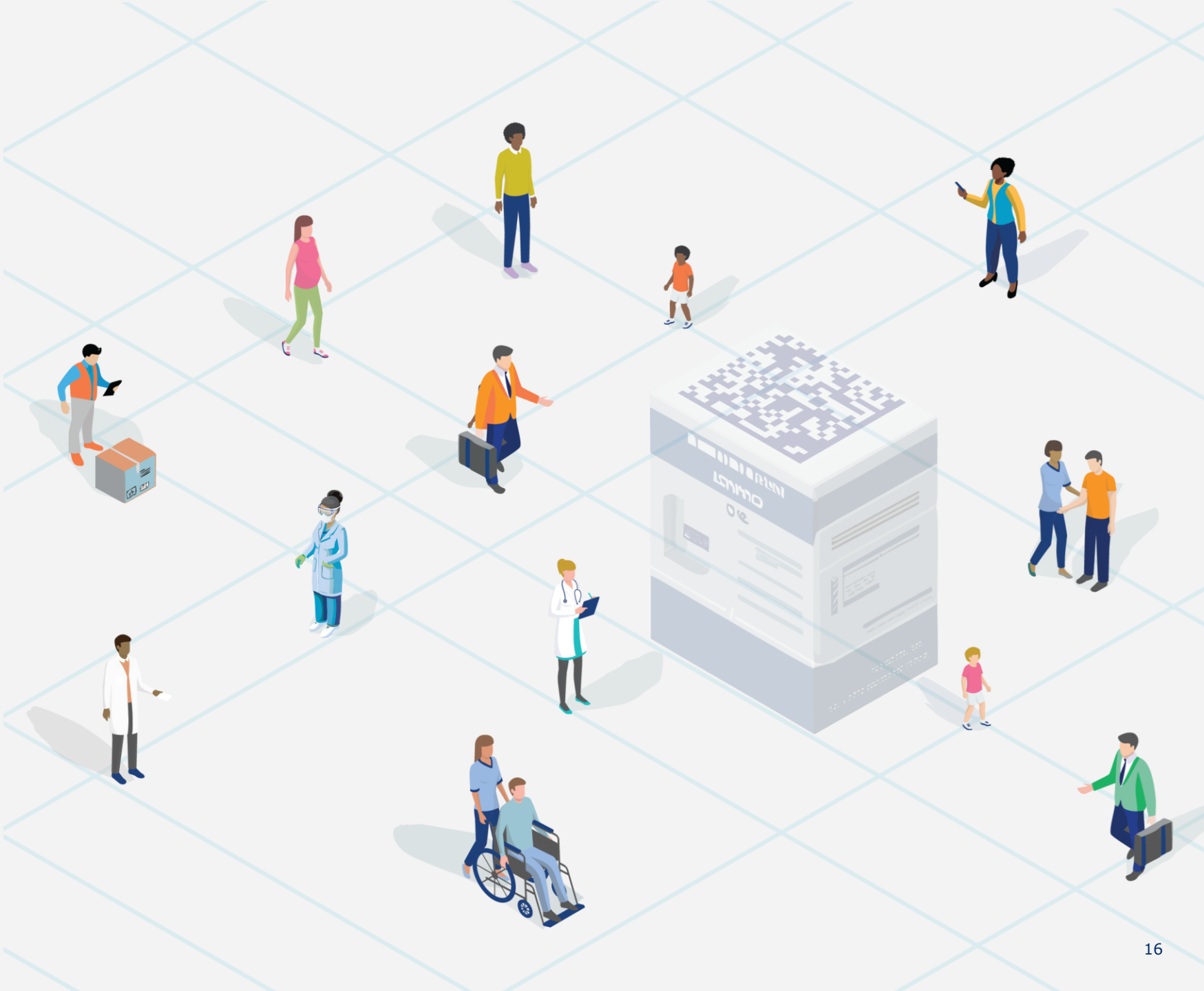
The path forward: key actions for the healthcare ecosystem

The current state of 1P1B readiness varies across the healthcare supply chain. Therefore, it is important for stakeholders to consider both their own readiness and that of their upstream and downstream partners, actively engaging with them throughout the transition. The 'network effect' will build as supply chains increase their readiness end-to-end, progressively adopting 1P1B.

The pages that follow aim to serve as a practical guide to what impactful steps can be taken right now.

It starts with a set of design principles, devised through this work, that will help as a reference point and guide decisions along the overall 1P1B journey.

These principles are then followed by a set of stakeholder-specific recommendations, obtained and distilled from the interviews, to provide actionable guidance for implementation.



Barcode design principles

By considering stakeholder needs, impacts of the presence of multiple barcodes and the opportunities presented, a set of guiding design principles for the 1P1B transformation journey have been proposed.

At the heart of this is **Patient Safety**, in other words minimising the risk of confusion and errors at every point of scan/care, particularly those arising from manual processes and the presence of multiple barcodes.

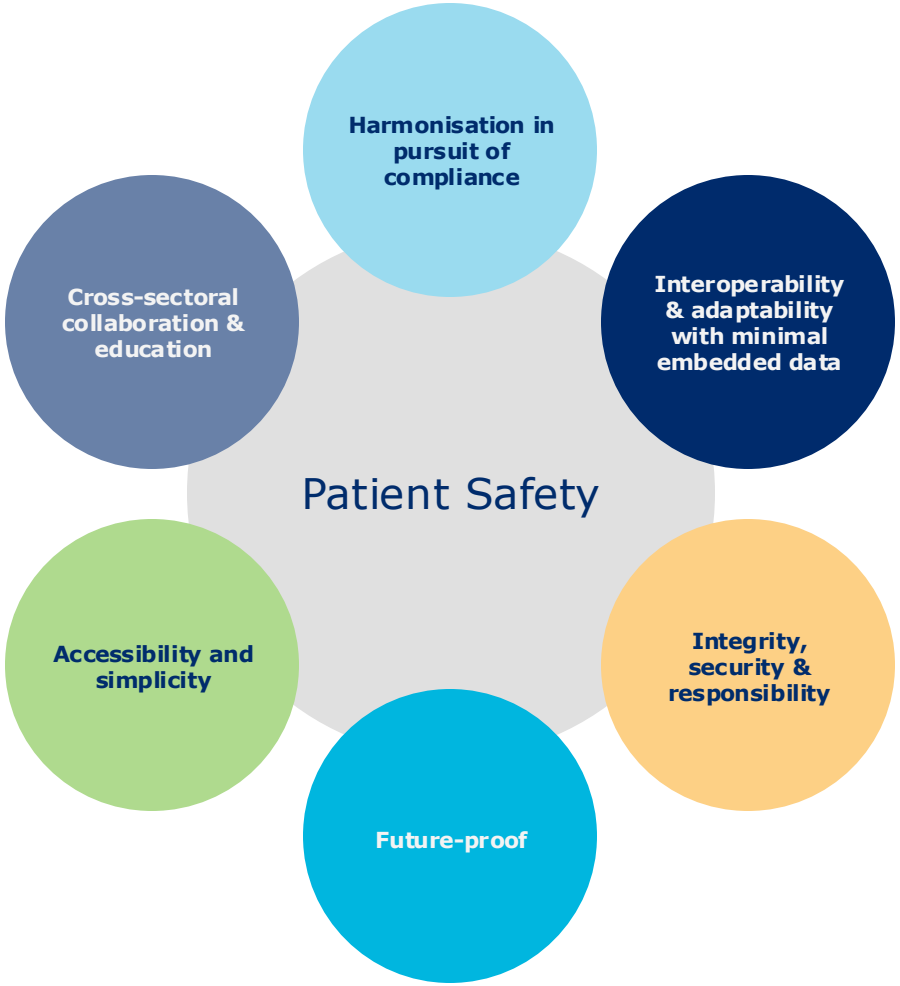
Patients and healthcare providers should be able to confidently scan the product barcode and achieve their desired outcome, ensuring the right product is administered to the right patient and the information they receive is relevant. To achieve this goal, six supporting principles have emerged from our analysis:

Cross-sectoral collaboration & education:

1P1B should foster collaboration and education by promoting standardised communication, knowledge transfer, best practice sharing, and cross-sector collaboration, ultimately contributing to a more connected and innovative healthcare ecosystem.

Accessibility and simplicity:

1P1B should enable frictionless and effortless scanning by minimising barcode scanning limitations, enhancing recognition and ease of use. This should involve simplified barcoding and scanning processes across the supply chain, minimised manual data entry, and straightforward barcode generation and usage.



Harmonisation in pursuit of compliance:

1P1B should address diverse regulatory requirements, promote compliance and steer towards harmonisation.

Interoperability & adaptability with minimal embedded data:

1P1B approach should operate effectively with minimal barcode-embedded data, while ensuring adaptability across diverse product types, geographies, and supply chain processes (e.g., inventory management, track & trace, medicine administration, billing). The design should also consider the limitations of healthcare systems (e.g., EHR interoperability) and the financial constraints of healthcare providers.

Integrity, security & responsibility:

1P1B should include robust measures to ensure authenticity, hacking prevention and protection against illegal re-use of products. It should promote sustainable practices, aiming to minimise environmental impact throughout the product lifecycle.

Future-proof:

1P1B approach should evolve alongside emerging technologies and changing requirements, meeting multiple needs and ensuring flexibility and longevity in the rapidly advancing landscape of healthcare and supply chain systems.

The path forward: actions for GS1

Empowering and assisting the healthcare community in developing the business case for adopting 1P1B approach:

- **Provide practical resources and toolkits**, such as guidelines, methodologies, and cost-benefit analysis frameworks.
- **Publish industry benchmarks:** include data such as 1P1B adoption rates by product category and stakeholder group, quality scores, and metrics demonstrating the impact of 1P1B on key areas like scanning error reduction and inventory management efficiency to enable stakeholders to assess their progression, and/or identify areas for improvement.
- **Showcase success stories**: amplify and disseminate case studies of successful partial or full transitions to 1P1B. These real-world examples would demonstrate the tangible benefits and inspire other stakeholders to embrace the approach.
- **Demonstrate the value and feasibility of 1P1B**: initiate and support targeted pilot programs, clearly defining its role (ranging from active participation to facilitation) before launch. These pilots should explore specific use cases, such as product identification, inventory optimisation, sustainability, or end-to-end supply chain journeys, encompassing mixed scenarios to showcase 1P1B's adaptability across various stakeholder needs.

Facilitating improvement of a robust master data foundation for 1P1B:

- **Encourage efficient master data sharing:** facilitate improvement in sharing master data in a way that enables healthcare providers to more efficiently and easily access the product data needed to effectively improve barcode scanning throughout hospital pathways including those related to patient care.

Championing standardisation and harmonisation:

- **Review and evolve existing guidance** for healthcare organisations on using GS1 standards, emphasising the alignment to 1P1B approach and its principles.
- **Develop clear and concise implementation guidelines** and rules for transitioning to a 1P1B approach, addressing technical specifications, data management, and stakeholder collaboration.
- **Maintain ongoing dialogue on evolving standards needs:** communicate with the industry to understand their evolving needs related to global standards, GTIN assignment, data requirements, barcode specifications and implementation guidelines. Foster open communication regarding readiness to transition to 1P1B approach.

Leveraging procurement as a catalyst for 1P1B implementation:

- **Signal 1P1B readiness:** explore possibilities to publish/communicate 1P1B readiness status of downstream stakeholders (e.g. healthcare providers) to encourage adoption and signal to manufacturers the growing demand for 1P1B-compliant products, prompting them to accelerate their own transition efforts.
- **Drive 1P1B adoption through procurement**: encourage procurement organisations and purchasing departments within HCPs to work with their supplier base to champion the adoption of the 1P1B approach, drawing on concrete examples of benefits already achieved by early adopters.

Fostering ongoing dialogue and awareness:

- **Drive 1P1B education and outreach:** develop and implement communication and content strategy targeting both members and non-members, including practical barcode use cases, compelling case studies and success stories to educate stakeholders on the benefits and implementation of 1P1B approach and foster its adoption.
- **Empower 1P1B champions**: establish a network of ambassadors who have successfully implemented 1P1B approach to champion its adoption. These individuals could share their firsthand experiences, provide training, and demonstrate the feasibility and benefits of this approach to inspire other stakeholders.

Engaging with regulators and partners:

- **Facilitate harmonisation**: continue to encourage the harmonisation of regulatory requirements and education on the benefits of 1P1B which help increase traceability, visibility, post-market surveillance and recalls and overall medical outcomes and patient safety.
- **Collaborate with key industry partners**: actively liaise with GS1 Member Organisations, strengthen partnerships with solution providers, trade associations and professional bodies. Communicate healthcare industry needs, guide the implementation of GS1 standards and 1P1B approach, and encourage these partners to incorporate 1P1B into their advocacy efforts and messaging.

The path forward: actions for ALL healthcare supply chain stakeholders

Through our work we identified a common set of actions every stakeholder should take, detailed on this page. Actions specific to individual stakeholder groups were also identified and are described in the remainder of this section.

Championing standardisation and harmonisation:

- **Actively contribute to standards development and adoption:** the healthcare community should proactively engage with GS1 Healthcare, local GS1 Member Organisations, intergovernmental and other organisations like WHO or UN, providing regular feedback, actively participating in existing working groups, and contributing expertise and insights to the development and improvement of barcode standards. This includes sharing best practices and lessons learned from diverse regions and contexts. Work with the existing partners, such as solution providers and manufacturers, to adopt GS1 standards.
- **Champion harmonised regulations:** actively advocate for the adoption of globally harmonised barcode standards by engaging with governments and regulatory bodies by educating on the global framework for the use of the GS1 DataMatrix for traceability of medicines and of standardised data carriers for UDI. Highlight the benefits of harmonised standards, such as reduced complexity, improved traceability, and enhanced patient safety. Emphasise an important role of regulation around scanning at the point of scan/care and traceability, which are an important foundation in unlocking the full potential of 1P1B. Support the development and implementation of regional and international agreements that promote consistency in barcode requirements.

Establishing value case and defining transition roadmap:

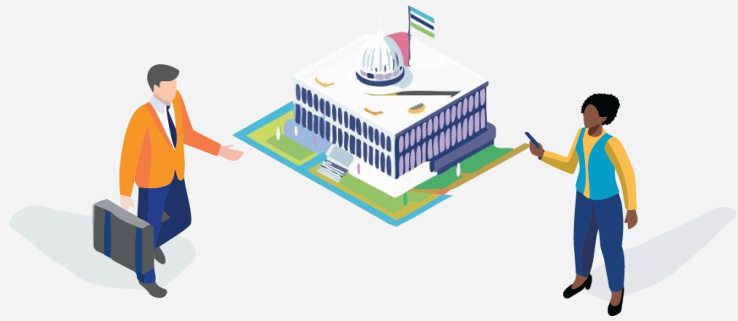
- **Collaborate on a phased implementation roadmap:** manufacturers, distributors and healthcare providers should actively engage with solution providers to develop a detailed roadmap for a phased transition to 1P1B. This collaborative effort should focus on defining clear milestones, outlining technical requirements for each phase, and establishing a realistic cost framework.
- **Highlight mutual benefits:** manufacturers and healthcare providers should emphasise the incentives for solution providers to prioritise the necessary changes, such as access to a wider client base, potential cost savings through streamlined processes, and the opportunity to be at the forefront of this industry transformation.

Enabling interoperability & adaptability with minimal embedded data

- Facilitate efficient and secure master data access and exchange for 1P1B: to enable the transition to 1P1B, solution providers and development partners should collaborate to create user-friendly platforms to make master data available through secure interface that enable manufacturers to electronically submit and validate new product line information, simplifying and automating data submission processes.

Facilitating education through cross-sectoral collaboration:

- **Share knowledge and best practices**: proactively communicate with partners, suppliers and customers to foster alignment on 1P1B; cultivate a culture of knowledge sharing by gathering and openly disseminating experiences, lessons learned, and best practices from 1P1B adoption journey through various channels such as industry conferences, webinars, online forums and publications.
- **Support resource-constrained settings in 1P1B implementation**: to facilitate broader 1P1B adoption, intergovernmental and NGO organisations could prioritise supporting knowledge transfer and capacity building in resource-constrained settings. This might include, for example, developing and delivering targeted training programs, creating and distributing educational materials in local languages, workshops and conferences to foster cross-sector discussions and knowledge sharing, and development of online platforms and resources that provide easy access to 1P1B information and best practices.



The path forward: actions for manufacturers

Value proposition and roadmap: implementing a robust foundation for 1P1B

- **Develop business case**: to secure funding for the required technology and process changes, build a compelling value case demonstrating both financial and patient safety benefits. Quantify cost savings in inventory, recall / alerts management, labour, while framing patient safety as risk mitigation against costly medical errors. Leverage internal benchmarks, partner with technology providers, and gather evidence to support these claims. Work with the healthcare providers to obtain the evidence on error-reduction and wasted time associated with multiple barcodes. A phased implementation plan and a narrative highlighting strategic alignment, long-term value, and positive ROI will further strengthen the justification for investment in 1P1B.
- **Develop a phased implementation roadmap:** prioritise new product launches or entry into new markets and implement 1P1B as new products are brought to market, then creating a roadmap for phasing in the approach across existing product lines over time, perhaps along with planned product packaging refreshes or required regulatory updates. This minimises disruption to established processes while building momentum for broader adoption. Emerging markets might represent an opportunity to test new technologies or more locally harmonised approaches as they often have fewer legacy systems, therefore lower technical debt, and more straightforward regulatory systems, allowing for faster implementation and evaluation of innovative approaches

Optimising processes and practices:

- **Assess reasons why multiple barcodes are applied** and define strategies/approaches to limit and/or reduce the number of barcodes on product packages. Ensure all internal stakeholders involved in packaging design and content are aware of 1P1B, the design principles and implement governance to ensure alignment across internal operations such as regulatory compliance, supply chain operations, packaging content owners, and marketing / product management.
- **Explore barcode reduction/removal strategies:** collaborate with/learn from peer organisations already trialling these strategies to identify best practices for minimising the number of barcodes on medical devices. Assess the feasibility of amending processes and technologies to enable barcode consolidation or removal of the internal/redundant barcodes without compromising regulatory compliance or product functionality.

Creating awareness and educating workforce

- **Drive towards internal awareness:** secure internal buy-in for 1P1B through stakeholder engagement, education programs, and revised change management processes. Specifically, educate departments on the need for and benefits of minimising barcode proliferation and discourage adding non-essential barcodes. Understand their requirements that were driving them towards use of multiple barcodes and seek solutions consistent with 1P1B.

Facilitating interoperability & adaptability with minimal embedded data

- **Ensure master data quality and availability**: recognising that 1P1B prioritises embedding only minimal essential data within the barcode itself, focus on ensuring compatibility with GS1 standards and on the quality and accessibility (e.g. via hosting APIs) of master data for downstream stakeholders requiring data not embedded in the barcode (non-exhaustive examples of non-embedded data mentioned in our interviews include strength, origin of product, manufacturer name and address, URL with commercial brand information, etc.).
- **Demonstrate single barcode efficacy:** collaborate with regulators to demonstrate how a single barcode can accommodate country-specific data requirements (especially for secondary packaging), eliminating the need for additional barcodes and streamlining compliance efforts.

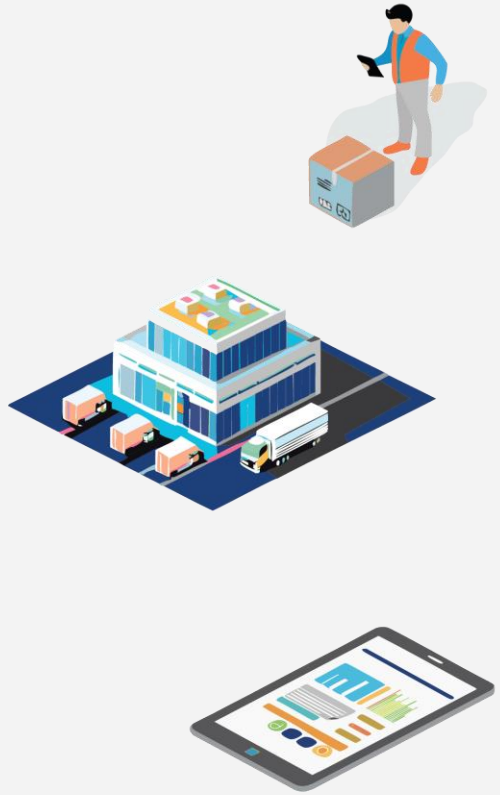
The path forward: actions for distributors

Addressing technological limitations and facilitating interoperability:

- **Optimise and modernise systems for 1P1B:** if involved in scanning primary and /or secondary packages of the healthcare products, prioritise investment in scanning technologies and systems that include warehouse management systems (WMS), and supporting software capable of reliably reading, processing, and integrating the increased data capacity of barcodes (such as those frequently applied by manufacturers, e.g. GS1 DataMatrix). Ensure seamless data flow between these systems, platforms like ERP and customer ordering systems. Phase out legacy equipment that only supports barcodes which are being gradually replaced.
- **Explore barcode reduction/removal strategies:** collaborate with medicines/devices manufacturers to eliminate unnecessary barcodes received on products, focusing on those that are not required for downstream stakeholders like healthcare providers. Encourage manufacturers to assess their internal processes and explore technologies that enable barcode consolidation or removal without compromising compliance or functionality. Avoid adding any additional barcodes to primary and secondary packaging.

Shaping up downstream supply chain requirements

- **Communicate data requirements and standards:** clearly communicate data to all suppliers and partners, emphasising the importance of GS1 standards for seamless data exchange and system compatibility; prioritise 1P1B-compliant suppliers.



The path forward: key actions for solution providers

Value proposition and roadmap: implementing a robust foundation for 1P1B

- **Quantify and demonstrate value:** support your customers' 1P1B journeys by clearly demonstrating to them the tangible benefits of 1P1B solutions. Provide evidence-based data, such as case studies and ROI calculations, to showcase how these solutions reduce errors, improve efficiency, enhance traceability, and ultimately contribute to better patient care and long-term cost savings.
- **Enable phased adoption and seamless transition**: offer modular solutions that allow for a phased adoption of 1P1B distributing costs over time and delivering incremental benefits. Develop a clear roadmap for phasing out outdated barcode technologies and transitioning to more robust solutions, actively engaging with GS1 and other industry bodies to stay informed about evolving standards and best practices. Partner closely with healthcare providers to understand their specific needs, challenges, and integration requirements, ensuring a smooth and successful implementation.

Addressing technological barrier:

- **Expand barcode accessibility in healthcare:** prioritise making widely adopted barcodes like GS1 Data Matrix universally accessible by developing and integrating technologies that enable native scanning capabilities across a range of devices commonly used within the healthcare ecosystem, including smartphones and tablets. Technical innovation will be key to ensure seamless and reliable barcode reading across diverse platforms and operating systems, regardless of the chosen format of 1P1B.

The path forward: actions for healthcare providers

Addressing technological and financial internal barriers:

- **Optimise barcode scanning technology:** prioritise investment in scanning technologies that can readily read 2D barcodes, such as GS1 DataMatrix. Explore cost-effective options like smartphone apps (if smartphone or tablets are available within the organisation/leveraging existing devices) to reduce reliance on expensive dedicated scanners, making the `transition more financially feasible.
- **Enhance system integration:** champion and prioritise solutions that seamlessly integrate 1P1B data with existing healthcare systems, such as Electronic Health Records (EHR), Inventory Management Systems (IMS) and Enterprise Resource Planning (ERP) systems. This streamlines workflows, reduces manual data entry, and improves data accuracy.
- **Explore financing and reimbursement:** investigate available financing options, such as grants, loans or leasing programs, to support the upfront investment in new technology and system upgrades. Additionally, explore potential reimbursement opportunities through government programs or insurance providers that recognise the value of improved patient safety and efficiency associated with 1P1B.

Defining value and establishing business case: implementing a robust foundation for 1P1B

- **Form an evidence-based business case:** gather evidence and quantify financial and non-financial costs and benefits of adopting 1P1B, such as costs associated with required scanning technology and systems integration changes, and savings from resource efficiency and reductions in medical errors, etc. Emphasise patient safety as a risk mitigation strategy against medical errors. Consider demonstrating error reduction related to use of medical devices and /or medication administration by conducting time studies to measure the labour hours spent on scanning products with multiple barcodes and manual relabelling. Implement an error tracking system to analyse the root causes of administration and dispensing errors due to multiple barcodes, comparing error rates before and after 1P1B implementation will provide concrete evidence of its impact. Additionally, gather evidence and use cases from clinicians and patients highlighting instances where scanning products with multiple barcodes caused errors, while 1P1B reduced errors and improved outcomes. This is linked to the corresponding recommendation for GS1.

Educating and defining value internally

- **Cultivate scanning culture**: work internally with all staff to emphasise the benefits of consistent barcode scanning, fostering a deep understanding about its role in patient safety, inventory accuracy and efficient billing. Position barcode scanning in the clinical environment as a key contributor to safe care, underpinned by comprehensive policy and procedure training. Measure the effective implementation of 1P1B and barcode scanning for example, the scanning rate of products and number of medication administration errors.

Shaping up downstream supply chain requirements

- **Define clear 1P1B requirements and data standards:** establish clear requirements for suppliers (i.e. manufacturers and solution providers), prioritising 1P1B-compliant suppliers and defining standardised data requirements (including GTIN, expiry date, batch/lot number, and serial number where applicable) to ensure seamless data exchange, system compatibility, and improved master data quality across the healthcare ecosystem.
- **Adopt 1P1B procurement rules and practices:** encourage/prefer suppliers, such as manufacturers, solution providers, that adopt 1P1B. Ensure clear requirements are communicated to manufacturers, avoid requests that lead to the proliferation of multiple barcodes. Support, communicate with and provide guidance and transition roadmaps to suppliers on their journey towards 1P1B, with an effective, smooth transition and business continuity in mind.

A successful transition to 1P1B hinges on a collection of individual efforts across the healthcare ecosystem. It's the sum of individual actions, guided by strong leadership and clear communication from GS1, that will pave the way for a safer, more efficient, and patient-centric healthcare system.

As the healthcare industry moves over time towards a future where 1P1B is the expectation, stakeholders who embrace 1P1B early will be best positioned to take advantage.

Manufacturers are encouraged to continue their efforts in streamlining barcode application, striving to minimise number of barcodes on products. Downstream stakeholders such as distributors and healthcare providers, should continue investing in enabling robust scanning systems and practices within their workflows. Regulators have the opportunity to explore harmonisation and to actively engage in conversations with GS1 to align regulations with these evolving standards.

We look forward to the time when 1P1B is brought fully to fruition.

Glossary

Contract Manufacturing Organisation (CMO) – *a company that provides manufacturing services to other companies on a contract basis, often helping with the production of pharmaceuticals and medical devices.*

Downstream healthcare supply chain stakeholders – *refers to the various entities and individuals involved in the distribution, delivery, and administration of healthcare products after they have been manufactured.*

Electronic Health Record (EHR) – *a digital version of a patient's health record that contains the medical history, treatments, medications, and other health information, accessible by authorised healthcare providers.*

Enterprise Resource Planning (ERP) – *a type of software used by organisations to manage and integrate important parts of their businesses, including planning, inventory, sales, and finance.*

GS1 – *a not-for-profit, international organisation developing and maintaining standards for identification, data capture and data exchange.*

GS1 Healthcare – *a voluntary, global user group comprised of leading manufacturers, distributors, solution providers, healthcare providers, and other actors to develop and implement global standards to enhance patient safety and supply chain efficiencies in the healthcare sector.*

GS1 Member Organisation (MO) – *a member of GS1 that is responsible for administering the GS1 system in its country (or assigned area). This task includes, but is not restricted to, ensuring user companies make correct use of the GS1 system, have access to education, training, promotion and implementation support and have access to play an active role in the GS1 Global Standards Management Process.*

Healthcare supply chain – *refers to all stakeholders involved in the journey of healthcare products, including manufacturers of pharmaceuticals, manufacturers of medical devices, distributors, solution providers, healthcare providers (e.g., hospitals, clinics), development partners and patients.*

Inventory Management Systems (IMS) – *software systems that help organisations track inventory levels, orders, sales, and deliveries to optimise inventory management and ensure product availability.*

'One Product, One Barcode' (1P1B) *– one barcode per healthcare product package, visible to and accessible at the point of scan/care, acting as a gateway to a wealth of product data and facilitating seamless information flow across healthcare systems.*

Primary packaging *- the packaging that is in direct contact with a product and is the first layer wrapped around it.*

Secondary packaging – *the outer packaging that contains one or more primary packages. The secondary packaging is often a trade item and serves marketing, branding, and protection purposes, as well as facilitating easier handling and distribution.*

Warehouse Management Systems (WMS) – *software solutions that support warehouse operations, including inventory tracking, order fulfilment, shipping, and receiving, improving efficiency and accuracy in warehouse management.*

About GS1 Healthcare
GS1 Healthcare is a neutral and open community bringing together all related healthcare stakeholders to lead the successful development and implementation of global GS1 standards, enhancing patient safety, and operational and supply chain efficiencies.

The development and implementation of GS1 standards is led by the experts who use them: pharmaceutical and medical device manufacturers, wholesalers, distributors, group purchasing organisations, hospitals, pharmacies, logistics providers, solution providers, governmental and regulatory bodies, and trade associations. Evidence available from industry implementations shows that GS1 identification, data capture and data sharing standards in healthcare deliver tangible benefit to all stakeholders. Global members of GS1 Healthcare include more than 100 leading healthcare organisations worldwide.

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