The Global Language of Business

How can we overcome the barriers to barcode scanning in a hospital?

Current situation and experts' opinion

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Abstract

The safety of health products is a priority for hospitals and health authorities. In this perspective, the GS1 Healthcare leadership team missioned a survey on the use of barcode scanning in hospitals in 2024. In December 2024, an international group of experts was interviewed on the results of this survey and on the situation worldwide. The results of the survey and the experts' opinion are presented in this article. They all agree that barcode scanning can increase patient safety in hospitals.

The group of experts explained that barcode scanning concerns healthcare products but can also concerns other aspects of patient care, from patient identification or biological sample tracking to equipment identification. The group of experts is convinced that GS1 has a major role in the promotion of barcode scanning implementation thanks to their standards and the development of educational tools for users.

Key messages

Patient safety is a major ambition for both global and national health agencies including regulatory authorities. For example, the aim of World Health Organisation's (WHO) Medication Without Harm program is to reduce the adverse events of drug treatments. Drugs have unavoidable adverse events, but the health product chain from prescription to administration also has avoidable adverse events. The objective of developing programs to promote patient safety is to reduce the occurrence of these unavoidable events.

In this context, codification tools such as one or two-dimensional barcodes, RFID tags can be used to enhance the accuracy of product identification and traceability and thus reduce administrative errors. Codification also allows simplified and secure approach to the management of drug and medical device vigilance.

For 50 years, consumer and retail products have been identified by linear or two-dimensional barcodes. More than 10 billion scans are performed daily worldwide.

GS1 Healthcare was established 20 years ago to promote the use of barcode technology in healthcare supply chains to drive operational efficiency and ultimately improve patient safety.

A bibliographical analysis conducted on PubMed in January 2025 found that over the past 20 years, 2584 articles have been published on "barcode scanning". When combined with terms such as "medication", "medical device" or "patient safety" the number of publications is 1200, 405 and 152 respectively. This reflects the lack of data and scientific investigation on the subject.

The identification of healthcare products, patients, locations and information needed in the supply chain can reduce errors. However, given the relatively low number of scientific publications on this topic, the GS1 Healthcare leadership team decided to conduct an international survey on the use of barcodes in hospitals.

Method

The international survey on the use of barcodes in hospitals was conducted in May 2024. The survey results were presented to 11 international experts representing nine organisations to share their views on the value of barcodes in the healthcare provider setting.

Survey

The survey, titled "Understanding the barriers to barcode scanning in a hospital", was conducted by GS1's Healthcare Leadership Team as part of the One Product, One Barcode project. It consisted of eight questions and was distributed on May 1st 2024, to all GS1 Member Organisation healthcare provider correspondents. The deadline for responses was set at the end of July 2024, providing recipients three months to participate. The tool used was Microsoft Forms.

The survey questions included:

1. How frequently do you use barcode scanning devices in your daily hospital tasks?
2. What items do you scan daily? (Select all that apply)
3. Where does barcode scanning take place in the hospital? (Select all that apply)
4. What are the main challenges associated with scanning products in the hospital? (Select all that apply)
5. How often do you experience difficulties due to these challenges when scanning products?

6. What are the consequences of these barriers on patient care and workflow efficiency?
7. What improvements or changes could help overcome these barriers to barcode scanning?
8. How can barcode scanning be improved within your hospital?

Expert Committee

The committee of experts chosen to analyse our study is representative of the different hospital stakeholders and the different continents.

The individual interview of each expert followed a standardized plan validated after an interview test with the following questions:

1. What are your first thoughts on the results of this study?
2. Do you think this study reflects the realities of your institution, region or country? Why?
3. Do you regularly use barcode scanning devices in your institution or country? In what area? (drugs/-medical devices, health system, retail, other)?
4. Do you believe that barcode reading can help improve patient safety?
5. What measures could be taken to encourage wider use?
6. Do you have any plans to implement barcode scanning in new areas of your facility or country?
7. In your experience, do you think that scanning barcodes could save time or money? If so, how?
8. Do you think barcode scanning could help address current challenges in your facility? Are there any other issues that it could address?
9. What areas or questions do you suggest for further research on this initial study?
10. How do you think GS1 can help promote the use of barcodes in health care activities?

Interviews were conducted in November and December 2024. Each interview was calibrated to last 30 minutes.

Results

Survey responses were received from 27 countries (n = 208). The country breakdown is shown in Figure 1.

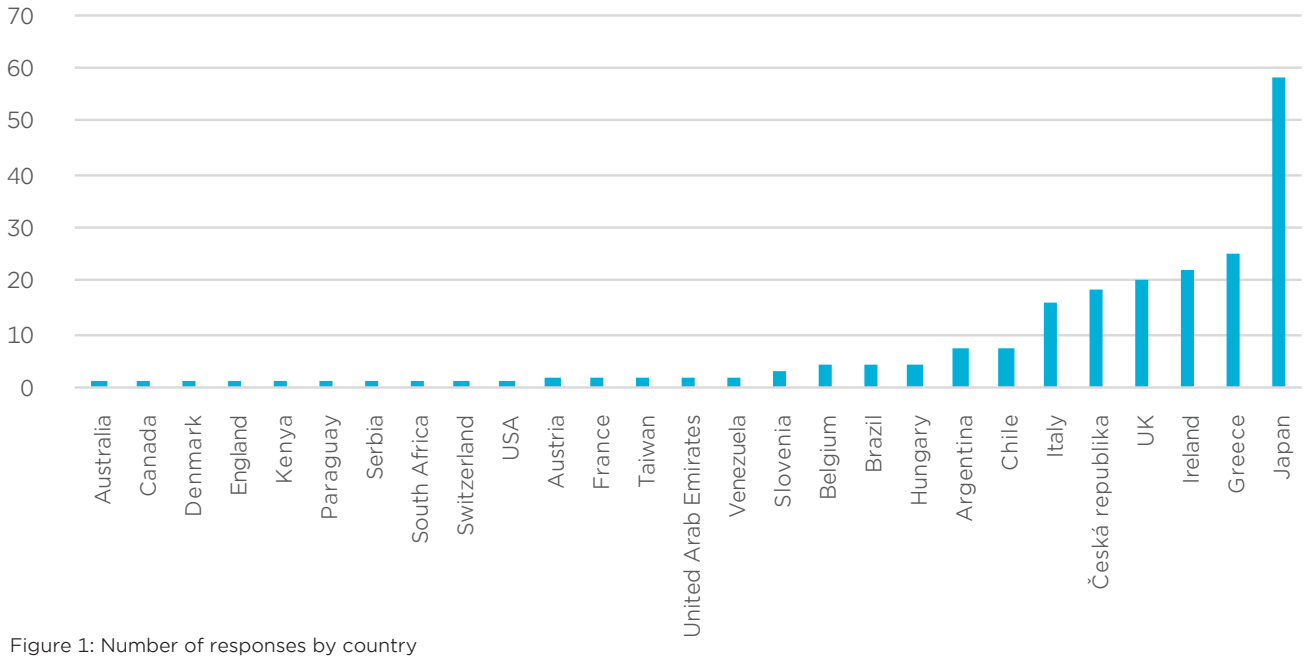

Figure 1: Number of responses by country

The results of the study are presented in Table 1.

The results show that

- 75% (n = 156) of respondents scan several times a day in their establishment.
- The scan mainly concerns drugs (27%, n = 56) medical devices (25%, n = 52) but also patients (16%, n = 33) and consumables (16%, n = 33).
- In 8% of cases (n = 17), all these products are scanned.
- Barcode scanning is performed in different places such as the operating room (37%, n = 76), care services (25%, n = 53), pharmacy or in all these cases (25%, n = 53).
- The main challenges encountered are the quality defects of the barcodes (31%, n = 65), the multiplicity of the barcodes (31%, n = 65) or the quality defect of the scanners (31%, n = 65).
- In terms of frequency, scanning difficulties are common in 31% of cases (n = 65) and absent or occasional in the other cases.
- The most frequently reported impact of barcode scanning is loss of time (32%, n = 67), but in 18% of cases (n = 37) a barcode scanning defect could lead

to patient safety risks. In the improvements proposed by the responders to reduce reticence, the barcode and Datamatrix appear first (35%, n = 73) and all other proposals are below 15%.

- For the last question on improving the barcode scanning process, respondents recommend in 59% of cases (n = 122) to raise awareness among users, enhance the product labelling (58%, n = 120) and have better scanning tools (51%, n = 106).

Expert Opinions

1. What are your initial thoughts on the findings of this study?

Experts generally agreed that the study reflects the hospital environment worldwide. They noted that barcode scanning adoption levels vary by country and institution. Some experts found it surprising that the benefits of barcode scanning still need to be demonstrated. They emphasised the importance of integrating barcode scanning into broader hospital security processes to reduce medication errors and enhance patient safety. One expert thinks it is very important to secure all activities in hospitals, and another thinks that this security can go as far as the patient's bedside, whether at the hospital or home. Important topics could have been studied such as reprocessing, product tracking, bed management and finally the financial aspect. Barcoding and barcode scanning must be part of the standard operating procedure of a hospital and not an individual approach. This approach should reduce never events and medication errors in a general way.

2. In your opinion, does this study reflect the realities of your facility, region, or country? Why or why not?

Experts confirmed that barcode scanning adoption varies significantly across regions. The variance can be seen across Europe. There are countries such as Japan and/or Hong Kong, which show a very advanced adoption of barcode scanning and especially an appropriation by users, who develop their own new needs and consequently new uses. In the UK, USA, and South America, implementation varies widely, with some highly advanced examples of both individual and institutional implementation projects. Our study being declarative, some experts are surprised by the variance in barcode usage in the healthcare setting. Therefore, to avoid bias in the answers, some experts would like the survey to be with a more detailed focus by geographical region, limiting the number of responses per country or region. The development is indeed different according to the regions, and therefore the actions of promotion of barcode scanning will be different.

3. Do you/your facility/country regularly use barcode scanning/scanning devices? In what area? (Drugs/medical devices, health system, retail, others)?

Since the expert group consists of leading professionals in their field, it is evident that many hospital activities can be secured through barcode scanning. The most crucial applications are those related to the patient, such as their identification throughout their hospital stay, as well as the identification and traceability of their medications, medical devices, samples, and additional examinations (e.g., laboratory tests and imaging).

However, barcode scanning also extends to the entire external and internal supply chain, enabling the identification of locations and equipment. This comprehensive traceability enhances patient safety while also generating financial savings by optimising resources.

4. Do you believe barcode scanning can contribute to improving patient safety?

The expert group is unanimous in its view that patient safety can be increased through barcode scanning.

5. What measures could encourage greater use?

The expert group is unanimous on the value of barcode scanning but also identifies key areas for improvement to further promote this practice. The role of solution providers is crucial, offering user support and tools that enhance resilience in implementation. Training and support with hospital staff operations is essential if these projects are to succeed. Another important perspective raised is the overall scope of these initiatives: for maximum efficiency, barcode scanning should be integrated as a broader institutional project. A comprehensive approach ensures a robust infrastructure, secured financing, leading to both qualitative and quantitative returns on investment. Other success factors are the quality of the barcode with standardisation of coded information, readability of barcodes and one barcode per product (One Product, One Barcode).

6. Are there any plans to implement barcode scanning in new areas at your facility or country?

Each expert group member presented their projects and many projects combine barcode scanning but also RFID technology. New applications were identified, including the management of pathology samples and projects involving full integration at the institutional level. Another key project focuses on the direct benefits to patient safety, particularly in improving the accuracy and efficiency of medication administration, reducing errors, and enhancing overall patient care. This includes adopting new technologies such as RFID and advanced scanning systems to streamline processes and improve data accuracy. Additionally, the importance of geographical regions was highlighted in the various advancements.

7. In your experience, do you believe barcode scanning could lead to time or cost savings? If so, in what ways?

The expert group has identified two main perspectives on this issue. One group firmly believes in the time and cost savings associated with barcode scanning. The other sees its potential but remains uncertain, with some experts arguing that while scanning can sometimes be time-consuming they agree it improves inventory management and tracking of medical equipment and supplies.

On this point, the panel is divided. While all experts acknowledge the potential time and cost savings of barcode scanning, one of them highlights concerns about the time required for scanning, especially given highlighted challenges. However, the benefits in managing inventories and medical equipment were also emphasised.

8. Do you believe barcode scanning could help address any current challenges at your facility? Are there any other problems it might solve?

The expert group notes that barcode scanning requires an initial investment. However, some experts emphasise that it helps optimise the internal supply chain within the institution, benefiting both equipment and product supply management, as well as patient care. This aspect is strongly supported by experts as a significant added value of barcode scanning.

9. What areas or questions would you suggest for further research to build on this initial study?

The expert group has proposed several suggestions for further research, including emphasising a marketing approach to promote barcode scanning. Specifically, this practice should be introduced to relevant professionals by showcasing success stories. Scientific publications are also needed to provide irrefutable evidence of barcode scanning's effectiveness.

Some experts even suggest focusing on specific areas, such as the operating room or inpatient care services. Another valuable perspective is the regional aspect, with publications and potential comparisons by geographical areas, allowing less developed countries to learn from more advanced ones.

Finally, beyond the medical and pharmaceutical fields, barcode scanning can be applied to other hospital activities, which could be explored in future studies.

10. How do you think GS1 can help promote the use of barcodes in healthcare activities?

The expert group believes that the promotion of barcode scanning will require not only scientific publication, but also education and support. GS1 can play a key role in this by developing educational tools for users. Training resources such as webinars, demonstrations, communications or seminars are essential. Education can also be done through distributors and companies in the healthcare sector.

Finally, collaboration with Warehouse Management Systems, management tools and Data Processing Interface publishers also seems to be an important step in simplifying the use of barcode scanning and advancing the adoption of this practice

Conclusion

In conclusion of the discussion with the expert group, it became clear that barcode scanning is an international topic with a common goal: patient safety. Barcode scanning is a tool, it is the tool of the moment because the most accessible, the most robust and financially adapted and that we must also develop other tools.

How frequently do you use scanning devices (e.g., barcode scanners) in your daily tasks within the hospital?		Multiple time a day	Once a day	Rarely	Never				
	%	75	4	12	9				
	n	156							
What is scanned within your daily tasks? Please tick all that apply.		Pharmaceuticals	Medical Devices	Patient Wristbands	Consumables	All the above	Other		
	%	27	25	16	16	8	8		
	n	56	52	33	33	17	17		
Where does barcode scanning takes place in the hospital? Please tick all that apply.		Operating room	Wards	Pharmacy when meds are delivered	Pharmacy when meds are administered	All the above	Other		
	%	37	25	28	39	25	19		
	n	76	53	58	82	53	39		
What are the main challenges you encounter when scanning products in the hospital? (please tick all that apply)		Poor barcode quality	Lack of training	Technical issues scanning devices	Resistance from colleagues	Products don't have barcodes	Too many barcodes	Other	
	%	31	19	31	24	38	31	16	
	n	64	40	64	49	78	65	33	
How often do you experience difficulties due to these challenges when scanning products?		Frequently	Occasionally	Rarely	Never				
	%	31	39	23	7				
	n	65	81	48	14				
In your opinion, what are the consequences of these barriers on patient care and workflow efficiency?		Time-Delay	Traceability	Patient safety	Information	Barcode	Patient	risk	Don't care or don't know
	%	32	6	18	8	17	26	7	7
	n	67	13	37	16	36	54	14	14
What improvements or changes do you believe could address the barriers to barcode scanning in the hospital?		Barcode-Datamatrix	GS1	QR Code	Better	Medication-Drug	Product	Training	Don't care or don't know
	%	35	8	5	11	14	12	6	3
	n	73	16	10	22	29	24	13	7
Overall, how do you feel the process of scanning products could be improved within your hospital?		Incresing awarness among staff on the importance of scanning	Enhancing barcode labelling	Implementing better scanning technology	Streaming training for staff	Other			
	%	59	58	51	31	10			
	n	122	120	106	65	20			

Table 1 : Survey answers

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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