



The Global Language of Business

Good morning, Mr. Jones,
here is your medication

GS1 standards for precise patient identification



Patient identification: A vital aspect of patient safety

About 10% of inpatient episodes result in errors of some kind, of which half are preventable.¹

Patient identification errors were at fault for 13% of surgical mistakes and 67% of transfusion mix-ups.²

8 to 14% of medical records include erroneous information tied to incorrect patient identity.³

Patient misidentification constitutes one of the most serious risks to patient safety in hospitals or clinics. Today identification of the patient by the caregiver is still generally checked manually. This human interaction is inevitably prone to error and may result in patient harm when carrying out vital activities such as surgery, medication administration, blood transfusions, or other medical procedures. Such errors can also have a significant economic impact.

It is the primary responsibility of caregivers to check the identity of patients and match the correct patients with the correct care

before that care is administered. However, healthcare processes are complex and resources are scarce. Deficient systems and processes, combined with high workload and stress, can lead caregivers to make mistakes or fail to prevent them.

The World Health Organization identified “patient misidentification as a root cause of many errors”. This led the Joint Commission for Accreditation of Health Care Organizations (JCHAO) to list improving patient identification accuracy as the first of its Patient Safety Goals already introduced in 2003, and it continues to be an accreditation requirement.

‘Nurse gave critically-ill man wrong drugs’

Radio New Zealand, 15 October 2012, **New Zealand**

[...] The nurse inadvertently attached the patient’s medication administration sheet to the file of another patient. As a result, she mistakenly believed that medications listed on the other patient’s file had been prescribed for the man. [...] Not long after the man had been given those medications, he became short of breath. He died on Monday evening.

‘Only 61% of nurses detected patient ID error in study’

Annals of Emergency, Medicine, June 2010, **USA**

In a study at Baystate Medical Center, Springfield, MA, USA, nurses were asked to administer an intravenous medication on three simulated patients, but the date of birth and medical record number of the third one did not match the identity information on the label. 39% of the nurses did not detect the identity error of the third patient and administered the wrong drug. Some because they didn’t verify the patient identity, but also others who completed the steps to verify patient identity failed to recognise the error.



Ensuring precise patient identification: Keep patients safe and avoid financial loss

One of the principal components of any effective patient safety initiative is accurate patient identification. For any patient to receive appropriate care, caregivers have to be able to accurately identify the patient at every stage throughout their treatment. Hospital systems and processes have to be designed to render human error impossible, or at least extremely difficult to make. This process needs to account for the actions of each stakeholder through an automated process with various layers of verification.

Automatic identification of patients, through the use of barcode identification bands, not only dramatically improves patient safety, including reduction of preventable medication errors, blood transfusion errors, wrong-site surgeries, etc. but also improves workflow. An automatic identification and data capture (AIDC) system integrated into

hospital processes reduces the need for paper records, which effectively decreases the risk of human error in the delivery of patient care. For example, caregivers can more effectively verify the five patient rights during the medication administration process, including the right product, dose, time, route and patient. It provides simultaneous access to the patient's medical records and information regarding the unit dose or the device, and creates a more precise path towards the right administration of medications or the right use of the device.

While the primary objective is to reduce medical errors and the associated preventable injuries, a secondary objective addresses the significant savings all stakeholders can gain as a result of improved processes. AIDC systems improve the efficiency of caregivers by reducing their administrative

burden and ensuring accurate documentation and cost capture. This allows them to spend more time to take care of patients and also to treat more patients.



By barcoding patient identification bands and medication doses, facilities can reportedly reduce medication errors by 65% to 86%.¹⁴

Benefits of implementing an automated patient identification system

At Charing Cross Hospital (UK), patient ID checks were only being done 17% of the time before barcoded identification wristbands were implemented; **after implementation, this increased to 81%.**

Dubuis Health System (USA) achieved **a nine month return on investment** in an automatic patient identification system; **Norman Regional (USA) saved US\$ 380,000 in one year.**

Houston Medical Center (TX, USA) achieved **30% reduction in patient ID errors in the first three months of implementation** of its point-of-care barcode wristband system for glucose testing. Besides more accurate patient identification, hospital staff could spend significantly more time treating patients: at least two minutes per patient are saved. With an average of 200 patients triaged in the Emergency Department per day, over 6.5 hours are saved in identifying patients for glucose testing.

“Nursing and laboratory personnel no longer have to manually key in the patient’s account number. This allows them more time for patient care. The barcode also gives our information systems accurate data automatically for charting in the patient’s medical record and to appropriately bill the patient’s account.”⁵

Beth Benefield, Executive Director of Information Technology and Imaging Services, Houston Medical Center

Streamlining record management: Electronic Health Records

Paper-based patient records are still by far the most common way to record patient data. Hospitals and other healthcare providers are adopting electronic health record (EHR) systems, but adoption is slower than expected. Despite the growing number of hospitals implementing such systems, many are still relying on paper-based processes.

But, paper-based records may be incomplete or inaccurate, not always easy to get access to and can even get lost or destroyed. They also require significant clerical support.

Switching to an electronic system is still perceived to be expensive, might require a lot of training, and create concerns that it may disrupt care delivery, but the benefits are

undeniable. Such systems provide reliable remote, instant access to, and management of, medical history, clinical decision support and other essential information. This helps in ensuring that the patient receives the appropriate care and reduces medical errors, such as administration errors.

Use of global standards: remove barriers

There are several barriers that may prevent the successful implementation of AIDC systems in hospitals. These systems require investment, both financially and in human resources. It is also critical to engage caregivers to ensure compliance with the new processes. The system should be efficient, simple and reliable, so that the associated and essential workflow of caregivers is not disrupted.

Another important barrier for implementation is the lack of adoption of existing global standards for AIDC processes, including patient identification keys and data carriers.

Hospitals use many different ways to identify a patient, including different processes to allocate

identification numbers and different ways to represent the information in a data carrier. Even within the same hospital, different patient identification processes may exist from one department to another. Solution providers need to spend time and resources adapting their systems to varying identification requirements, rather than focusing on the development of functionality that actually adds value.

This becomes even more critical and complex when integrating with an EHR system; for example, the standard for Digital Imaging and Communications in Medicine (DICOM) allows identification numbers up to 64 digits, and some older versions of the standards for interoperability of health information technology (HL7) limit this

32 different ID numbers are used in most NHS trusts to identify a patient.⁶

to 15 digits. Different identification methods may also cause confusion among caregivers when working in another department in the hospital or when moving to another hospital.

The lack of use of global standards may also jeopardise the uniqueness of a patient identification number. In case hospitals are using the same system, the same identification number may be generated for different patients. This has led to serious incidents when a patient is transferred to another hospital or when using a regional referral laboratory.

Silos within hospitals and/or a regional setting lead to a lack of interoperability. As a result, there are increased costs across the healthcare sector. Interoperability is easier to sustain when all healthcare stakeholders use a single global system of identification standards.



Reduce complexity between and within organisations by using global standards.

6. Source: NHS, UK



Why choose the GS1 system of standards?

Implementing global standards across the entire healthcare supply chain could save 22,000-43,000 lives and avert 0.7 to 1.4 million patient disabilities.”⁷

Standards play a very important role in day-to-day business processes: They reduce complexity between and within organisations, and are the foundation for interoperability of IT systems. GS1 standards ensure effective exchange of identification data among all stakeholders (external and internal), and act as basic guidelines that facilitate interoperability and provide structure to many industries. In short, they allow organisations to focus on how to use information instead of how to get information.

GS1 standards should be the standards of choice, rather than developing and maintaining non-standard proprietary identification and data capture systems. Leading

hospitals are already adopting GS1 standards to streamline their supply chain and improve internal processes. This will align with the many healthcare manufacturers who have adopted, or are adopting, GS1 standards to identify and label their medicinal products and medical devices globally. GS1 standards were implemented by the consumer goods industry in the 1970's, and most non-healthcare products supplied to hospitals carry GS1 barcodes. Using the same global standard to identify supplies, caregivers and patients, allows the reduction of complexity for hospital information systems.

GS1 standards are:

- **Global** – GS1 standards ensure globally unique identification and enable cross-border compatibility of IT solutions.
- **Robust** – Today, in various sectors, over 6 billion transactions per day are enabled by GS1 standards, demonstrating and confirming its robustness.
- **User-generated** – GS1 standards are built and maintained collaboratively by volunteers from across the world from hospitals as well as multi-national suppliers.

- **Scalable** – GS1 standards meet the needs of a small rural hospital as well as a multi-national supplier.
- **ISO/IEC compliant** – GS1 standards utilise ISO/IEC Standards and are referenced within ISO/IEC Standards.

“The lack of a standardised coding system has led to errors by staff who provide care at multiple facilities.”

World Health Organization (WHO)

65 regulatory agencies worldwide accept the use of GS1 standards in healthcare.

7. Source: McKinsey report, “Strength in unity: The promise of global standards in healthcare”, October 2012

GS1 standards enable global automatic identification

The GS1 system of standards is built around and upon several elements, including:

- **GS1 identification keys** used to distinguish any object, location, patient or caregiver, so interested parties can use it as a 'key' to get information related to them from a database.
- **GS1 Application Identifiers** present a standardised way to encode additional variable information, such as expiry date, lot number and serial number, which is now becoming a regulated requirement in some countries and can be critically important in the case of a product recall.
- **GS1 barcodes** provide a portfolio of data carriers including GS1-128 Linear barcodes, GS1 Data Matrix (two dimensional barcodes) and others.

From 2011 to 2012, a GS1 work group, consisting of volunteers from the global healthcare community, developed a new standard to meet the specific

requirements of identifying patients and caregivers in a healthcare environment.

The Global Service Relation Number (GSRN)

is the GS1 identification key used to identify the relationship between an organisation offering services (in this case, any healthcare provider) and the recipient of services (in this case, the patient). The same identification key can be used to identify the relationship between the organisation offering the service and the provider of the service (in this case, the caregiver), but using a different Application Identifier to clearly distinguish the role. **The data string** is comprised of the:

- **Application Identifier** provides the meaning of the data field which follows, allowing the same GS1 data carrier to encode multiple data fields.
- **GS1 Company Prefix** allocated by GS1 Member Organisations to member companies and users, enabling them to allocate GSRNs.

- **Service reference** allocated by the member company or user to each different person.
- **Check digit** provides extra security by preventing accidental key stroke errors.

Recognising that it may be useful to be more granular when identifying a patient, the service relation instance number (SRIN) allows specifying the relevant instance within the care process. The AIDC data carrier should then carry both the GSRN and SRIN, and allows simultaneously capturing of the patient ID and instance. This would, for example, allow the capturing of different instances of care during laboratory sample collections.

AIDC systems reading the barcode on the patient's wristband allow automatic capturing the GSRN and SRIN, which in turn provides immediate access to patient information from the hospital's information system and enables the sharing of relevant patient information.

GSRN is a formally approved ISO standard, also adopted by CEN. It is referred to as CEN ISO TS 18530 and this technical specification provides good practice based on various use cases as well as the experience gathered by users from blood transfusion. It helps bridging other global standards like ISBT 128 to GS1 standards, thus contributes to higher patient safety.

With the appropriate GS1 Application Identifiers, this identification key allows for clearly defining the role (caregiver or patient⁸) and precisely specifying the instance within the care process.



8. In ISO terms: 'Patient' is the Subject of care (SoC), any person who uses, or is a potential user of a healthcare service. 'Caregiver' is the Individual provider, any person who provides or is a potential provider of a healthcare service.

GS1 standards in action!

Medication verification and positive patient ID at Geneva University Hospitals (Switzerland)

In order to better manage the risks of treating cancer patients with cytostatics, Geneva University Hospitals (HUG) implemented several process enhancements. A crucial part of this was to automatically capture all relevant information at the point-of-care, for which caregivers use a trolley with a laptop computer and a barcode scanner. Before administering medication, the caregiver scans the GS1 Data Matrix barcode on the bag containing the cytostatic, giving access to the product identification key (GS1 Global Trade Item Number or GTIN), and the bag's serial number. The caregiver also scans the GSRN from the barcode on the patient's wristband. Having more reliable access to product and patient information has helped to address and eliminate medication errors associated with incorrect patient, incorrect medication and incorrect timing. After a few years of experience, HUG decided to deploy patient ID wristbands with GS1 GSRN across all the hospital groups to support other processes, such as patient transport, etc.



L'ESSENTIEL, C'EST VOUS.

Total visibility at St. James's Hospital (Ireland)

The National Centre for Hereditary Coagulation Disorders (NCHCD) located at St. James's Hospital, Dublin, manages patients with inherited and acquired bleeding disorders. In the 1980s, Haemophilia patients became infected with HIV/Hepatitis due to blood product contamination, some of them even after the product was recalled, simply because it couldn't be traced back to the patients. St. James's Hospital completely redesigned the system giving them total visibility of each unit of Haemophilia medication. The key to the success of this project involved harnessing the power of GS1 barcodes. Each patient is allocated a unique identifier (GSRN), as is each unit of medication (GTIN + serial number) and each location in the supply chain (GLN - Global Location Number). For self-treatment at home, patients use a smartphone to scan the barcodes and connect to the hospital's information system. In the event of a recall, the location of 100% of any selected batch of product can be identified within 10 minutes and appropriate action taken.



Call to action

When redesigning hospital care processes and leveraging IT and AIDC, make the adoption of GS1 standards a priority in your strategy to ensure interoperable scanning solutions.

Adopt an AIDC strategy for your organisation

Define the areas where to start, such as identification of critical medical products throughout the hospital supply chain (in-house production, warehouse management, internal deliveries) and identification of patients and caregivers at the point-of-care.

Become a GS1 member

GS1 has Member Organisations in over 110 countries worldwide, many of which have hospital membership programmes in place.

Build your project team

To ensure effective implementation, different departments and experts should be involved, including IT, quality / safety specialists, logistics, technicians, nurses, doctors and care providers.

Develop and implement the project plan

The project team needs to assess the current processes, and reengineer those processes by leveraging AIDC technology and identification standards so as to improve their efficiency and effectiveness. This includes for example eliminating multiple key-entries with the same data, mappings between IT systems, etc. The project team also needs to define an appropriate purchasing programme for AIDC systems meeting their specific requirements.

Share your experiences

Exchange information and experiences with other healthcare providers. Your local GS1 Member Organisation helps you in meeting other organisations engaged in similar implementation projects.

About GS1 Healthcare

GS1 Healthcare is a global, voluntary user community bringing together all healthcare supply chain stakeholders, including manufacturers, distributors, healthcare providers, solution providers, regulatory bodies and industry associations. The mission of GS1 Healthcare is to lead the healthcare sector to the successful development and implementation of global standards by bringing together experts in healthcare to enhance patient safety and supply chain efficiencies. GS1 Healthcare members include over 70 leading healthcare organisations worldwide.

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