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**Healthcare**  
User Group

# Recommendations on Staff Identification using GS1 Standards

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## Contributors

Name	Organisation
Jackie Pomroy (Sub group chair)	NHS South of England Procurement Services
Adam Parsons	Salisbury NHS Trust
Claire Clarke	GS1 UK
Juliette New	GS1 UK
Mark Songhurst	Leeds Teaching Hospitals NHS Trust
Rose Gallagher	Royal College of Nursing
Dave Weatherby	GS1 UK (Facilitator)
Serena Knight	Royal Cornwall Hospitals NHS Trust
Munndeeep Chahal	Derby Hospitals NHS Foundation Trust
Debbie Blackwood	North Tees and Hartlepool NHS Foundation Trust
Lyn Astle	North Tees and Hartlepool NHS Foundation Trust

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## About the GS1 UK Healthcare User Group

The GS1 UK Healthcare User Group (HUG) is made up of invited senior representatives from healthcare trade associations, providers, suppliers, solution and service companies and other related organisations. The objectives of the group are:

- practice solutions from local implementations



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## 1 Introduction

The Department of Health (DH) has mandated that Acute Trusts in England should implement standards and common ways of working based on GS1 and PEPPOL standards. Six Trusts, the Scan4Safety Trusts, have been funded to fast track implementation as demonstrators for other Trusts to follow.

Through the implementation of these standards, Trusts will be better able to track and trace their patients, products and locations enabling operational efficiency and ultimately improving patient safety.

The DH and the Scan4Safety Trusts have documented the use of GS1 standards to identify patients, products and places as core enablers in realising the benefits that these standards can deliver. In addition, the Scan4Safety Trusts have found that the use of GS1 standards to identify staff, both permanent and non-permanent, is also an important enabler. This document recommends how GS1 standards should be used for staff identification based on the experience of a number of Scan4Safety and other Trusts.

This draft is an early release of the final document which will incorporate the implementation experience of at least two Acute Trusts in England.

## 2 Scope

This paper provides recommendations on the implementation of barcoded or RFID tagged Trust Staff Identity Cards using GS1 standards. This is an enabler for the use of GS1 barcode scanning similar to the Scan4Safety enablers of patient, product and place. Clearly the benefits of a barcoded staff card are only realised when applications are implemented which scan the card. Implementing a scanning application is out of scope of this paper.

## 3 Recommendations Summary

Staff should be identified by a single GS1 compliant identifier which can be used across all hospital systems.

The single identifier should be a GS1 Global Service Relation Number (GSRN) based on the Electronic Service Record (ESR) number.

The GSRN should be encoded in a GS1 DataMatrix barcode which also encodes a card issue number using the GS1 Service Relation Instance Number (SRIN). This barcode should be printed on the front of the existing Trust Staff Identity Card. Section 6 on GS1 Compliant Identity Card provides details of how this should be done.

Optionally, the Trust Staff Identity Card may also carry the same information in a GS1 RFID tag.

Where possible non-permanent staff such as volunteers, bank, or long term or frequently used agency staff or locums should be added to ESR and given a Trust staff identity card with a GS1 barcode as for staff.

Where required, short-term or emergency agency staff should be given a barcoded generic staff badge and full details recorded of who it was allocated to and for what period.

## 4 Common use cases and benefits of barcoded/RFID staff identity cards

### ■ Patient safety

By quickly scanning the clinician's card and the equipment they are about to use, a check can be made that they are qualified to carry out the procedure. Equally where a clinician is being trained on a piece of equipment or procedure, scanning their card can automatically update their training record.

### ■ Staff safety

Having accurate information about staff location makes it easier for employers to accurately account for all employees during and after an emergency. Managers would be able to identify who has left the department or building and determine their location. Where personal safety is threatened, whether by fire, an emergency, personal attack, physical illness or collapse; being able to rapidly identify the staff and the location of the vulnerable enables employers to provide assistance quickly and effectively.

### ■ Saving staff time

Using handheld devices to scan barcoded staff identity cards enables nurses and other staff to quickly and accurately record who did what to whom when, where and why. It can release time to care by eliminating handwritten notes or having to return to the nurses' station to key in data.

### ■ Resource management

Scanning staff ID, e.g. at the start of each shift, would provide managers with accurate information around staffing levels throughout the organisation; provide positive proof of attendance; and support decision making if there was a requirement to deploy staff to other areas of the Trust. An additional benefit would be in identifying where and when staff are working longer hours than contracted, or even longer than is safe for patients.

### ■ Allocating staff costs

Being able to quickly and accurately record which staff are present during a procedure, and for how long, enables full patient and procedure costing. Linking these costs to outcomes can suggest improvements in clinical processes and productivity.

### ■ Record keeping

By scanning their identity card, product barcodes and the patient wristband, a clinician can quickly and accurately create a record of who has done what to a patient and where and when this was done. This record can be used as evidence in the event of claims of negligence against the hospital or against individual members of staff. In the long term this could lead to lower insurance premiums.

## 5 Staff Identification Principles

In the long term, all persons working for the NHS, including bank staff, agency staff and volunteers, should be identified by a GS1 Global Service Relation Number (GSRN), based on a national GS1 company prefix allocated by the Department of Health. Ideally the GSRN will be a unique identifier that individuals carry with them across all their NHS employment.

However, until a national identifier for NHS staff is developed, NHS staff should be identified by a GSRN based on their ESR number and using a GS1 Company Prefix (GCP) provided by the Department of Health. This number should ideally be used wherever it is necessary to identify staff, for example the WHO (World Health Organisation) surgical checklist process in theatres, when taking blood or when controlling physical access.



If an RFID and/or barcoded card is issued to staff and third-party personnel, the barcode should contain their GSRN and a Service Relation Instance Number (SRIN). The SRIN should be different for each issue of a card thus enabling the card to be decommissioned if lost or stolen.

Master data for NHS staff should be managed through the ESR system.

## 6 GS1 compliant staff identity card

A GS1 compliant staff identity card has a GSRN and SRIN encoded in a GS1 compliant barcode.

### ■ GSRN

This is the GS1 identification key used to identify the relationship between an organisation offering services and the recipient or provider of services. The NHS patient ID band uses the GSRN to identify patients.

The GSRN is an 18-digit number made up of a GS1 Company Prefix, service reference and check digit. For more information about the GSRN see:

<https://www.gs1.org/global-service-relation-number-gsrn>

### ■ SRIN

The SRIN is used when an identification card identified with a GSRN needs to be decommissioned and a replacement issued. The SRIN provides a means for the organisation issuing badges to distinguish between badges with identical GSRNs.

The SRIN can be up to 10 numeric digits. The first 2 digits of the SRIN identify what type of object the barcode has been printed on. For example, 09 as the first 2 digits specifies that the barcode is on an identity card. The code list of possible entries is documented in Table 18 of the ISBT 128 standard available at <https://www.iccbba.org/docs/tech-library/technical/st-001-isbt-128-standard-technical-specification.pdf>.

The SRIN for every issue of a card should be unique.

### 6.1 The GS1 compliant staff identity card barcode

The GSRN and SRIN should be encoded in a GS1 DataMatrix 2-dimensional barcode with the following data structure:

**8017505717700123456786801909nn..nn**

Where

The first **red 8017** is the Application Identifier (AI) which indicates that what follows is a GSRN

The next **green 5057177** is the GCP allocated by the Department of Health

The next purple **00** are filler digits

The next **blue 12345678** is the 8-digit ESR Number. The additional ESR role number should not be included

The next **amber 6** is the check digit for the GSRN. See Appendix Check Digit Calculation for how to calculate the check digit

The next **red 8019** is the AI which indicates that what follows is an SRIN

The next **purple 09** indicates that this barcode is on an identity card or badge

The next **blue nn...nn**, up to a max of 8 digits, is the card issue number and must be different for every card issued to a person

Note only the blue and amber digits will change for different staff. All other digits remain the same for all staff.

A Trust can include additional information in the staff barcode by using one of the internal application identifiers allocated by NHS Digital for Trust specific requirements. It is strongly recommended that Trusts contact GS1 UK for guidance if they are planning to make use of these identifiers.

## 6.2 Location of barcode

This document recommends that the Trust staff identity card should carry the GS1 barcode and/or RFID tag since this is the only card carried by all staff. However, the barcode/tag could be put on other cards or objects if required.

The barcode should be on the front of the card so that it is easily available for scanning. A one dimensional non-GS1 barcode can also be shown on the badge in order to assist in the transition from an existing non-GS1 barcoded staff badge. See an example below:



Credit: The Mid Yorkshire Hospitals NHS Trust

## 6.3 Use of RFID

The staff GSRN and SRIN can be encoded in a GS1 EPC compliant passive UHF RFID tag. The details of how to do this are relatively complex and can be found in the GS1 Tag Data Standards available at <http://www.gs1.org/tag-data-standard>. Note that the RFID chip must have more than 96 bits of memory.

Passive tags do not have a battery and are activated by the RFID reader. They can be embedded in a staff card.

UHF tags can typically be read at a distance of up to 10 meters depending on the type of reader. Lower powered readers require the tag to be in close proximity, enabling the use of UHF tags for access control.

If the identification card is to carry a GS1 compliant passive UHF RFID tag, then care should be taken to ensure that it will not interfere with any systems for access control or using the NHS care records service card.

Alternatively, an active RFID tag can be used. Active tags contain a battery and are too large to be incorporated in a staff badge. Where active tags are used the tag identifier (typically the MAC address) should be linked to the GSRN of the staff member in the ESR extract database (see section 7.4).

## 6.4 Scanning a staff identity card

Scanning applications should scan both the GSRN and the SRIN and check that the SRIN is still valid and has not been decommissioned.



## 7 Implementing GS1 staff identification cards

### 7.1 Management support

The first step is to get management support which may require the development of a business case that documents the costs and benefits associated with agreed use cases.

The business case for implementing GS1 compliant Trust staff identify cards will be through improvements in patient safety, reduction in costs of negligence claims and releasing time to care.

The direct costs of implementing GS1 staff ID cards will include:

- Barcode image software
- Optional RFID tags and RFID writers
- Cost of new cards (approx. £1 per card) and staff time in replacing existing cards
- Change management including training and project management

Process map to be added

### 7.2 Identify where barcoded staff ID may be beneficial

There are many hospital processes and departments which require the identity of staff to be recorded, some examples are shown below. The scanning of a GS1 compliant identity card could make recording more accurate while reducing the staff time involved.

- Electronic Patient Observations
- Electronic Patient Record
- Blood Administration
- Blood Glucose reading
- Theatres
- Point of use product tracking
- Materials Management
- Endoscopy
- Pharmacy
- Radiology
- Patient movements

Some of these processes and places may already involve scanning of non-GS1 compliant staff cards which could cause problems in introducing GS1 compliant cards. One approach could be to add a GS1 compliant barcode to the existing staff card. This is a similar approach to that adopted by some Trusts for implementing the patient identification band, where they have included both the NHS number in a GS1 DataMatrix barcode together with the hospital number in non-GS1 liner barcode.

### 7.3 Should the staff identity card include GS1 RFID

RFID enabling of the card should be considered as part of an overall strategy for the use of GS1 compliant RFID within the hospital for tracking such things as medical equipment, patient samples, medical records etc. If the card is to be RFID enabled testing will be required to ensure it does not interfere with other uses of RFID.



## 7.4 Creation of the GSRN and barcode image

The staff name and associated ESR number is required in order to create the GSRN and SRIN. This information may already be in a database as part of the system for printing staff cards. If this database does not exist then it can be downloaded from the ESR database using the “*workflow notification extract*”. It may be useful to add additional information to the extract database such as staff role(s) and training record.

The GSRN and SRIN for each staff member can then be easily calculated and added to the extract database.

Barcode images can be created using:

- barcode generation web sites
- barcode generation software products
- special barcode printer fonts

Note that the existing system for printing Trust staff identify cards may already have barcode generating capability.

The barcode image can be created and stored in the database or alternatively the barcode can be created at the point of printing.

It is strongly recommended that Trusts send example staff ID barcodes to GS1 UK to ensure that they are fully compliant. Contact the GS1 Healthcare team on 0808 172 8390 or [healthcare@gs1uk.org](mailto:healthcare@gs1uk.org).

## 7.5 Identifying non-permanent staff

Not all personnel in the hospital are directly employed by the Trust and therefore may not have an ESR number. Trusts will need to decide which non-permanent staff will need a barcoded identity card. This section provides guidance on how barcoded identity cards can be provided for non-permanent staff.

### 7.5.1 Bank staff

Bank staff will probably have an ESR number already, if they do not then they should be added to ESR and then processed as for staff in the normal way.

### 7.5.2 Long term/frequent agency and locum staff

Long term or frequently used agency and locum staff should be added to ESR and then processed as for staff in the normal way.

Alternatively, the Trust could create a GSRN for such staff using the Trust GCP. This GSRN, plus other information such as name, training record etc could then be added to the extracted staff ID database. They could then be given staff cards in a similar way to staff.

### 7.5.3 Short term agency staff

For short term agency staff, the Trust can issue a generic card with a GSRN and SRIN barcode. The Trust should then keep a record of to whom the card was issued, the date it was issued and the date it was returned.

### 7.5.4 Volunteers

Volunteers can be handled in the same way as long-term agency or locum staff.



### 7.5.5 Service providers

Service providers will normally be closely supervised while on site and therefore may not require a barcode ID card. However, if cards are required then Trusts may provide them in the same way as for agency staff.

In the future, service providers may provide their staff with GSRN based barcoded cards and this GSRN and additional information can be added to the ESR extract database.

### 7.5.6 Supplier representatives

The NHS is supporting the creation of a Life Sciences Industry registry for supplier representatives with the expectation that the registry will create GSRNs to identify representatives and will also hold their training status etc. Until the registry is operational, Trusts may handle supplier representatives as either long or short-term agency staff as appropriate.

## 7.6 Printing the barcode image

The printed barcode needs to be sufficiently durable that the barcode remains readable after normal wear and tear. It may be necessary to laminate the cards or protect them in some other way.

Care also needs to be taken that the card material and laminate does not make the barcode difficult to read.

If the card is RFID enabled, then the tag should be programmed at the point that the card is printed and issued. This should ideally be done in an integrated print and programme system. Alternatively, the tag could be programmed as a separate process before or after the card has been printed.

The barcode/tag should be test read before each card is issued to ensure that it has been correctly printed and programmed.

## 7.7 Administration of cards

If a barcoded Trust card is lost or stolen, the SRIN value in the staff ID database needs to be deleted. Any systems that use the barcode on the Trust identity card also need to be informed this card should no longer be accepted.

When issuing new or replacement staff cards, the SRIN must be updated on the staff ID database and any systems that use the barcode on the Trust identity card informed of the current value of the SRIN.

## 7.8 Communicating with staff, patients, unions and the public

When to communicate what information to staff, unions, patients, relatives etc:

- Staff communication should start at an early stage, highlighting benefits to them and patients
- Union input and support sought locally and nationally
- Build into local policy and procedures as part of the communication process

## 8 Appendix - other staff identifiers considered

Information about NHS staff is typically managed in many different systems, each of which has its own staff identifier. The long-term aim is to agree on a single GS1 based staff identifier which can be used in any system. In the meantime, it may be necessary to provide cross reference tables between the various systems.

Clearly any staff identifier to be used in a barcoded staff card must uniquely identify the member of staff. For this reason, any local identifiers or identifiers linked to proprietary systems, such as blood monitoring systems, were eliminated from consideration.

The table below shows the identifiers that were considered. Again, any identifiers with limited scope were eliminated since it was required to be able to identify any NHS staff.

The NHS number was eliminated since concerns were raised that using the NHS number for purposes other than identifying patients might cause problems.

The ESR number was chosen since it was already familiar within Trusts, had a formal registration system already in place, provides links to professional registries and staff training records and roles. The ESR does allocate a different number for each employment and therefore a person may have more than one ESR number. However, within the ESR system all the ESR numbers for a person are linked to a single internal unique user identifier.

Identifier	Type	Identify Organisation	Format	Owner	Scope
ESR	Numeric	Yes	8 (+1 optional)	DoH	All NHS staff plus others
Medical PIN	Alpha Numeric	No	7	GMC	Only medical staff
Nursing PIN	Alpha Numeric	No	8	NMC	Only nursing staff
HCPC Pin	Alpha Numeric	No	7	HCPC	Only HCPC staff
Pharmaceutical PIN	Numeric	No	7	GPC	Only pharmaceutical staff
NHS ID	Numeric	No	10	NHS Digital	Virtually everyone in England
National Insurance Number	Alpha Numeric	No	8	HMRC	Virtually everyone in the UK



## 9 Appendix - check digit calculation

GS1 provides a check digit calculator at <https://www.gs1.org/check-digit-calculator>.

Software providers will often include check digit calculators within their systems.

In case neither of these approaches is suitable, this section shows how the check digit can be calculated.

The same calculation is used to create the check digit for all the GS1 Identification Keys that require them, including GSRNs, GTINs and GLNs.

This is how you calculate a check digit:

- 1 Starting with the right-hand digit of the number, add all the alternate digit values
- 2 Multiply the result of step one by three
- 3 Add up all the other remaining digits
- 4 Add the result of step two to the result of step three
- 5 The check digit is the smallest number that must be added to this sum to reach a multiple of 10

So, to calculate the check digit of the GSRN 50571770012345678C where C is the check digit:

- 1  $8+6+4+2+0+7+1+5+5= 38$
  - 2  $38 \times 3 = 114$
  - 3  $7+5+3+1+0+7+7+0 = 30$
  - 4  $114 + 30 = 144$
  - 5  $144 + C = 150$ . T so **C = 6**
- The complete GSRN is 505717700123456786**



## 10 Appendix - glossary

Application Identifier	Two or more digits at the beginning of an element string in a GS1 barcode that uniquely defines the element's format and meaning
Element string	The combination of a GS1 Application Identifier and GS1 Application Identifier data field.
ESR	Electronic Staff Record
GCP	GS1 Company Prefix
Global Service Relation Number (GSRN)	The Global Service Relation Number is the GS1 identification key used to identify the relationship between an organisation offering services and the recipient or provider of services. The key comprises a GS1 Company Prefix, service reference and check digit.
GMC	General Medical Council
GPC	General Pharmaceutical Council
GS1 Company Prefix (GCP)	A unique string of four to twelve digits used to issue GS1 identification keys. The first digits are a valid GS1 Prefix and the length must be at least one longer than the length of the GS1 Prefix. The GS1 Company Prefix is issued by a GS1 Member Organisation. As the GS1 Company Prefix varies in length, the issuance of a GS1 Company Prefix excludes all longer strings that start with the same digits from being issued as GS1 Company Prefixes.
GS1 DataMatrix	A two-dimensional matrix barcode complying with GS1 standard
HCPC	The Health and Care Professions Council (HCPC)
HMRC	Her Majesty Revenue and Customs
HUG	GS1 UK Healthcare User Group
ICCBBA	An international non-governmental organization that manages, develops, and licenses the ISBT 128 standard
ISBT-128	The standard for the identification, labelling, and information transfer of medical products of human origin
NHS Care Record Service Card	A chip-based card issued by NHS Digital to log on to computer systems. Also known as the NHS Smartcard
NMC	Nursing and Midwifery Council
RFID	Radio Frequency Identification
SRIN	Service Relation Instance Number An attribute to the GSRN which allows to distinguish different encounters during the same episode, or the reuse of the same GSRN in different episodes.



Trust Staff Identity Card	An identify card issued by the Trust to staff. Also known as primary access card
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