Information Standards Board
for Health and Social Care

Title	AIDC for Patient Identification – Operational Information Standard - Specification		
Document ID	ISB 1077 Amd 03/2012		
Director	Chris Wilber	**Status**	Final
Owner	Neil Lawrence	**Version**	4.4
Author	Neil Lawrence	**Version Date**	29 February 2012

Automatic Identification and Data Capture (AIDC) for Patient Identification

Operational Information Standard

Specification

Amendment History:

Version	Date	Amendment History
1.0	04-Aug-2011	Draft version submitted to ISB for appraisal
1.1	10-Aug-2011	Inclusion of conformance criteria
1.2	12-Aug-2011	Changes following NHS Data Dictionary review
1.3	13-Aug-2011	Changes following ISB appraisal
2.0	06-Sep-2011	Changes follow Change Proposal and ISB appraisal
3.0	08-Sep-2011	Further changes following GS1 comments
4.1	23-Sep-2011	Final changes following feedback from ISB
4.2	08-Nov-2011	Changes following ISB Board
4.3	18-Nov-2011	Formatting amendments
4.4	29-Feb- 2012	Correction to Data Set Specification

Reviewers:

This document must be reviewed by the following:

Name	Signature	Title / Responsibility	Date	Version
Neil Lawrence		AIDC Lead	08-Sep-2011	3.0
Miles Gray		Technical Architect	08-Sep-2011	3.0
Stephen Pope		AIDC Technical Architect	08-Sep-2011	3.0
DHID - Clinical Safety Group / Clinical Safety Projects			08-Sep-2011	3.0

Approvals:

This document must be approved by the following:

Name	Signature	Title / Responsibility	Date	Version
Information Standards Board for Health and Social Care (ISB)			21-Mar-2012	4.4
Clinical Safety Group			08-Sep-2011	3.0

Distribution:

- ISB distribution list.
- ISB website.

Document Status:

This is a controlled document.

Whilst this document may be printed, the electronic version maintained on the ISB website (www.isb.nhs.uk) is the controlled copy. Any printed copies of the document are not controlled.

Contents

1 Overview

1.1 Summary

STANDARD	
Standard Number	ISB 1077
Title	Automatic Identification and Data Capture (AIDC) for Patient Identification.
Type	Operational
Description	This Standard defines how to encode the NHS approved patient identifiers for identity bands into a two dimensional bar code, namely the GS1 DataMatrix Symbol. This standard covers production, verification and printing rules for the bar code. The standard uses the GS1 System of Standards for code numbering and bar coding and ISB 0099 - Patient Identifiers for Identity Bands for the required data items. The resulting dataset is the AIDC for Patient Identification Dataset. The purpose of this standard is to support the accurate, timely and, therefore, safer identification of NHS patients in England. It is a technology enabling standard. Implementation of this standard will enable subsequent processes involving the patient and care provided to the patient (where these processes are also bar coded) to be automatically identified using AIDC techniques, eg. bed management, phlebotomy, theatres management, medications administration. At this point, the full patient safety, cost and efficiency benefits of the standard will be realised. This standard should be reviewed and implemented alongside the existing AIDC Fundamental Standard: ISB-0108: AIDC for the NHS in England and related standards and guidance outlined in Sections 1.2 and 1.3. The following are **out of scope** for this Operational standard: ▪ Identity band design including display of human readable information. ▪ Identity band production, verification, fitting and use. ▪ OBS for Newborn Screening Blood Spot Card Label. ▪ The NHS required patient identifiers for identity bands. These are mandated by the NPSA standard ISB 0099. ▪ Radio Frequency Identification (RFID). ▪ Bar coding of blood and blood products tracking. ▪ Bar coding of medical records tracking and document management. ▪ Any of the business processes that adoption of this standard will enable, eg. scanning of bar codes and system design.

Applies to	This standard applies to all health care settings in England where an identity band is worn by the patient. It also applies to all healthcare IT / system suppliers to the NHS in England that develop and implement systems which result in the production of patient identity bands. The users of the standard will be those involved in the design, manufacture, procurement, deployment and use of systems which result in the production of patient identity bands, as well as those who are associated with the provision of care to the patient. These may include: ▪ IT and informatics personnel. ▪ Finance and procurement. ▪ Departmental directors and managers. ▪ Project managers. ▪ Healthcare professionals. ▪ Administration staff. ▪ Estates. Although out of scope, due to the relationship between the two, the standard may be used as additional supporting guidance when meeting the requirements of the UK Newborn Screening Programme. However, this standard does not replace Output Based Specification (OBS) for the Newborn Screening Blood Spot Card Label.

RELEASE	
Release Number	Amd 03/2012
Title	Minor Amendments to the Specification
Description	This release corrects the following minor errors within the specification: 1. ‘GS1 Data Matrix’ amended to ‘GS1 DataMatrix’ throughout the document. 2. Page 13 AI data items amended from 'fixed' to 'variable'. 3. Page 17 Section 1.5 Data amended from 'F' to 'V'. 4. Page 20 Section 2.1 Data amended from 'F' to 'V'. 5. Page 22 Section 2.4 Data Format amended from 'an11 DD-MM-CCYY' to 'an11 DD-Mmm-CCYY' as per NHS Common User Interface Standard 'Date Display'. 6. Page 23 Section 2.5 'GS1 AI 92' amended to 'GS1 AI 93'. 7. Page 24 Section 3.1 Data amended from 'F' to 'V'. 8. Page 26 Section 3.3 'GS1 AI 93' amended to 'GS1 AI 92'. 9. Page 27 Section 3.4 'GS1 AI 93' amended to 'GS1 AI 92'. 10. Page 32 example is missing a comma following ‘Chan’ it should be ‘Chan,’.
Stage	Change
Proposed Implementation	01/09/2013

Date	

1.2 Guidance

Document Reference	Name
	NPSA – Framework for Action – Right Patient Right Care.
NPSA/2005/SPN011	Identity bands for hospital inpatients improve safety.
NPSA/2007/SPN024	Standardising identity bands improves safety.
NPSA/2009/SPN002	Risk to patient safety of not using the NHS Number as the national identifier for all patients.
	NHS Numbers for Newborn Screening – OBS for the Blood Spot Card Label – v3.0 – Final – 8 February 2011

1.3 Related Standards

Reference	Title
ISB 0108	Automatic Identification and Data Capture (AIDC)
ISB 0099	Patient Identifiers for Identity Bands
ISB 1503	Common User Interface – Date Display
ISB 1504	Common User Interface – NHS Number Input and Display
ISB 1506	Common User Interface – Patient Name Input and Display
ISB 1501	Common User Interface – Time Display – Operational Standard
ISB 0149-01	NHS Number for General Practice
ISB 0149-02	NHS Number for Secondary Care
ISB 0129	Patient Safety Risk Management System - Manufacture of Health Software
ISB 0160	Patient Safety Risk Management System - Deployment and Use of Health Software
ISBT 128	Identification, labelling and information processing of human blood, tissue and organ products
ISO/IEC 15416:2002	Automatic identification and data capture techniques. Bar code print quality test specification. Linear symbols
ISO/IEC 15426-1:2006	Automatic identification and data capture techniques. Bar code verifier conformance specification. Linear symbols

2 Specification

2.1 Information Specification

#	Requirement
General:	
1.	When implementing the Operational standard, ISB 1077: AIDC for Patient Identification, the Fundamental standard ISB 0108: Automatic Identification and Data Capture (AIDC) MUST be used as a reference guide.
2.	This standard SHOULD be implemented alongside the existing national standards, notices and guidance for patient identifiers and identity bands, including Common User Interface (CUI) standards for the display of human readable information. These are all listed in Sections 1.2 and 1.3 of this document.
3.	When designing and manufacturing AIDC solutions / systems, including middleware, for purposes of Patient Identification in the NHS, ISB 0129: Application of Clinical Risk Management relating to the Manufacture of Health Software (ISB 0129) SHOULD be used to identify and acceptably manage clinical safety risk associated with solution / system design.
4.	When procuring, deploying and using AIDC solutions / systems, including middleware, for purposes of Patient Identification in the NHS, ISB 0160: Application of Clinical Risk Management relating to the Deployment and Use of Health Software (ISB 0160) SHOULD be used to identify and acceptably manage clinical safety risk associated with context of use and human factors. While not in scope for this standard, it is assumed that NHS organisations will address risks and issues related to identity band production, verification, fitting and use as part of wider patient identification safety and information governance risk management for that NHS organisation. This standard MAY also be used as a framework for developing an AIDC for Patient Identification implementation project plan.
5.	All NHS identity bands MUST carry the encoded AIDC for Patient Identification Dataset (found at Section 4) according to the instructions outlined in Section 3 - Concept of Operation. Examples can be found at Section 5.
Data Carriers	
6.	The data carrier which MUST be used to carry the AIDC for Patient Identification Dataset is the GS1 DataMatrix Symbol. (Refer to Section 6 – Permitted Data Carriers).
7.	It is recommended that, where space permits, all identity bands SHOULD carry two GS1 DataMatrix Symbols, containing exactly the same AIDC for Patient Identification Dataset, one at each end of the identity band. This is for ease of scanning and as a backup, should one fail or become destroyed.

8.	GS1 DataMatrix Symbol production, verification and printing MUST be conducted according to the technical instructions and guidance in GS1 document: "GS1 DataMatrix - An introduction and technical overview of the most advanced GS1 Application Identifiers compliant symbology". (Available to GS1 registered members only. Refer to ISB 0108 for guidance on registering an NHS organisation with GS1).
9.	For legacy purposes and to ease migration, NHS organisations MAY implement dual bar coding on identity bands, i.e. a GS1 DataMatrix Symbol containing the AIDC for Patient Identification Dataset AND a 1D / linear bar code containing the NHS Number or local hospital / PAS number. The linear bar code MAY be a Code 39 or Code 128. It MUST NOT be a GS1 128 bar code as these are too wide to fit onto identity bands. This standard assumes that identity bands are not transferred between hospitals.
10.	Implementation of dual bar codes MUST NOT compromise the human readable information on the identity band, nor the GS1 DataMatrix Symbol.
Encoding the AIDC for Patient Identification Dataset	
11.	The AIDC for Patient Identification Dataset (refer to Section 5) MUST be used exactly as specified when encoding the data string for bar coded patient identity bands. The dataset will be published and maintained by the NHS Data Dictionary. Mandatory, Required, and Optional data items are indicated for adult and baby identity bands and MUST be adhered to.
12.	The GS1 Identification Key to be used for the encoding of patient identifiers on identity bands MUST be the Global Service Relation Number (GSRN). Refer to Section 3 for a high level description and the GS1 General Specification (Section 4.7) for full details and allocation rules.
13.	There are up to 4 sections in a complete encoded data string for patient identification: The GSRN (containing the NHS Number); followed by up to 3 additional data strings: Hospital Identifiers; Patient Descriptive Data; and Baby Details. Each data string MUST be identified by the appropriate GS1 Application Identifier.
14.	The GSRN data string MUST be identified by the Application Identifier '8018'. The GSRN is a required data string; It MUST be used in all cases.
15.	The data string Hospital Identifiers MUST be identified by Application Identifier '91'. Hospital Identifiers is an optional data string; It MUST be used if the NHS Number is unavailable, invalid or unverified; It MAY be used if the NHS Number is available, valid and verified.
16.	The data string Patient Descriptive Data MUST be identified by Application Identifier '93'. Patient Descriptive Data is a required data string; It MUST be used in all cases.
17.	The data string Baby Details MUST be identified by Application Identifier '92'. Baby Details is a REQUIRED data string; It MUST be used if the patient is a newborn baby / neonate.

18.	GS1 Application Identifiers (AIs) 91 through to 99 are specifically allocated to "Company Internal Information". (Refer to Section 3.10.2. of the GS1 General Specification). The NHS has allocated AIs 91, 92 and 93 for Hospital Identifiers, Baby Details and Patient Descriptive Data respectively, for the specific purpose of encoding on patient identity bands. They MUST NOT be used by the NHS to identify anything else. AIs 94 through to 97 inclusive have been reserved by the NHS for future allocation. AIs 98 and 99 have been put aside for local NHS organisation allocation and use. (See Information Specification No. 19). All allocation of AIs 91 through to 97 for the NHS will be subject to formal NHS Data Dictionary Change Requests and published in the NHS Data Dictionary.
19.	Additional optional data relating to the patient that is fixed MAY be added to the end of the encoded required dataset by local decision, eg. current gender, wristband size indicator or alerts, etc. However, such optional data items are out of scope for this standard. Neither are they mandated or recommended by the NPSA as formal data items for the identity band. As such, any decision to encode local optional data items for use on the identity band MUST be subject to a comprehensive clinical safety risk assessment for design and use in line with ISB 0160 and ISB 0129. Such optional data items MUST NOT include variable data about the patient such as the hospital ward or department they are in, as this could lead to multiple identity band production for the same patient. Optional data items MUST be identified by an appropriate GS1 Application Identifier for "Company Internal Information", ie. of either AI 98 or 99. Such optional data items MUST NOT be identified by any other GS1 Application Identifier.
20.	There MUST NOT be any patient related data encoded into the bar code on patient identity bands which is not printed on the identity band in human readable form.
21.	The complete data string for the GS1 DataMatrix Symbol MUST NOT be printed in human readable form on the patient identity band; It is too long and would cause end user confusion. Printing of the patient related data contained within the GS1 DataMatrix Symbol MUST conform to ISB 0099

22.	The GS1 Unique Organisation Prefix used in the GSRN number (data item 1.2) MUST be the fixed value of 5050898 to identify NHS Connecting for Health (as the service provider of the NHS Number). It MUST NOT be the NHS Trust GS1 Unique Organisation Prefix (which is addressed by data item 1.8).
23.	IF the NHS Number is not known, the NHS Number portion (including the NHS Number check digit) of the data string MUST be set to '9999999999' and the GSRN Check Digit MUST be set to '3'.
24.	The GSRN Check Digit MUST be calculated according to the instructions at Appendix 1.
25.	This Standard Specification does not replace the Output Based Specification (OBS) for the Newborn Screening Blood Spot Card Label. However, it MAY be used as additional supporting guidance in meeting the OBS requirements, due to the relationship between them. Systems which have been designed / configured to produce both NN4B / baby identity bands AND the Newborn Screening Blood Spot Card Label SHOULD be updated so that the GS1 DataMatrix Symbol containing the AIDC for Patient Identification Dataset is printed on the identity band and the GS1 128 bar code containing the NHS Number is printed on the Blood Spot Card Label.
26.	NHS organisations SHOULD NOT procure AIDC technological solutions for encoding the AIDC for Patient Identification Dataset unless they can demonstrate compliance with this standard.

The key words MUST, SHOULD and MAY are defined in the information standards development methodology. They follow RFC-2119.

2.2 Conformance Criteria

#	**Conformance Criteria**
1.	With immediate effect, all new identity band systems and solutions procured, deployed and used by the NHS can demonstrate compliance with the Automatic Identification and Data Capture (AIDC) for Patient Identification Operational Standard.
2.	From 1 April 2012, all NHS Trusts have established a clear migration plan to ensure existing identity band systems and solutions adhere to the AIDC for Patient Identification Operational Standard by 1 October 2013.
3.	From 1 October 2013, all identity bands produced in the NHS carry a GS1 DataMatrix Symbol containing at least the NHS Number, First Name, Last Name and Date of Birth of the patient.

4.	From 1 October 2013, all identity bands produced in the NHS can clearly and unambiguously display the indicated AIDC for Patient Identification dataset in both human readable and bar coded format.
5.	The GS1 DataMatrix Symbol can be accurately scanned in 100% of cases.
6.	A clinical safety risk assessment has been conducted by each NHS organisation prior to the implementation of this standard. The clinical safety assessment should be in line with the standard: ISB-0160: Patient Safety Risk Management for the Deployment and Use of Health Software.
7.	There are no clinical safety near misses or serious untoward incidents (SUIs) reported as a direct result of the AIDC for Patient Identification standard.

3 Concept of Use

3.1 GS1 Global Service Relation Number (GSRN)

The Global Service Relation Number (GSRN) is the GS1 Identification Key that MUST be used when encoding the AIDC Patient Identification Dataset. For full details of the GS1 GSRN, refer to the GS1 General Specification (Section 4.7).

A GSRN identifies a relationship between a service provider and a service recipient. In simple terms, a company or business will issue a GSRN to a customer to identify their relationship. This could be a club membership, a member of a loyalty scheme or to identify a patient using NHS services.

In the case of this standard, the service provider is NHS Connecting for Health (as the service provider of the NHS Number) – identified by the GS1 Unique Organisation Prefix for NHS CFH; The service recipient is the individual patient receiving care and wearing an identity band – identified by their NHS Number.

The GSRN is simply a key to a database which holds the information required, eg. Patient Administration System (PAS). The GSRN can then be encoded in a bar code which is used to access the database.

3.2 Encoding the AIDC for Patient Identification Dataset

The encoded AIDC for Patient Identification Dataset results in a data string which consists of the following items (the full dataset can be found at Section 4):

DATA STRING BEGINS:

Application Identifier	Application Identifier (AI) 8018 to indicate the following data string is a GS1 GSRN.
GS1 Unique Organisation Prefix	A globally unique number assigned to a GS1 member organisation; In this case the GS1 member is NHS Connecting for Health, as the service provider of the NHS Number.
Service Reference Number	The number allocated to identify the service. In this case, the individual patient's NHS Number including the check digit.
Check Digit	A modulo 10 check digit – for the GSRN.
[1]Application Identifier	Application Identifier (AI) 91 to indicate the following data string is for Hospital Identifiers.
Organisation Code	The local NHS organisation code, allocated by the NHS Organisation Data Service (ODS).

.

Patient Hospital Number	The local hospital / PAS number for the individual patient.
GS1 Unique Organisation Prefix	A globally unique number assigned to a GS1 member organisation; In this case the GS1 member is local NHS Trust / organisation.
Application Identifier	Application Identifier (AI) 93 to indicate the following data string is for Patient Descriptive Data.
Last Name	The patient's last / surname.
First Name	The patient's first / forename.
Date of Birth	The patient's date of birth.
Time of Birth	The patient's time of birth (if a baby).
Application Identifier	Application Identifier (AI) 92 to indicate the following data string is for Baby Details.
Number of Babies Indicator	An identifier indicating number of babies born and their rank.
Baby of (Last Name)	The baby's mother's last / surname.
Baby of (First Name)	The baby's mother's first / forename.

DATA STRING ENDS

Format of the AIDC for Patient Identification Data String																
AI	**GSRN**			**AI**	**Hospital Identifiers**			**AI**	**Patient Descriptive Data**				**AI**	**Baby Details**		
	GS1 Unique Org Prefix	**NHS Number**	**Check Digit**		**Organisation Code**	**Patient Hospital Number**	**GS Unique Organisation Prefix (NHS Trust)**		**Last Name**	**First Name**	**Date of Birth (DD-Mmm-CCYY)**	**Time of Birth (HH:mm)**		**Number of Babies Indicator (e.g. 1/2)**	**Baby of (Last Name)**	**Baby Of (First Name)**
8018 F	**n7 F**	**n10 F**	**n1 F**	**91 V**	**an3 or an5 V**	**an10**	**n7 F**	**93 V**	**an35 V**	**an35 V**	**an11 F**	**an5 F**	**92 V**	**an3 F**	**an35 V**	**an35 V**

4 AIDC for Patient Identification Dataset

The following section lists the complete AIDC for Patient Identification Dataset (v1.0 – 6 September 2011). This dataset will be published in and maintained by the NHS Data Dictionary.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
1.1	Application Identifier (AI)	N/A	GS1 Application Identifier code which identifies the following data element string.	n4	F	8018 = Global Service Relationship Number	M	GS1	N/A	Fixed value of 8018. The GS1 Application Identifier of 8018 means the data element string is a GS1 Global Service Relationship Number. A GSRN always has 18 digits (numeric only).
1.2	NHS Connecting for Health GS1 Unique Organisation Prefix	N/A	NHS Connecting for Health (NHS CFH)	n7	F	5050898 = NHS Connecting for Health	M	GS1	8018	The fixed value of 5050898 MUST be used. It is the NHS CFH GS1 Company Prefix. The local organisation GS1 Company Prefix MUST NOT be used. Forms the beginning of the GS1 GSRN.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
1.3	NHS Number	NHS NUMBER	The NHS NUMBER, the primary identifier of a PERSON, is a unique identifier for a PATIENT within the NHS in England and Wales.	n10	F	E.g. 1234567890	R	NHS Data Dictionary	8018	IF the NHS Number is missing, invalid or unverified, THEN set the value to 9999999999 AND data elements 1.5 to 1.7 inclusive become MANDATORY. Forms part of the GS1 GSRN. For human readable forms, the NHS Number SHOULD be displayed in accordance with the NHS Common User Interface information standard "NHS Number Input and Display", eg. the 3,3,4 format. IF the NHS Number is not known, THEN the human readable form MUST be blank.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
1.4	GSRN Check Digit	N/A	A modulo 10 check digit for the GSRN string	n1	F	E.g.: 1	M	GS1	8018	Data element delimited as CSV. Ensures the GSRN is correct. Refer to Table X for check digit calculation for the 18-digit GSRN. If the NHS Number is not known or unverified, set this value to 3. The final part of the GS1 GSRN.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
1.5	Application Identifier (AI)	N/A	GS1 Application Identifier code which identifies the following data element string.	N2	V	91 = Hospital Identifiers	M	GS1	N/A	Data element delimited as CSV. Variable value of 91. The AI of 91 identifies the code number is a GS1 Application Identifier for "Company Internal Information". The NHS has allocated the AI of 91 to "Hospital Identifiers". Data elements 1.5 to 1.7 are REQUIRED in that they become MANDATORY in the absence of a valid, verified NHS Number. IF the NHS Number is valid and verified, THEN the data elements 1.5 to 1.7 are OPTIONAL.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
1.6	Organisation Code	ORGANISATION CODE	This is the ORGANISATION CODE of the ORGANISATION acting as a Health Care Provider.	an3 or an5	V	Eg. RAN or Q30 or	R	NHS Data Dictionary	91	Data element delimited as CSV. For NHS organisations, it is a code that is managed by the Organisation Data Service (ODS), NHS Prescription Services or NHS Dental Services. This data item is REQUIRED.
1.7	Patient Hospital Number	LOCAL PATIENT IDENTIFIER	The hospital's local identifier for the patient, eg. PAS Number. This number is used to identify a PATIENT uniquely within a Health Care Provider. It may be different from the PATIENT's casenote number and may be assigned automatically by the computer system.	an10	V	Eg. 567823	R	NHS Data Dictionary	91	Data element delimited as CSV. This data item is REQUIRED.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
1.8	NHS Trust GS1 Unique Organisation Prefix	N/A	The GS1 UK allocated Unique Organisation Prefix for the local NHS Trust / organisation.	n8	V	E.g. 50897671	O	GS1	91	Data element delimited as CSV. This is the unique organisation prefix allocated to each NHS organisation registered with GS1. This data item is OPTIONAL.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
2.1	Application Identifier (AI)	N/A	GS1 Application Identifier code which identifies the following data element string.	N2	V	93 = Patient Descriptive Data	M	GS1	N/A	Variable value of 93. AI of 93 identifies the code number is a GS1 Application Identifier for "Company Internal Information". The NHS has allocated the AI of 93 to "Patient Descriptive Data". Data elements 2.1 to 2.4 are MANDATORY for ALL patient wrist / identity bands. Data element 2.5 is REQUIRED in that it becomes MANDATORY for neonates and newborn baby wrist / identity bands.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
2.2	Last Name	PERSON FAMILY NAME	That part of a PERSON's name which is used to describe family, clan, tribal group, or marital association.	an35	V	E.g. SMITH	R	NHS Data Dictionary and NHS Common User Interface	93	Data element delimited as CSV. For human readable forms, the Last Name SHOULD be displayed in accordance with the NHS Common User Interface information standard "Patient Name Input and Display", eg. the Last Name MUST be displayed in capitals.
2.3	First Name	PERSON GIVEN NAME	The forename or given name of a PERSON.	an35	V	E.g. David	R	NHS Data Dictionary and NHS Common User Interface	93	Data element delimited as CSV. For human readable forms, the First Name SHOULD be displayed in accordance with the NHS Common User Interface information standard "Patient Name Input and Display", eg. the First Name MUST follow the Last Name and be displayed using initial capitals.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
2.4	Date of Birth	DATE OF BIRTH (PATIENT IDENTIFICATION)	The date of birth of the patient.	an11 DD-Mmm-CCYY	F	E.g. 21-Nov-1993	R	NHS Data Dictionary - New Item and NHS Common User Interface	93	Data element delimited as CSV. For human readable forms, the date format SHOULD be displayed in accordance with the NHS Common User Interface information standard "Date Display". For neonates and newborn babies, the data element 3.6 'Time of Birth' MUST be encoded after (and printed next to) data element 2.4 'Date of Birth'.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
2.5	Time of Birth	TIME OF BIRTH (PATIENT IDENTIFICATION)	The time of birth of the neonate / newborn baby.	an5 HH:mm	F	E.g. 15:30	R	NHS Data Dictionary - New Item and NHS Common User Interface	93	Data element delimited as CSV. For human readable forms, the time format MUST be displayed in accordance with the NHS Common User Interface information standard "Time Display", e.g. display time using 24 hour clock and separate the hours and minutes with a colon. This data element is REQUIRED in that it becomes MANDATORY for neonates and newborn babies. It should be printed immediately to the right of the data element 2.4 'Date of Birth'.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
3.1	Application Identifier (AI)	N/A	GS1 Application Identifier code which identifies the following data element string.	n2	V	92 = Baby Details	R	GS1	N/A	Variable value of 92. AI of 92 identifies the code number is a GS1 Application Identifier for “Company Internal Information”. The NHS has allocated the AI of 92 to “Baby Details”. Data elements 3.2 to 3.3 are REQUIRED in that they become MANDATORY for newborn babies / neonates in the absence of a valid and verified NHS Number. Data element 3.4 is OPTIONAL. IF the NHS Number is valid and verified, THEN data elements 3.2 to 3.4 are OPTIONAL but highly recommended.

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
3.2	Number of Babies Indicator	NUMBER OF BABIES INDICATOR (PATIENT IDENTIFICATION)	An identifier indicating number of babies born and their rank.	an3 n/n	F	Eg: 1/1 = one baby; 1/2 = First of two babies (twin 1); 2/2 = Second of two babies (twin 2); and so on. (See Appendix 2 for the full specification of this data item.	R	NHS Data Dictionary - New Data Item	92	Data element delimited by CSV. For human readable forms, the label "Rank" MUST be displayed to the left of the Number of Babies Indicator. This data item is REQUIRED

Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
3.3	Baby Of (Last Name)	PERSON FAMILY NAME (MOTHER OF BABY)	That part of a PERSON's name which is used to describe family, clan, tribal group, or marital association, where the PERSON here is the mother of the baby.	an35	V	E.g. SMITH	R	NHS Data Dictionary - New Item and NHS Common User Interface	92	Data element delimited as CSV. For human readable forms, the label "Baby Of" MUST be displayed first, followed by the mother's FAMILY NAME (in capitals). This MAY be followed by the mother's GIVEN NAME (in initial capitals). Person names SHOULD be displayed in accordance with the Common User Interface information standard "Patient Name Input and Display). This data item is REQUIRED

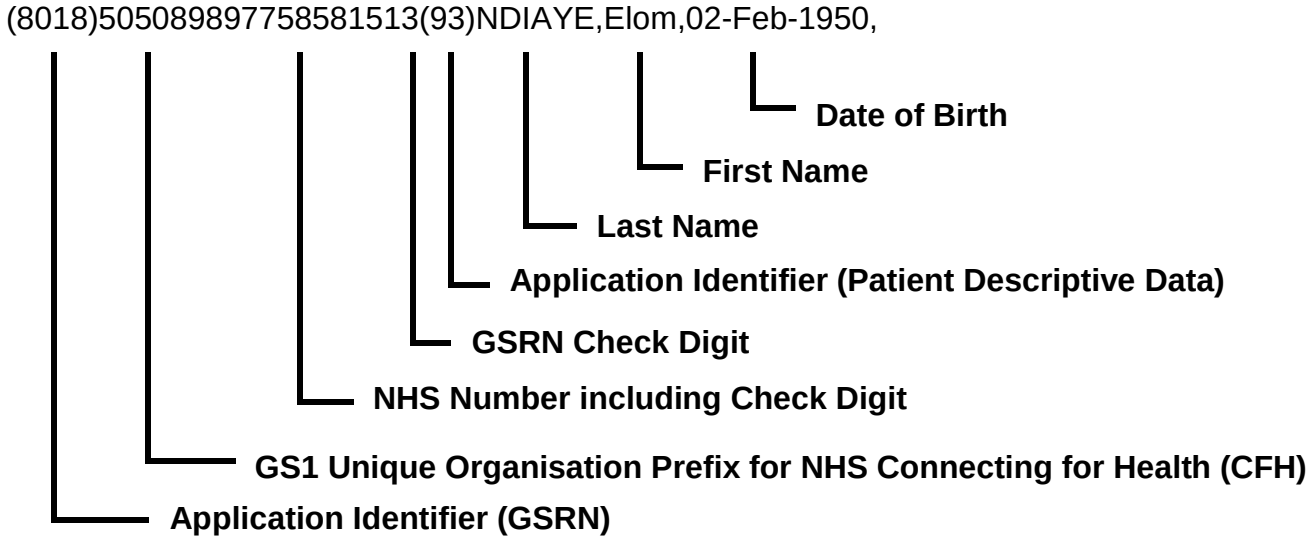
Data Item No	Data Item	Data Element / Attribute (NHS Data Dictionary)	Description	Data Format	Fixed or Variable	Permissible Values	M=Mandatory R=Required O=Optional	Source	GS1 AI	Comments
3.4	Baby Of (First Name)	PERSON GIVEN NAME (MOTHER OF BABY)	The forename or given name of a PERSON, where the PERSON here is the mother of the baby.	an35	V	E.g. Sandra	O	NHS Data Dictionary - New Item and NHS Common User Interface	92	Data element delimited as CSV. For human readable forms, the label "Baby Of" MUST be displayed first, followed by the mother's FAMILY NAME (in capitals). This MAY be followed by the mother's GIVEN NAME (in initial capitals). Person names MUST be displayed in accordance with the Common User Interface information standard "Patient Name Input and Display). This data item is OPTIONAL.

5 Patient Identity Bands – Example Encoded Data Strings

Using the information provided in Sections 3 and 4, the encoded data string for identity bands can be represented in the following **human readable** way: (NB: Brackets are there to aid the human readable format and MUST be removed for machine readable codes):

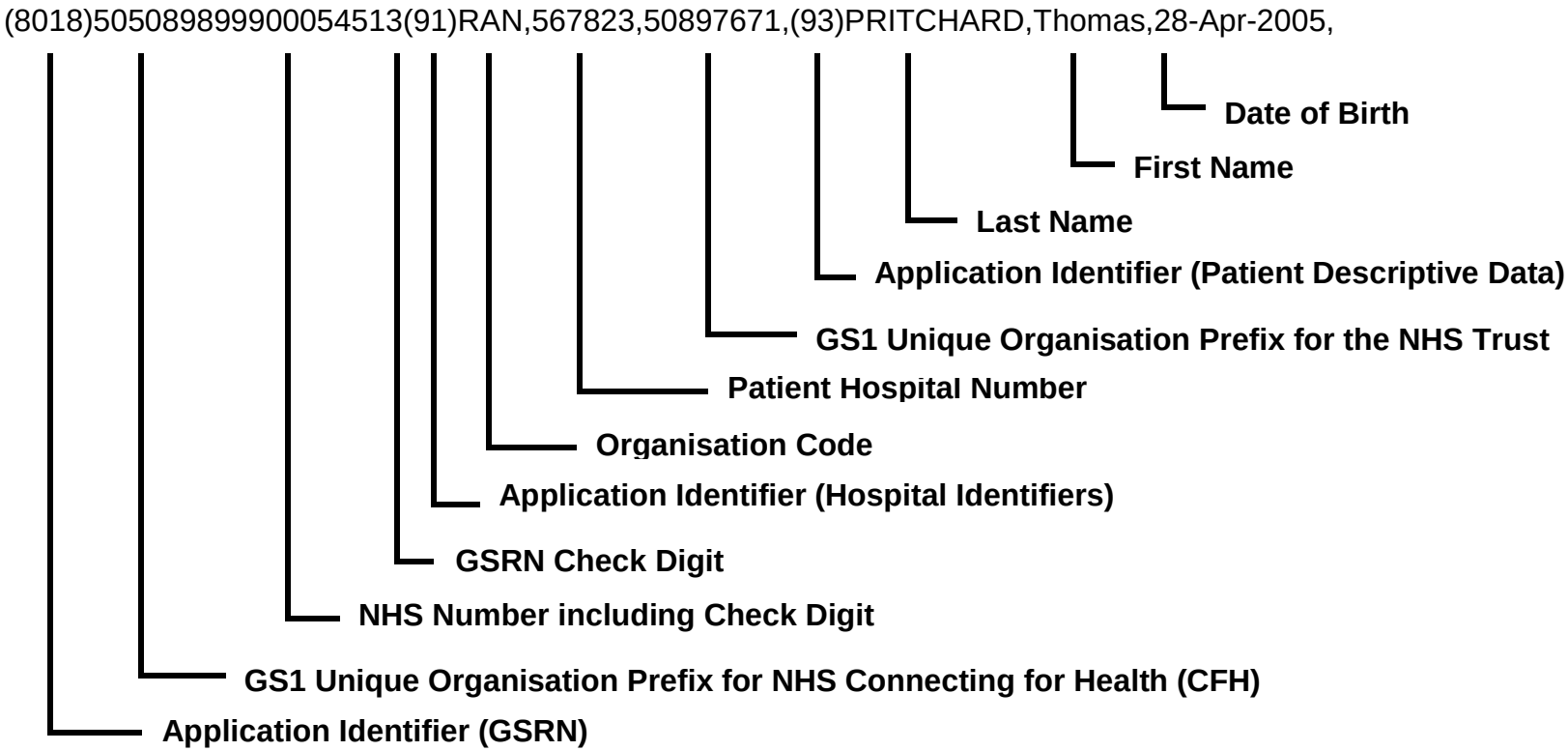
5.1 Standard Identity Band – NHS Number Valid and Verified

The patient is a female with a valid and verified NHS Number. The Trust does not require local information to be encoded and has not registered with GS1 for their GS1 Unique Organisation Prefix.



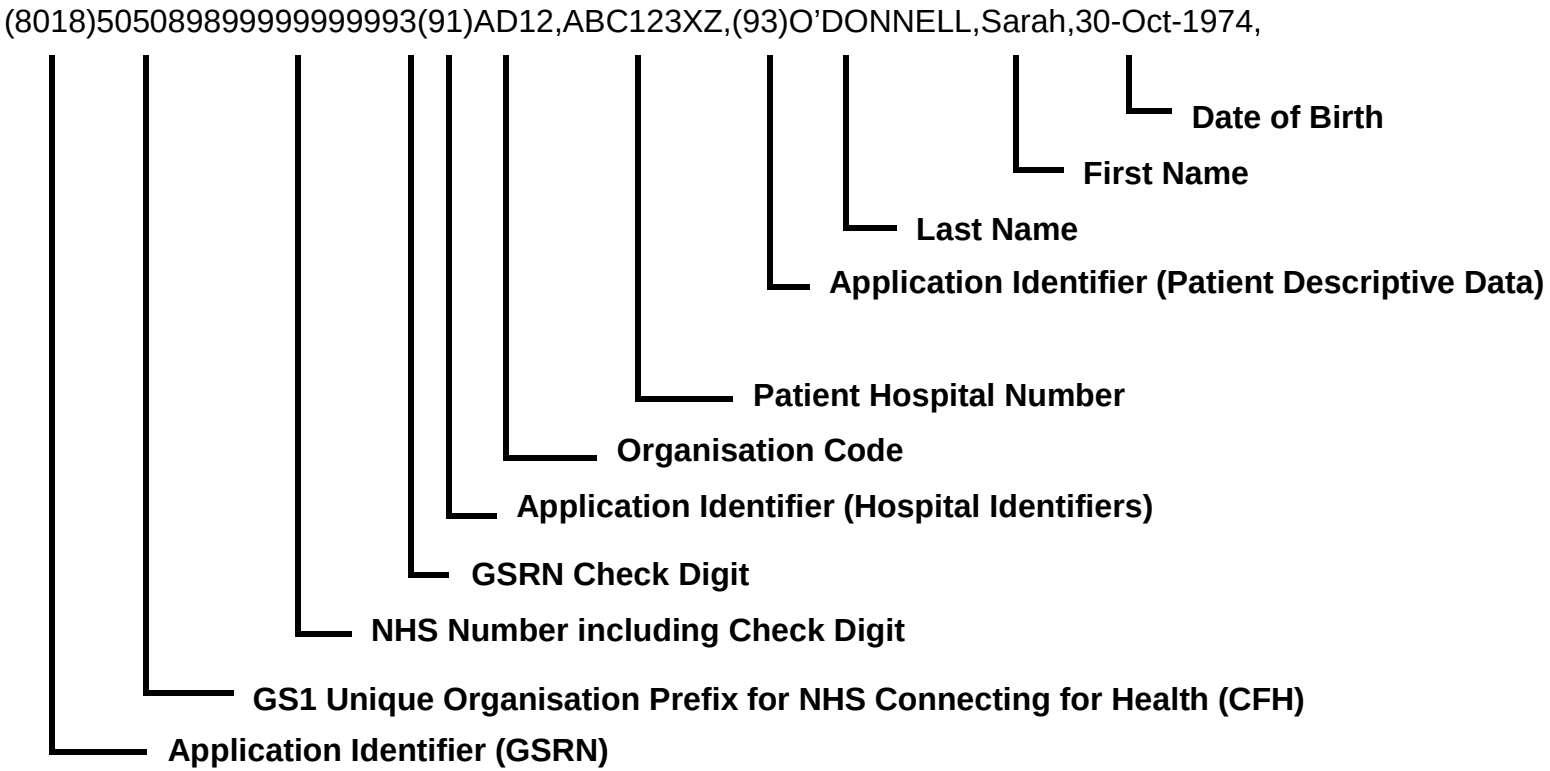
5.2 Standard Identity Band – NHS Number and Local Hospital Identifiers

The patient is an infant male with a valid NHS Number available. The Trust wishes to include local hospital information extracted directly from the PAS and the Trust's GS1 Unique Organisation Prefix (which is optional).



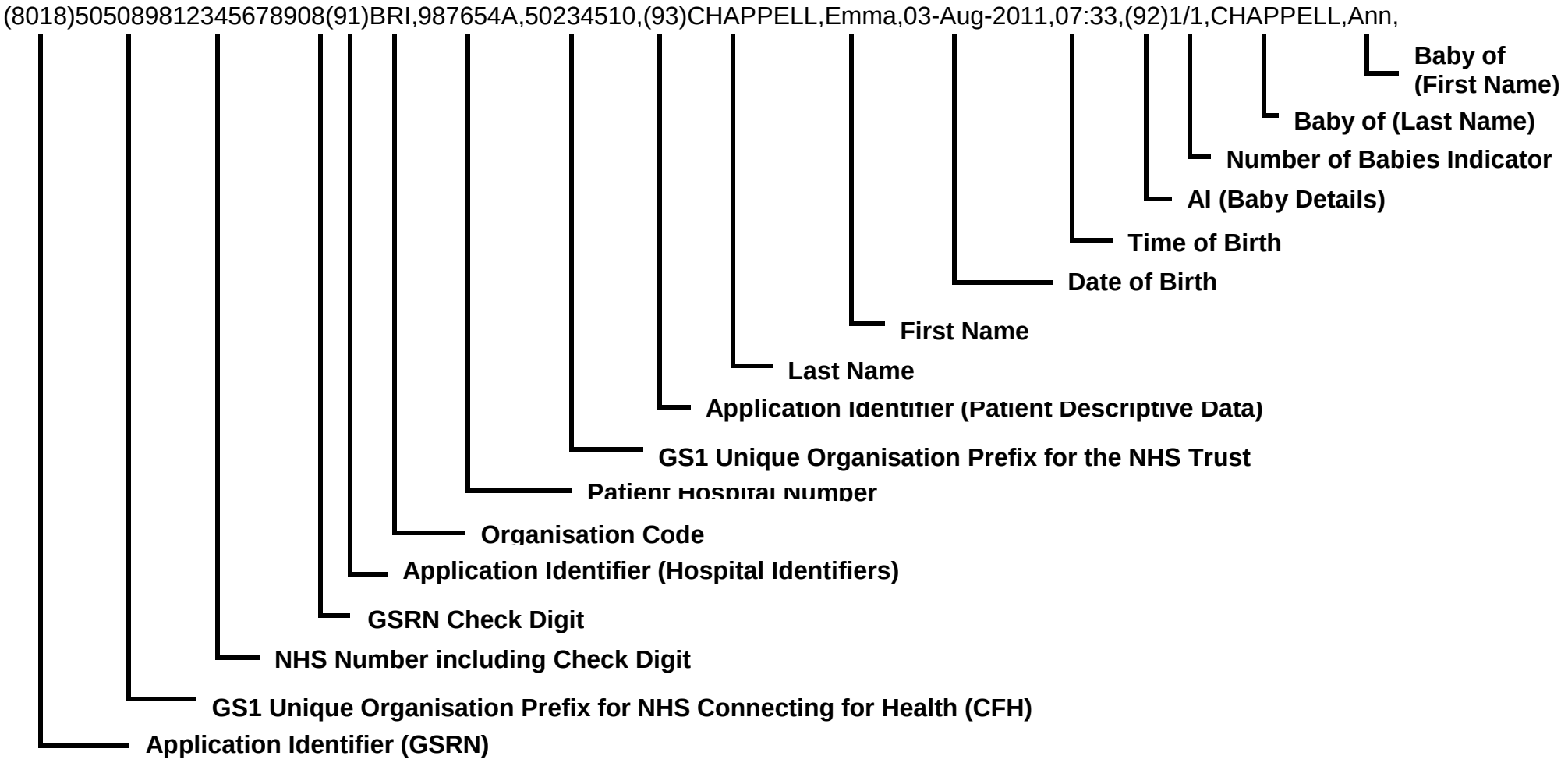
5.3 Standard Identity Band – NHS Number Not Available / Invalid / Unverified

The patient is an adult female – NHS Number not available (or invalid or unverified). Therefore, the NHS Trust has used local hospital information extracted directly from the PAS. The Trust has not registered with GS1 yet to obtain their own GS1 Unique Organisation Prefix.



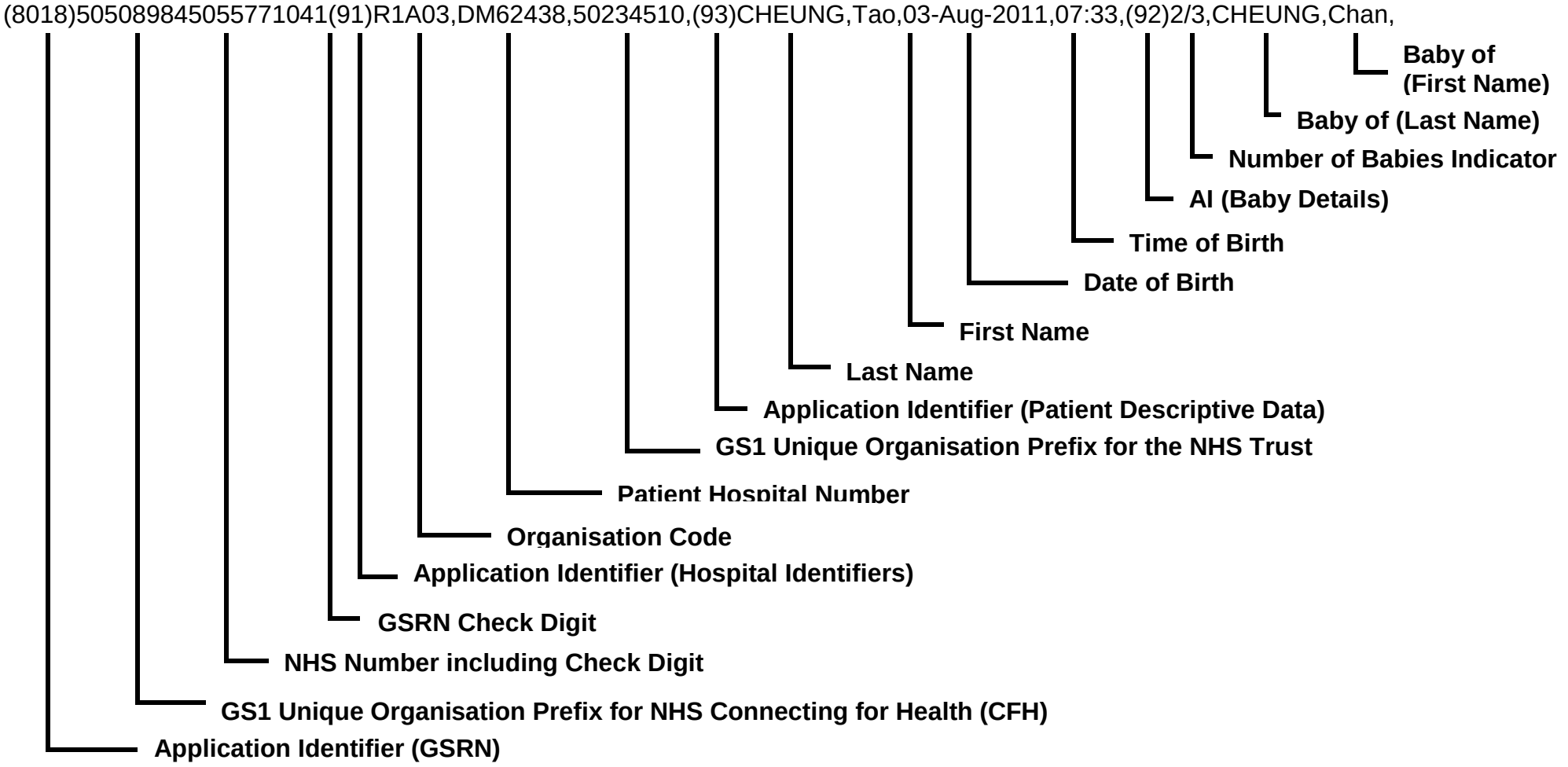
5.4 Baby Identity Band – Single Baby

The patient is a one day old female single baby and has been registered with NN4B and therefore has a valid and verified NHS Number. The Trust wishes to include local hospital information extracted directly from the PAS and the Trust's GS1 Unique Organisation Prefix.



5.5 Baby Identity Band – More Than One Baby

The patient is the one day old second baby of male triplets and has been registered with NN4B and therefore has a valid and verified NHS Number. The Trust wishes to include local hospital information extracted directly from the PAS and the Trust's GS1 Unique Organisation Prefix.



6 Permitted Data Carriers

The following data carriers are permitted for use with the AIDC for Patient Identification standard.

GS1 DataMatrix Symbol	
Example	
Recommendation	MUST
Comments	▪ This standard mandates the use of the GS1 DataMatrix Symbol containing the AIDC for Patient Identification Dataset. ▪ For legacy purposes and to ease migration, NHS organisations MAY implement dual bar coding on identity bands, ie. a GS1 DataMatrix Symbol containing the AIDC for Patient Identification Dataset AND a 1D / linear bar code containing the NHS Number or local hospital / PAS number. The linear bar code MAY be a Code 39 or Code 128. It SHOULD NOT be a GS1 128 bar code as these are too wide to fit onto identity bands.
Pros	▪ Carries alpha numeric data. ▪ Capable of encoding much larger amount of data than linear bar codes. ▪ Fit into small spaces / onto small items, thereby improving scanning ease and accuracy and ideal for patient identity bands. ▪ The GS1 DataMatrix Symbol is an emerging symbology that will be indicated for use in other AIDC standards, e.g. Sterile surgical instruments tracking.
Cons	▪ It is likely that a number of existing systems in the NHS will be unable to create the GS1 DataMatrix bar code format without making system changes. ▪ Some existing older model printers in the NHS will not be capable of printing the GS1 DataMatrix Symbol.
GS1 DataMatrix Symbol Production, Verification and Printing Technical Instructions	▪ "GS1 DataMatrix: An introduction and technical overview of the most advanced GS1 Application Identifiers compliant symbology".

7 The Resulting Bar Coded Identity Band

Examples of compliant identity bands are as Figures 1, 2 and 3 below. Note that all examples are dual bar coded, i.e. Inclusion of the GS1 DataMatrix Symbol (in some cases twice) AND an existing proprietary bar code (e.g. Code 39 or Code 128 bar code) containing the NHS Number of local hospital / PAS number.

Figure 1:

Figure 2:

Figure 3:

8 Supporting Information

8.1 Contact Information

For further information about the AIDC information standards for the NHS in England, please contact the following:

Sponsor	
Name	Peter Coates, Commercial Director
Organisation	Department of Health
Email Address	Peter.Coates@dh.gsi.gov.uk
Developer	
Name	Neil Lawrence
Organisation	Department of Health Informatics Directorate
Email Address	neil.lawrence@nhs.net
AIDC Programme Lead and Maintenance Manager	
Name	Neil Lawrence
Organisation	Department of Health Informatics Directorate
Email Address	neil.lawrence@nhs.net

8.2 Useful resources

http://www.connectingforhealth.nhs.uk/systemsandservices/aidc

www.isb.nhs.uk/use/baselines/aidc

www.gs1uk.org

9 Known Risks and Issues

Please refer to the document, “AIDC for Patient Identification – Clinical Safety Case and Closure Report – v1.1 – 8 Sep 2011” (which contains the Hazard Log)” for full details of all risks and issues related to this standard. However, a brief summary of the hazards and recommendations are provided below:

9.1 Summary of Hazards

Six key hazards were identified during the end to end hazard assessment process, resulting in a total of ten risks. Hazards and causes were identified from a range of factors, including technical issues, clinical process, usability and data quality. They were all considered in scope for AIDC for Patient Identification, as the consequences arising from the hazards were assessed to be patient safety related. Mitigations for the hazards are primarily the production of compliant identity bands, examples of which are provided earlier in Section 7.

See below for the high level summary of the key hazards:

Hazard ID	Hazard Name	Hazard Description
AIDCPI/ H001	Bar code does not fit on the identity band.	Data is encoded in the GS1 DataMatrix Symbol, but not printed in human readable form on the identity band.
AIDCPI/ H002	Lack of 2D bar code on the identity band.	NHS Trust's existing AIDC systems and processes are dependent upon their proprietary bar code, eg. Code 39 or Code 128 or a GS1 128 linear bar code containing the NHS Number or local hospital / PAS number.
AIDCPI/ H003	Patient information unavailable or hidden.	Inability to identity the patient by scanning of the bar code. On a baby identity band, it is not clear which is the name of the baby (the patient) and which is the name of the mother of the baby. Data is encoded in the GS1 DataMatrix Symbol, but not printed in human readable form on the identity band.

AIDCPI/ H004	System incompatibility.	NHS Trust's existing AIDC systems and processes are dependent upon their proprietary bar code, e.g. Code 39 or Code 128 or a GS1 128 linear bar code containing the NHS Number or local hospital / PAS number.
AIDCPI/ H005	User misinterpretation of data	On a baby identity band, it is not clear which is the name of the baby (the patient) and which is the name of the mother of the baby. GS1 code numbers that make up the encoded data string, such Application Identifiers and the GSRN check digit are printed in human readable form on the identity band. Information on the identity band is ambiguous or unclear, e.g. display of names, date of birth, NHS Number and time of birth.
AIDCPI/ H006	Misidentification of bar coded artefact.	Use of the AIDC for Patient Identification bar code on other documentary artefacts other than the identity band, leading to misidentification of the artefact.

9.2 Recommendations and Conclusions

a.	GS1 128 linear bar codes MUST NOT be used on identity bands as they are too large. GS1 DataMatrix Symbols are the mandated data carrier for patient identity bands. They are capable of being scanned at even 2 or 3 mm, therefore, are ideal for neonate / baby identity bands.
b.	Bar codes must not be the sole mechanism for identifying the patient and there must be no coded patient information in the bar code that is not printed in human readable form on the identity band.
c.	Where the NHS Number is unavailable, invalid or unverified, the encoded data string SHOULD use 9999999999 in place of the NHS Number and the GSRN check digit MUST automatically revert to 3. Following the GSRN data string, an additional data string "Hospital Identifiers" MUST be used, first identified by the Application Identifier "91". This MUST be followed by the NHS Data Dictionary data elements (comma delimited): ORGANISATION CODE (CODE OF PROVIDER) and LOCAL PATIENT IDENTIFIER. The GS1 Unique Organisation Prefix for the NHS Trust is optional, but recommended. See the full AIDC for Patient Identification dataset for full details.
d.	NHS Trusts MUST NOT encode patient or clinical information into the 2D bar code on the identity band that is not printed in human readable form on the identity band. (This rule does not include the codes, such as GS1 Application Identifiers or GSRN check digit. This is for patient demographic / clinical data items only).

e.	NHS Trusts may print dual bar codes on the identity band, i.e. their existing proprietary linear bar code containing the NHS Number or local hospital / PAS number AND the GS1 DataMatrix Symbol containing the full AIDC for Patient Identification dataset. This will allow existing systems dependent on the linear bar code on the identity band to continue as per usual, with a migration period of one year over to GS1 DataMatrix Symbol. NB. This does not mean the Newborn Screening Blood Spot Card Label needs to migrate to 2D bar codes. This should remain with a GS1 128 bar code until screening labs have changed their systems.
f.	Ensure the label "Baby Of" is printed alongside the baby's mother's name on the identity band. (A new NHS Data Dictionary item may be developed to ensure the label is actually part of the data item itself).
g.	NHS Trusts MUST NOT print the GS1 Application Identifiers (namely, 8018, 91, 92 or 93) or the GSRN check digit in human readable form on the identity band.
h.	NHS identity bands in the NHS MUST conform to existing NHS Common User Interface standards for the display of human readable patient identifiers on the identity band, namely: First Name, Last Name, NHS Number, Date of Birth and Time of Birth. The Common User Interface standards can be found on the ISB website: www.isb.nhs.uk/use/baselines/cui In addition, the introduction of the bar coded patient identifiers provides a further layer of mitigation.
i.	Bar codes must be produced and verified according to the instructions provided by GS1 for DataMatrix Symbols. Refer to the standard specification for ISB 1077.
j.	This standard MUST NOT be used on documentary artefacts other than the patient identity band IF the intended purpose is to identify the document itself and not the patient.

10 Glossary of Terms

Term	Definition
AIDC	Auto Identification and Data Capture
Application Identifier (AI)	The two, three or four digit number that specifies the data that immediately follows it in a GS1-128 bar code. In the case of the NHS Number, the Application Identifier is a Global Service Relation Number (GSRN), with the four digit number 8018.
Bar code or symbol	A graphic code, either printed or photographically reproduced, composed of parallel bars and spaces of various widths (linear bar code, eg. GS1-128) or dots and spaces arranged in an array (2 dimensional bar code, e.g. GS1 DataMatrix Symbol).
CUI	Common User Interface
DH	Department of Health
DHID	Department of Health Informatics Directorate
GS1	Global Standards - the governing body for GS1 member organisations which administers the GS1 system.
GSMP	Global Standards Management Process
GSRN	Global Service Relation Number – a GS1 Identification Key type (identified as such by the Application Identifier 8010).
ISB	Information Standards Board for Health and Social Care
ISN	Information Standards Notice
NHS CFH	NHS Connecting for Health
NN4B	NHS Number for Babies
NPSA	National Patient Safety Agency
PAS	Patient Administration System(s)
RFID	Radio Frequency Identification

Appendix 1 – GSRN Check Digit Calculation

The table below shows the workings of the **GSRN** check digit calculation:

Example of a GSRN Check Digit Calculation for the 18-Digit Field																		
Positions	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}	N_{15}	N_{16}	N_{17}	N_{18}
Number without Check Digit	5	0	5	0	8	9	8	9	9	9	0	0	0	5	4	5	1	
Step 1: multiply by	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	
Step 2: Add up results to sum	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	
	15	0	15	0	24	9	24	9	27	9	0	0	0	5	12	5	3	= 157
Step 3: Subtract sum from nearest equal or higher multiple of ten (160) = Check Digit (3)																		
Number with Check Digit	**5**	**0**	**5**	**0**	**8**	**9**	**8**	**9**	**9**	**9**	**0**	**0**	**0**	**5**	**4**	**5**	**1**	**3**

Appendix 2 – Number of Babies Indicator

Below is the full specification for the data item 3.2 in the AIDC for Patient Identification Dataset – “Number of Babies Indicator”:

1/1 - One baby
1/2 - First of two babies (twin 1)
2/2 - Second of two babies (twin 2)
1/3 - First of three babies (triplet 1)
2/3 - Second of three babies (triplet 2)
3/3 - Third of three babies (triplet 3)
1/4 - First of four babies (quadruplet 1)
2/4 - Second of four babies (quadruplet 2)
3/4 - Third of four babies (quadruplet 3)
4/4 - Fourth of four babies (quadruplet 4)
1/5 - First of five babies (quintuplet 1)
2/5 - Second of five babies (quintuplet 2)
3/5 - Third of five babies (quintuplet 3)
4/5 - Fourth of five babies (quintuplet 4)
5/5 - Fifth of five babies (quintuplet 5)
1/6 - First of six babies (sextuplet 1)
2/6 - Second of six babies (sextuplet 2)
3/6 - Third of six babies (sextuplet 3)
4/6 - Fourth of six babies (sextuplet 4)
5/6 - Fifth of six babies (sextuplet 5)
6/6 - Sixth of six babies (sextuplet 6)
1/7 - First of seven babies (septuplet 1)
2/7 - Second of seven babies (septuplet 2)
3/7 - Third of seven babies (septuplet 3)
4/7 - Fourth of seven babies (septuplet 4)
5/7 - Fifth of seven babies (septuplet 5)
6/7 - Sixth of seven babies (septuplet 6)
7/7 - Seventh of seven babies (septuplet 7)
1/8 - First of eight babies (octuplet 1)
2/8 - Second of eight babies (octuplet 2)
3/8 - Third of eight babies (octuplet 3)
4/8 - Fourth of eight babies (octuplet 4)
5/8 - Fifth of eight babies (octuplet 5)
6/8 - Sixth of eight babies (octuplet 6)
7/8 - Seventh of eight babies (octuplet 7)
8/8 - Eighth of eight babies (octuplet 8)
1/9 - First of nine babies (nontuplet 1)
2/9 - Second of nine babies (nontuplet 2)
3/9 - Third of nine babies (nontuplet 3)
4/9 - Fourth of nine babies (nontuplet 4)
5/9 - Fifth of nine babies (nontuplet 5)
6/9 - Sixth of nine babies (nontuplet 6)
7/9 - Seventh of nine babies (nontuplet 7)
8/9 - Eighth of nine babies (nontuplet 8)
9/9 - Ninth of nine babies (nontuplet 9)