nehta

# eHealth Integration Sample Code v2.0.3
# HL7 Merging Specification

2 February 2016

Approved for external use

**National E-Health Transition Authority**

**National E-Health Transition Authority Ltd**
Level 25, 56 Pitt Street
Sydney, NSW 2000
Australia
www.nehta.gov.au

**Acknowledgements**

**Council of Australian Governments**

The National E-Health Transition Authority is jointly funded by the Australian Government and all State and Territory Governments.

**HL7 International**

This document includes excerpts of HL7™ International standards and other HL7 International material. HL7 International is the publisher and holder of copyright in the excerpts. The publication, reproduction and use of such excerpts is governed by the HL7 IP Policy (see http://www.hl7.org/legal/ippolicy.cfm) and the HL7 International License Agreement. HL7 and CDA are trademarks of Health Level Seven International and are registered with the United States Patent and Trademark Office.

**Disclaimer**

The National E-Health Transition Authority Ltd (NEHTA) makes the information and other material ('Information') in this document available in good faith but without any representation or warranty as to its accuracy or completeness. NEHTA cannot accept any responsibility for the consequences of any use of the Information. As the Information is of a general nature only, it is up to any person using or relying on the Information to ensure that it is accurate, complete and suitable for the circumstances of its use.

**Document control**

This document is maintained in electronic form and is uncontrolled in printed form. It is the responsibility of the user to verify that this copy is the latest revision.

**Copyright © 2016 National E-Health Transition Authority Ltd**

This document contains information which is protected by copyright. All Rights Reserved. No part of this work may be reproduced or used in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems—without the permission of NEHTA. All copies of this document must include the copyright and other information contained on this page.

# Document information

## Key information

| | |
|---|---|
| **Owner** | Head of Delivery |
| **Contact for enquiries** | NEHTA Help Centre<br>t: 1300 901 001<br>e: help@nehta.gov.au |

## Product version history

| Product version | Date | Release comments |
|---|---|---|
| 1.0 | February 2014 | Initial release (HIPS 4.1.0). |
| 2.0 | February 2015 | See release note (NEHTA-2040:2015) for details of changes and bug fixes. |
| 2.0.1<br>2.0.2 | | Unpublished updates. |
| 2.0.3 | February 2016 | See release note (NEHTA-2185:2016) for details of changes and bug fixes. |

# Table of contents

**1. Introduction ..... 5**
1.1 Purpose ..... 5
1.2 Background ..... 5
**2. Data Model ..... 5**
**3. NEHTA Conformance Requirements ..... 7**
3.1 Conformance Requirement 10613 – Unresolved IHI Alerts ..... 7
3.2 Conformance Requirement 5839 – Duplicate IHI Alert ..... 7
3.3 Conformance Requirement 5875 – Duplicate Patient Alert ..... 8
3.4 Conformance Requirement 5906 - Validation of IHI After Merge ..... 9
3.5 Merge Conflict Alert ..... 9
**4. Standard Message A36 – Merge MRNs ..... 11**
4.1 eHISC Actions on PAS Merge ..... 11
**5. Standard Message A45/A51 – Move Visit Number ..... 12**
5.1 eHISC Actions on Move Visit ..... 12
**6. Standard Message A35 – Merge Visit Numbers ..... 13**
6.1 eHISC Actions on Merge Visits ..... 13
**7. Standard Message A34 – Merge Enterprise Numbers ..... 14**
7.1 eHISC Actions on EMPI Merge ..... 14
**8. Standard Message A43 - Move MRN to Enterprise Number ..... 15**
8.1 eHISC Actions on Move MRN ..... 16
**9. Non-Merge Messages – A01 to A31 ..... 17**
9.1 eHISC Actions on Normal PAS Messages ..... 17
9.2 Diagram of eHISC Actions on Normal PAS Messages ..... 19

# 1. Introduction

## 1.1 Purpose

The purpose of this document is to specify the business logic for merging and moving patient records in response to intra-facility events communicated from hospital Patient Administration Systems (PAS) and cross-facility events communicated from an Enterprise Master Patient Index (EMPI).

## 1.2 Background

The solution interfaces with the Enterprise Service Bus (ESB) to receive HL7 records from the PAS systems for patient and episode information, and CDA documents from the clinical systems for upload to PCEHR.[1]

eHISC uses the demographic information about each patient (Medicare card number or DVA file number, name, sex and date of birth) to search the Medicare Healthcare Identifier Service to obtain the nationally unique Individual Healthcare Identifier (IHI), a 16-digit number that has been allocated to every Australian resident.

Of the hospital facilities connected to eHISC, some or all may be integrated with an Enterprise Master Patient Index (EMPI). This means each PAS message from these hospitals will have both a local patient identifier (MRN) and an enterprise patient identifier.

Other hospital facilities connected to eHISC may not be integrated with an EMPI. Each PAS message from these hospitals will have only an MRN and will not have an Enterprise ID.

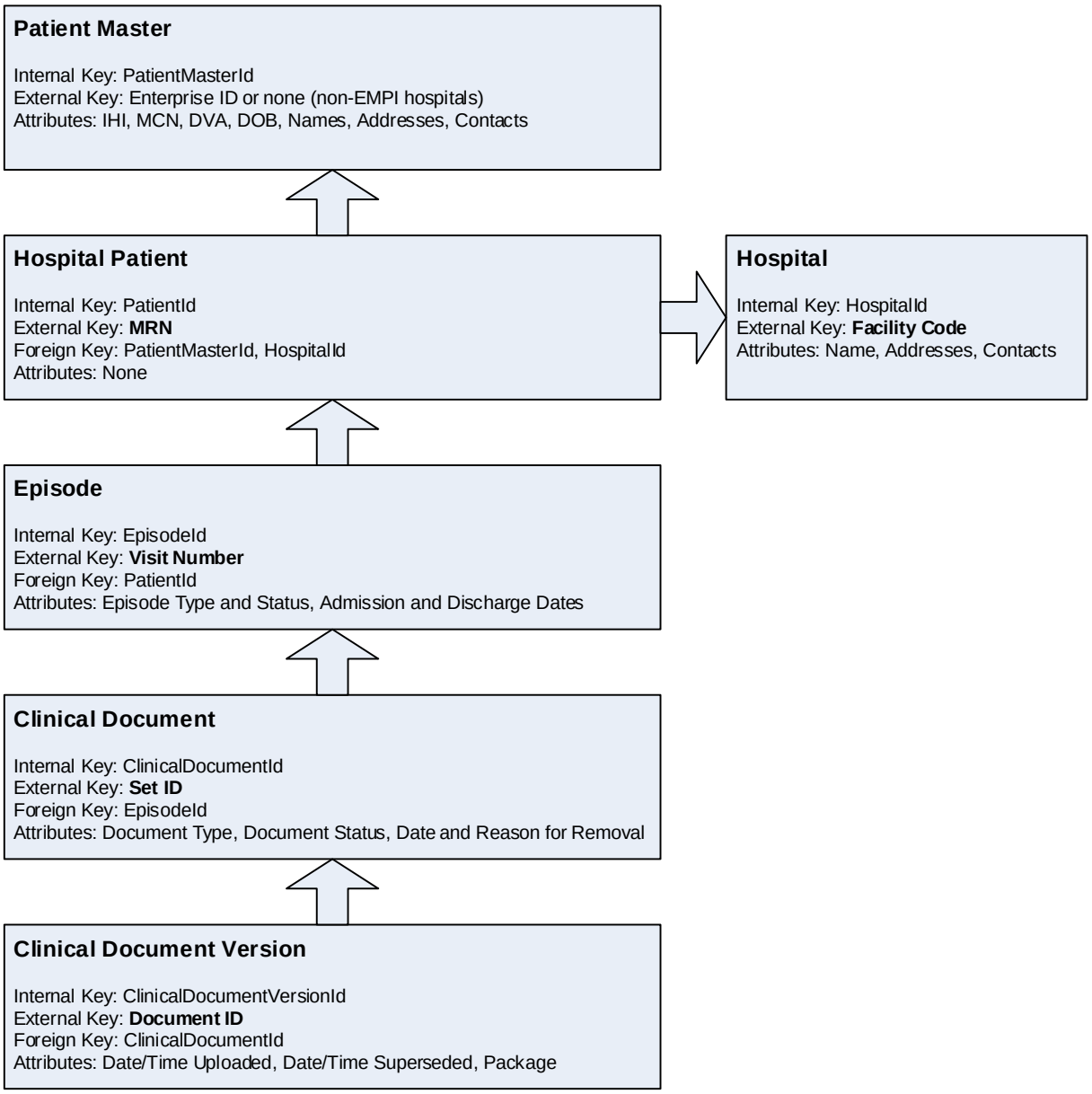
# 2. Data Model

The eHISC application uses a local SQL Server database, also known as the PCEHR Data Store (PDS), to store the patient demographic information, episodes of care, and assignment of IHI numbers to patient records.

The following are the relevant entities in the data model:

- "Patient Master" is an enterprise view of the patient, keyed by the Enterprise ID for EMPI enabled hospitals. There is a separate patient master for each active MRN for non-EMPI hospitals.
- "Hospital" represents a hospital facility, keyed by the Facility Code.
- "Hospital Patient" is a hospital view of the patient, keyed by the MRN.
- "Episode" is the episode of care, keyed by the Visit Number.
- "Clinical Document" represents a document uploaded to national eHealth record.
- "Clinical Document Version" represents a single version of such a document.

[1] **Disclaimer**: PCEHR means the My Health Record, formally the "Personally Controlled Electronic Health Record", within the meaning of the *My Health Records Act 2012* (Cth), formerly called the *Personally Controlled Electronic Health Records Act 2012* (Cth).


Patient Master
Internal Key: PatientMasterId
External Key: Enterprise ID or none (non-EMPI hospitals)
Attributes: IHI, MCN, DVA, DOB, Names, Addresses, Contacts
Hospital Patient
Internal Key: PatientId
External Key: MRN
Foreign Key: PatientMasterId, HospitalId
Attributes: None
Hospital
Internal Key: HospitalId
External Key: Facility Code
Attributes: Name, Addresses, Contacts
Episode
Internal Key: EpisodeId
External Key: Visit Number
Foreign Key: PatientId
Attributes: Episode Type and Status, Admission and Discharge Dates
Clinical Document
Internal Key: ClinicalDocumentId
External Key: Set ID
Foreign Key: EpisodeId
Attributes: Document Type, Document Status, Date and Reason for Removal
Clinical Document Version
Internal Key: ClinicalDocumentVersionId
External Key: Document ID
Foreign Key: ClinicalDocumentId
Attributes: Date/Time Uploaded, Date/Time Superseded, Package

# 3. NEHTA Conformance Requirements

The national Compliance, Conformance and Accreditation (CCA) program is intended to ensure all health information systems meet our community's expectations for quality and safety.

CCA acknowledges that large hospitals and health departments do not have a clearly defined local system and in many cases the hospital PAS is considered to be functionally the same, from a CCA perspective. System architects should consider all references to 'local system' the same way.

## 3.1 Conformance Requirement 10613 – Unresolved IHI Alerts

| | | | |
|---|---|---|---|
| **Req No** | 010613 | **Priority** | Mandatory |

**Inclusion of a healthcare identifier in an eHealth message/document with an unresolved exception or alert**

The software shall not include a healthcare identifier (IHI, HPI-O, HPI-I) in an eHealth message/document if an unresolved exception or alert exists for that identifier in the local system.

| | |
|---|---|
| **Related Business Use Cases** | UC.320, UC.330 |
| **Additional Information** | If an exception or alert has been raised in relation to a healthcare identifier, then this indicates that an abnormal condition exists with the healthcare identifier. Therefore it is potentially unsafe to use that healthcare identifier in communication with a third-party healthcare provider until the exception or alert has been resolved. |

eHISC will not allow an IHI with an unresolved alert to be used in a clinical document or for any operation on the PCEHR system.

## 3.2 Conformance Requirement 5839 – Duplicate IHI Alert

| | | | |
|---|---|---|---|
| **Req No** | 5839 | **Priority** | Mandatory |

**Exception alert raised when the same IHI is assigned to records of more than one patient.**

The software shall raise an exception alert whenever an IHI is assigned to a patient record and the same IHI has already been assigned to one or more other records of patients in the local system.

| | |
|---|---|
| **Related Business Use Cases** | UC.010, UC.015, UC.025 |
| **Additional Information** | Creating an exception alert when the same IHI has been assigned to two or more patients in the local system allows the operator to resolve local record issues or to report the IHI to the HI Service as a potential replica. The HI Service may be notified of a potential replica by the Notify of Replica IHI by B2B web service [TECH.SIS.HI.25] or by contacting the HI Service operator. |

eHISC will raise a "Duplicate IHI" alert when the same IHI is assigned to two active MRN's from the same hospital. This alert can be resolved by merging the MRNs in the hospital PAS, making one inactive. While the alert is active, the IHI cannot be used to connect to the PCEHR system.

## 3.3 Conformance Requirement 5875 – Duplicate Patient Alert

| | | | |
|---|---|---|---|
| **Req No** | 5875 | **Priority** | Mandatory |

**Assignment of IHIs**

If an IHI with a supported record status is returned from the HI Service for a patient, the software shall have the capacity to assign that IHI to the patient's record and raise an alert if the search criteria used matches another patient's demographic data from the same registration source.

If an alert is raised, the system shall either discard the IHI or store it against the target patient record and flag the records as potentially conflicting.

| | |
|---|---|
| **Related Business Use Cases** | UC.010, UC.015, UC.025, UC.035 |
| **Additional Information** | Storing an IHI with a patient record assists with the realisation of the clinical safety benefits of the HI Service.<br><br>Enterprise Master Patient Indexes (EMPI) such as those used by state and territory health jurisdictions are populated with multiple registration sources e.g. hospital patient administration systems. They contain multiple records from different registration sources that identify the same person. It is desirable that these multiple records from different sources that identify the same person contain the same IHI value. This contributes to the process of linking these records across sources to manage patient identification across institution boundaries. Requirement 5875 seeks to address the exposure of fragmented patient records due to duplicate registration records within a single registration source/institution.<br><br>Requirement 5839 may apply if the operator determines that the patient records possessing the same IHI are for different patients. |

eHISC will raise a "Duplicate Patient" alert when the search criteria used to obtain an IHI matches the demographic data of another active patient from the same hospital facility. This alert can be resolved by merging the MRNs in the hospital PAS, making one inactive. While the alert is active, the IHI cannot be used to connect to the PCEHR system.

eHISC will not raise "Duplicate Patient" alerts when the demographic data matches another patient from a different facility.

## 3.4 Conformance Requirement 5906 – Validation of IHI After Merge

One additional conformance requirement in the *Software Conformance Requirements for Use of Healthcare Identifiers in Health Software Systems* applies when the system implements the merging use case.

| | | | |
|---|---|---|---|
| **Req No** | 5906 | **Priority** | Mandatory |

**IHI assignment for merged patient health record in the local system**

When merging two patient records in the local system, the software shall use either the IHI Inquiry Search via B2B [TECH.SIS.HI.06] or the IHI Batch Searching via B2B [TECH.SIS.HI.12], as outlined in section 2.8, to obtain the IHI, the IHI number status and IHI record status for the surviving or final merged patient record.

| | |
|---|---|
| **Related Business Use Cases** | UC.035 |
| **Additional Information** | The IHI Inquiry Search via B2B is to be performed even if the original patient records both possessed the same IHI. Contacting the HI Service to obtain the IHI ensures the most recent status information is obtained. |

The eHISC application implements this requirement by validating the IHI on the surviving or final patient master after a merge is performed.

## 3.5 Merge Conflict Alert

eHISC only stores Verified IHIs so in the case where two patients from the same hospital undergoing a merge each have a different IHI, a user is required to notify the Medicare Healthcare Identifier Service of a potential duplicate or replica and choose the primary IHI.

To facilitate this process, eHISC defines an alert called "Merge Conflict" that is raised against both of the records involved in such a situation. Medical Records department in the hospital will be responsible for contacting the Medicare Healthcare Identifier Service to notify of the potential duplicate or replica, and raise a service request to reset the alert status.

This situation is described in the document *Use of Healthcare Identifiers in Health Software Systems – Business Use Cases*, as pictured below.

### 2.5.9 Use Case Sub-process – Select IHI

| | |
|---|---|
| **Process Name** | Select IHI |
| **Purpose** | To select the most appropriate IHI for the patient health record from the two available.<br><br>In a merge, and using some rules of IHI processing, the IHI's remain correctly associated with the primary and secondary patient health records, and ONLY if the data elements used to get the IHI for the primary patient health record are unchanged. |
| **Derivation** | UC.035 Use Case – Merge patient health records |
| **Outline** | Where two IHIs are available to be associated to a single patient health record, one is selected, and the appropriate course of action, in notifying the HI Service is also taken. |
| **Pre-Conditions** | • Two patient health records are undergoing a merge process, each with a different IHI<br>• The primary patient health record has been selected |
| **Post-Conditions** | • One IHI has been selected as the primary IHI to be associated to the merged patient health record |

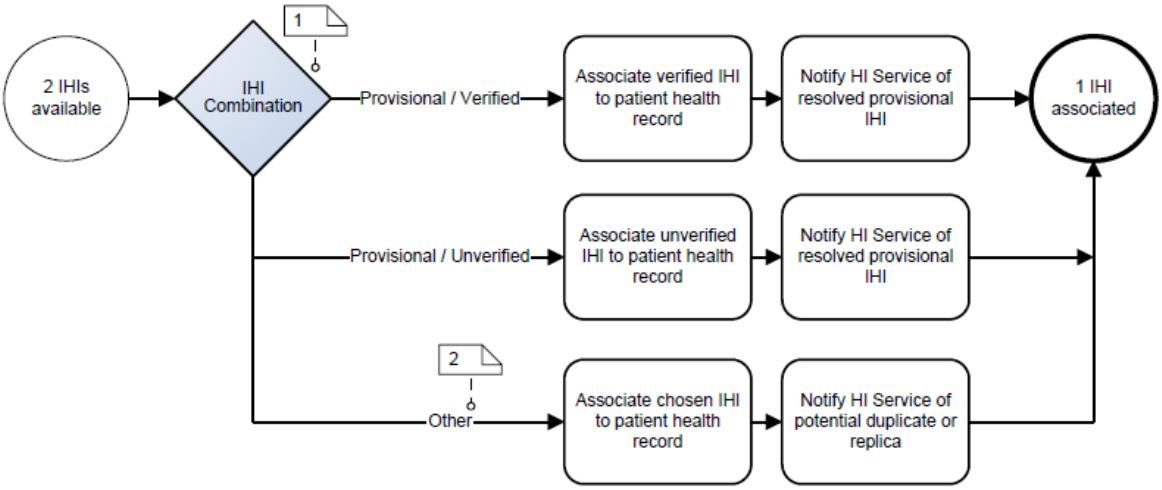
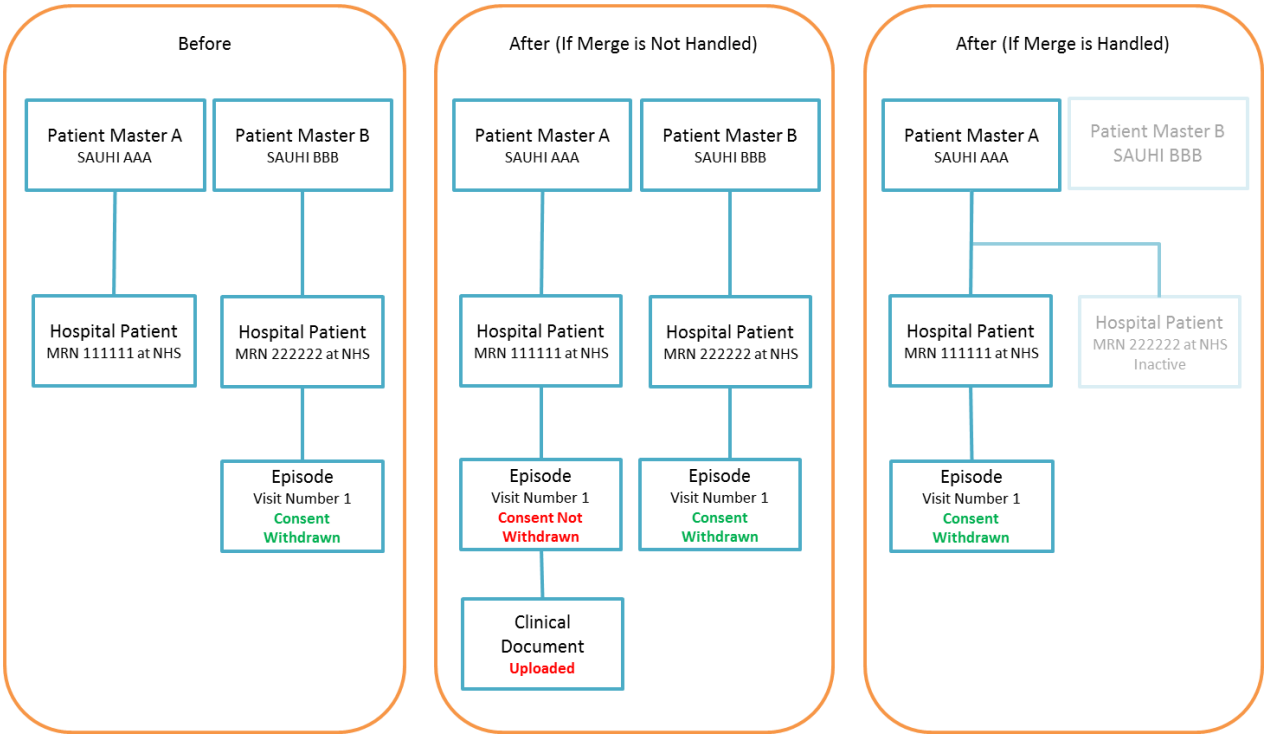



**Figure 34 - Select IHI**

# 4. Standard Message A36 – Merge MRNs

The PAS Merge event occurs when a patient administration staff member in a hospital facility determines that two patient records in the hospital represent the same person. This may happen when a newly arrived patient cannot be definitely identified and a temporary record is created. Later, the original record is found, and the temporary record is merged into the existing record.

Example: An episode with Visit Number 1 has been created for a new MRN 222222 while a patient was unconscious and unable to confirm her identity. After the patient regains consciousness, it is determined that she was already in the PAS under MRN 111111. The original MRN 111111 is the correct, "surviving" record while MRN 222222 is the superfluous, "non-surviving" record. The PAS will mark MRN 222222 as inactive, and move the episode with Visit Number 1 onto MRN 111111.




Note: In the right-hand scenario, where the merge was handled, the Clinical Document is not shown because eHISC has recognised that the patient withdrew consent to upload the document to PCEHR.

## 4.1 eHISC Actions on PAS Merge

If the source and destination MRNs both exist in the database:

1. If the source and destination PM's have different IHI's then raise a merge conflict alert on both, and perform only steps 2 and 3 below.
2. Move the source HP, and all other HP's from the same hospital, to the destination PM. This ensures previously merged MRN's come along with the moving MRN.
3. Move all episodes from the source HP to the destination HP.

4. Revalidate the IHI on the surviving PM. This will remove a duplicate IHI or duplicate patient alert if it is no longer the case that the same IHI is assigned to more than one active MRN from the same hospital.

If the source MRN exists but the destination MRN does not:

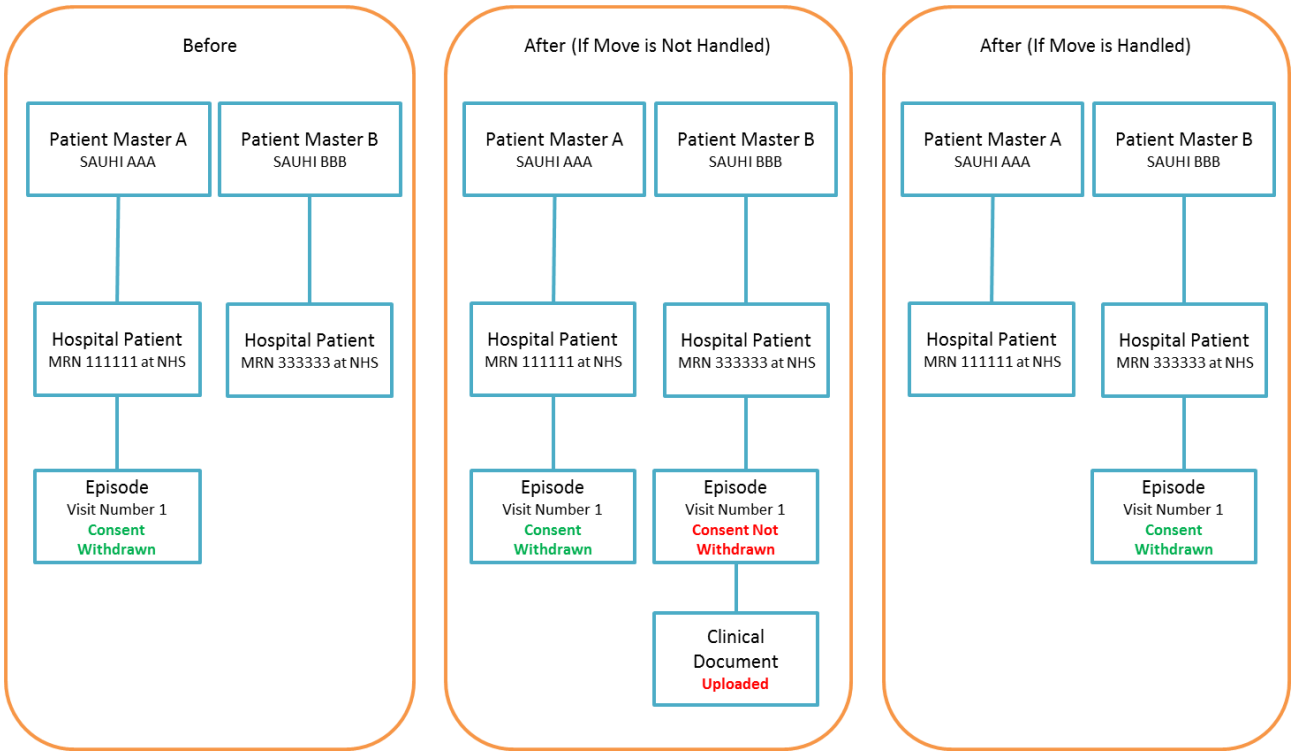
1. Change the MRN in the HP record to the destination MRN.

If the source MRN does not exist, do nothing.

# 5. Standard Message A45/A51 – Move Visit Number

A patient administration staff member discovers that an episode is attached to the wrong medical record. The episode is then attached to the correct medical record.

Example: MRN 111111 and MRN 333333 at NHS represent different people. Episode with visit number 1 was attached to MRN 111111 in error. The PAS user moves this episode from MRN 111111 to MRN 333333.




Note: In the right-hand scenario, where the merge was handled, the Clinical Document is not shown because eHISC has recognised that the patient withdrew consent to upload the document to PCEHR.

## 5.1 eHISC Actions on Move Visit

If the source MRN does not exist in the database, skip the message.

If the source Visit Number does not exist in the database, skip the message.

If the source Visit Number exists but the destination MRN does not:

1. Create the destination hospital patient using the demographic data in the message.
2. Attach the moving episode to the destination hospital patient.

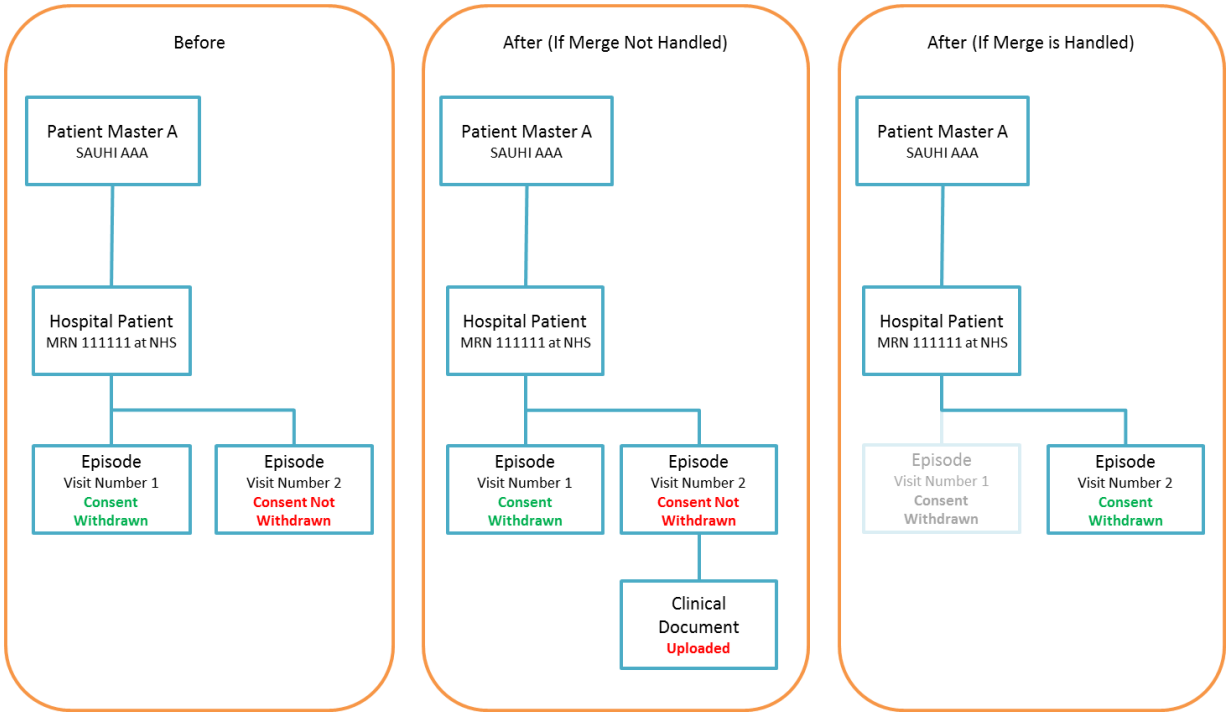
If the source Visit Number and destination MRN both exist in the database:

3. Attach the moving episode to the destination hospital patient.

# 6. Standard Message A35 – Merge Visit Numbers

A patient administration staff member discovers that two episode records have been created for the one patient, where only one episode should exist. One of the visit numbers is retained and the other is no longer used. Any documents, orders or results attached to the non-surviving episode must be moved to the surviving episode.

Example: Visit Number 1 and Visit Number 2 represent the same episode of care. The PAS marks the episode with Visit Number 1 as inactive, and moves anything attached to it (like clinical documents) onto the episode with Visit Number 2.




Note: In the right-hand scenario, where the merge was handled, the Clinical Document is not shown because eHISC has recognised that the patient withdrew consent to upload the document to PCEHR.

## 6.1 eHISC Actions on Merge Visits

If the MRN does not exist in the database, then skip the message.

If the source Visit Number does not exist in the database, then skip the message.

If the source Visit Number exists in the database, but the destination Visit Number does not:

1. Change the visit number on the source episode to the destination visit number.

If the source Visit Number and destination Visit Number both exist:

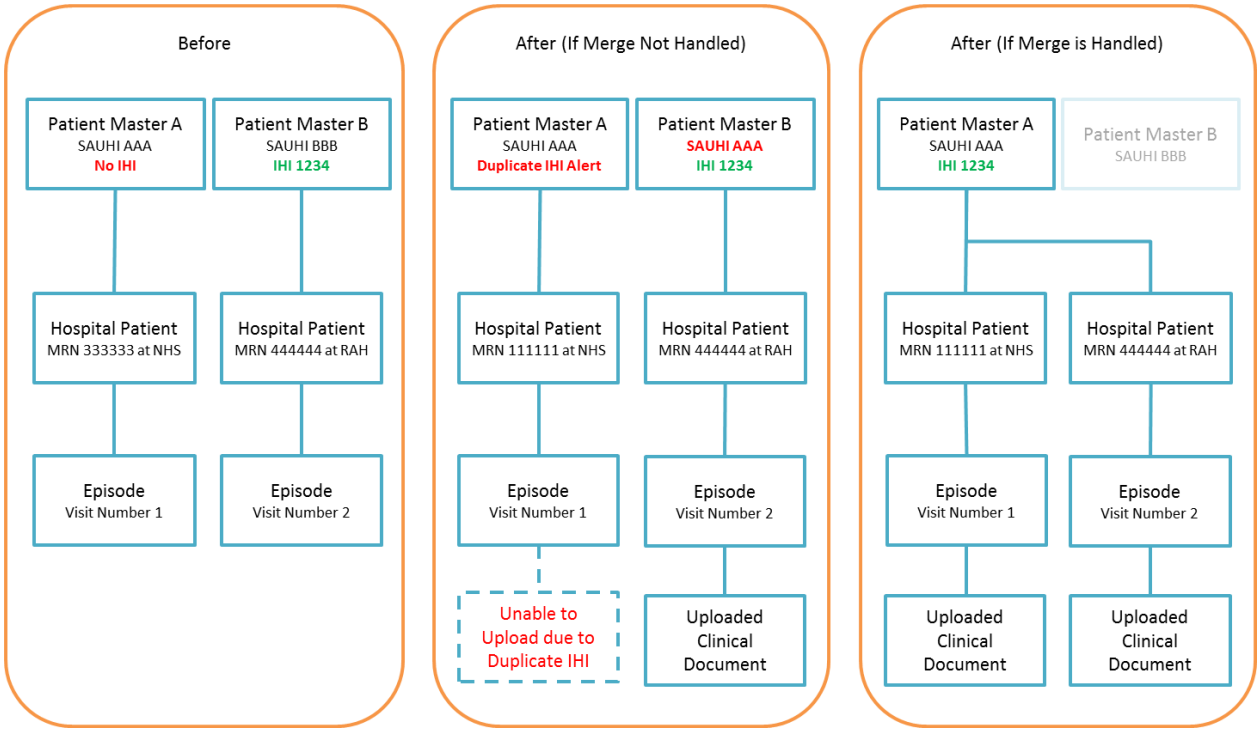
2. Move all previously uploaded clinical documents from the source episode to the destination episode.

3. If the patient had withdrawn consent to upload documents to PCEHR for the source episode, then mark the destination episode in the same way.
4. Set the episode lifecycle property on the source episode to "Merged" so that it will not be used again.

# 7. Standard Message A34 – Merge Enterprise Numbers

The Enterprise Master Patient Index or its operator may determine that two Enterprise IDs represent the same person. One of the IDs is retained and the other will no longer be used. Any hospital patient records (MRNs) associated with the non-surviving ID must be re-associated with the surviving ID.

Example: Enterprise ID AAA and Enterprise ID BBB represent the same person. Enterprise ID AAA is the surviving Enterprise ID, while Enterprise ID BBB will no longer be used. Mark Enterprise ID BBB as inactive and associate all of the attached hospital patient records (MRNs) with Enterprise ID AAA.




## 7.1 eHISC Actions on EMPI Merge

If the source Enterprise ID is not found in the database, then skip the message.

If the source Enterprise ID is found but the destination Enterprise ID is not found, then:

1. Change the Enterprise ID on the patient master record from the source Enterprise ID to the destination Enterprise ID.

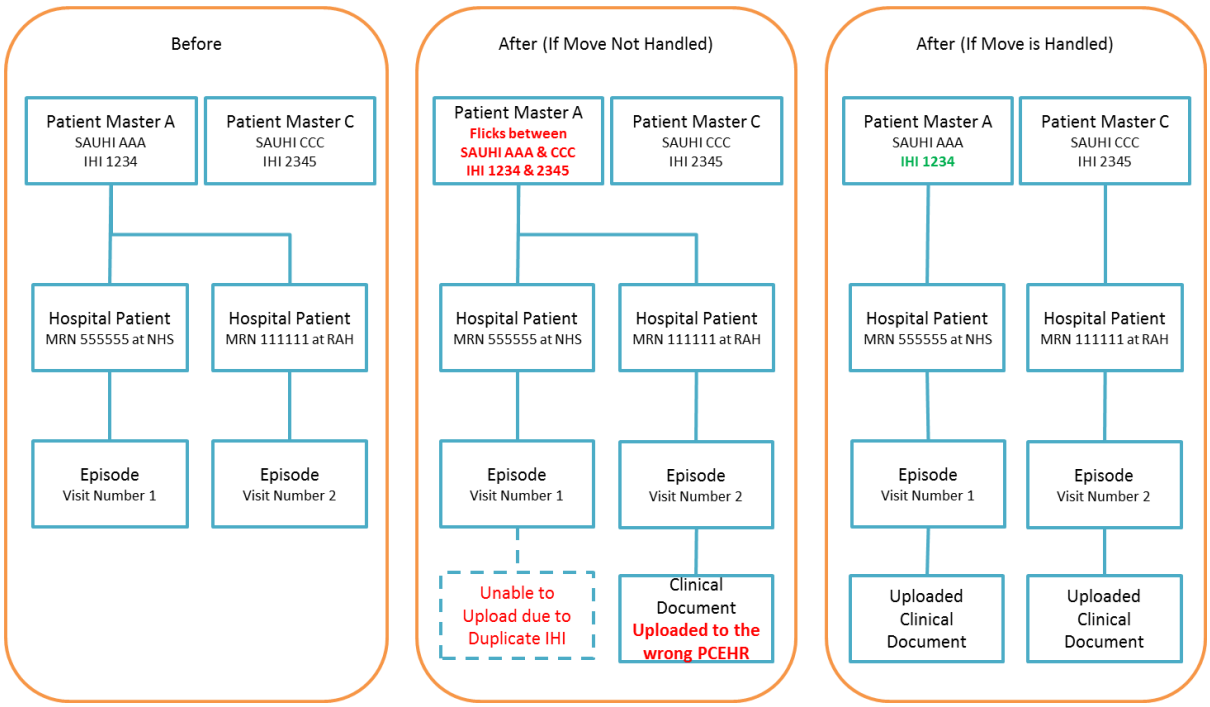
If the source Enterprise ID and destination Enterprise ID are both found, then:

1. Record whether there are any MRNs from the same hospital on both patient masters. This should not happen, because the MRNs should have been merged in the PAS first. If there is a case of this occurring, record the most recently updated MRN from each PM. This will be used to create a merge conflict alert if the IHI's are different.
2. Move all hospital patient records from the source patient master to the destination patient master.
3. Move all downloaded document records from the source PM to the destination PM.
4. If both patient masters have an IHI and it is the same IHI (i.e. there is a duplicate IHI alert):
   a) Remove the IHI from the source patient master
   b) Remove the alert from the destination patient master
5. If both patient masters have an IHI and it is different:
   a) If there are MRNs from the same hospital on both patient masters, create an IHI conflict alert on both patient masters.
6. If only the source patient master has an IHI:
   a) Move the IHI from the source patient master to the destination patient master.
7. If only the destination patient master has an IHI:
   a) Remove any IHI alerts from the destination patient master.
8. Validate the IHI on the destination patient master.

# 8. Standard Message A43 – Move MRN to Enterprise Number

The Enterprise Master Patient Index or its operator may determine that one of the patient records in a linked group represents a different person and was incorrectly linked into its current group. A task is generated to move the patient record, either into another existing group, or into a new group.

Example: Enterprise ID AAA (on Patient Master A) and Enterprise ID CCC (on Patient Master C) represent different people. MRN 111111 was attached to Enterprise ID AAA in error. Move MRN 111111 from Enterprise ID AAA to Enterprise ID CCC.




## 8.1 eHISC Actions on Move MRN

If the source MRN is not found in the database, then skip the message.

If the destination Enterprise ID is not found in the database:

1. Create a new patient master with the destination Enterprise ID.
2. Move the source HP, and all other HP's from the same hospital, to the destination PM. This ensures previously merged MRN's come along with the moving MRN.
3. Populate the new patient master with the demographic information provided in the HL7 message.
4. There is typically not sufficient information to search for an IHI using the demographic information provided, as it is missing the Medicare card number and DVA file number. Therefore this new patient master will be missing an IHI until the next message for the patient is received from the PAS.

If the destination Enterprise ID was found in the database:

1. Check whether the destination PM already has an HP from the same hospital as the moving MRN. This should not happen because the MRN's should have been merged in the PAS system first, and an A36 message generated. Nonetheless, if this does happen:
   a) If the two patient masters both have an IHI and it is different, then raise an IHI merge conflict alert against both IHI's.
2. Move the source HP, and all other HP's from the same hospital, to the destination PM. This ensures previously merged MRN's come along with the moving MRN.
3. Validate the IHI on the destination patient master.

# 9. Non-Merge Messages – A01 to A31

The following event types are considered normal PAS messages, and usually should not trigger any move or merge actions. However if there is an unannounced change in the Enterprise ID included within the PAS message, then eHISC will perform certain actions to resolve the linkages.

- A01 Admit a patient
- A02 Transfer a patient
- A03 Discharge a patient
- A05 Pre-admit a patient
- A08 Update patient information
- A11 Cancel admit
- A12 Cancel transfer
- A13 Cancel discharge
- A16 Pending Discharge
- A20 Bed Status Update
- A21 Leave of absence – out
- A22 Leave of absence – in
- A25 Cancel pending discharge
- A28 Add person information
- A31 Update person information
-

## 9.1 eHISC Actions on Normal PAS Messages

If the MRN is not found within the database:

- If there is no Enterprise ID in the message:
    - Create a new patient master with no Enterprise ID using demographics from the message.
- If the Enterprise ID in the message is not found within the database:
    - Create a new patient master with the Enterprise ID using demographics from the message.
- If the Enterprise ID in the message is found within the database:
    - Add the MRN to the existing patient master and update its demographics.

If the message has no Enterprise ID, or the existing patient master has the same Enterprise ID as the message:

- Update the existing patient master using the demographics from the message.

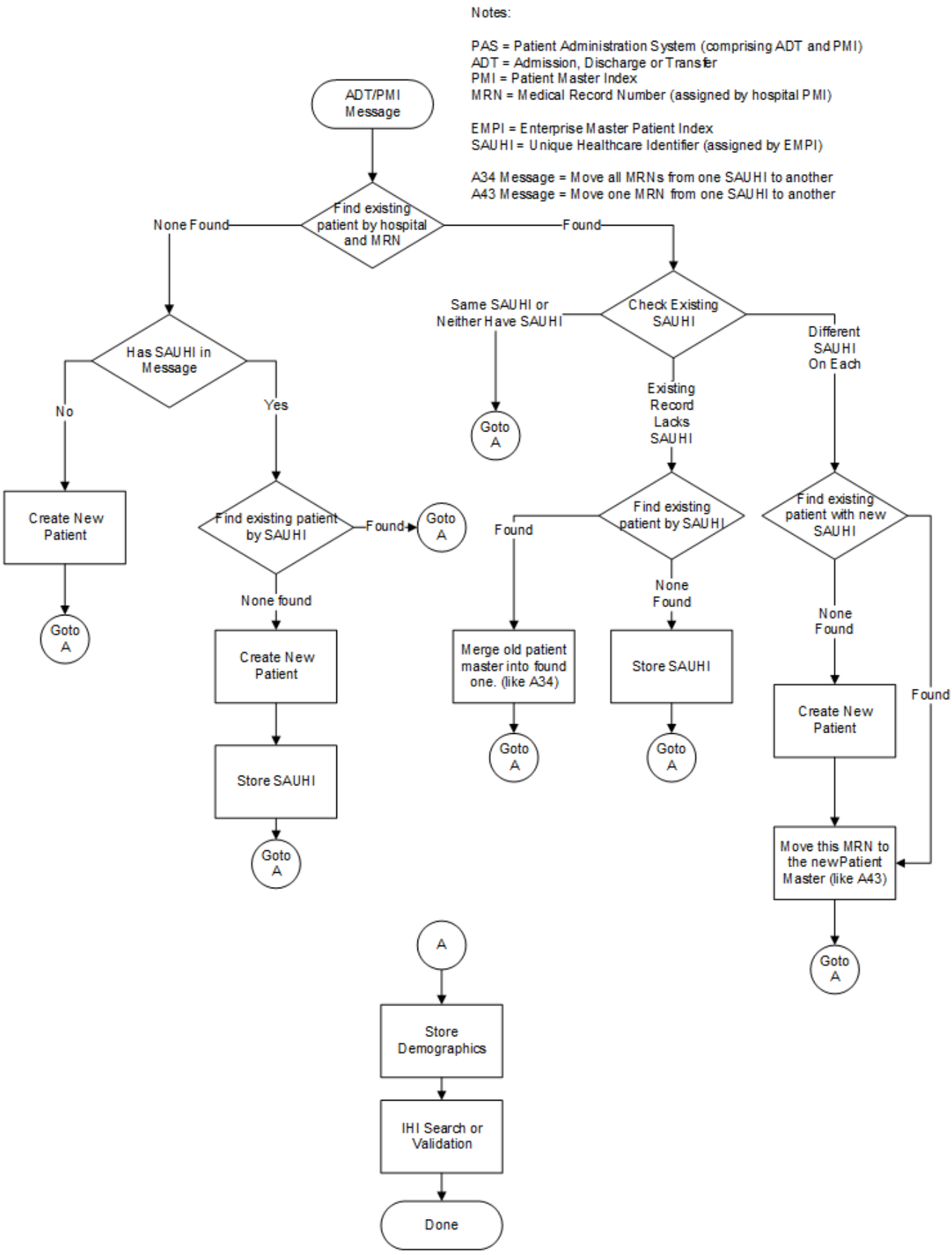
If the message has an Enterprise ID but the existing patient master does not:

- This could happen when additional non-EMPI hospitals are added into EMPI.

- If there is another patient master with the given Enterprise ID, merge the patient master without a Enterprise ID into the patient master with the Enterprise ID, using the logic for an A34 message.
- Otherwise store the Enterprise ID into the patient master that lacked a Enterprise ID.

If the message has a different Enterprise ID to the existing patient master:

- This could happen if the queue processing A43 messages is delayed and another message from PAS picks up the new Enterprise ID first.
- Move the MRN to the new Enterprise ID using the logic for an A43 message.

If there is a new patient master or a change to the name, DOB, sex, Medicare or DVA number of the patient master, then search for an IHI or validate the existing IHI with the Medicare Healthcare Identifier Service.

## 9.2 Diagram of eHISC Actions on Normal PAS Messages