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Australian Digital Health Agency



HIPS

Patient Record Merging Profile

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Australian Digital Health Agency

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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).

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 'My Health Record'.

HIPS 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 HIPS, 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 HIPS 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.

1.2 Scope

This profile covers merging messages / message segments that have been standardised. The document currently describes messages that originate from Patient Administration systems, but in time can cover standardised merging messages from any source.

This profile does not describe any functional requirements, such as archiving or error reporting, as these are to be covered by other documentation.

1.3 Assumptions

The following assumptions have been made in the development of this profile:

- HL7 message continuation standard will not be used and therefore each message sent/received must be complete;
- Confidential information sent across the interface will be accepted "as is";
- HL7 Sequence Numbering is not used.

1.4 Special Rules

The following rules have been made in the development of this profile:

- 1 When two patient records within the same hospital have a matching Validated IHI, HIPS will raise a Merge Conflict against both patient records.

1.5 Definitions and Acronyms

Item	Definition
ADT	Admission, Discharge, Transfer. Class of HL7 message types. ADT is also an Application Code used in MSH.3 and MSH.5
ESB	Enterprise Service Bus – integration hub for routing and transforming messages within and between healthcare facilities.
HL7	Health Level Seven
HIPS	Healthcare Identifier and PCEHR System
PMI	Patient Master Index – often used to describe an informal class of HL7 ADT messages – includes updates to patient demographics and merge/unmerge message types. PMI is also an Application Code used in MSH.3 and MSH.5
MRN	<p>Medical Record Number, identified by the code “MR” in PID-3. Ideally one MRN is allocated by the hospital for each patient, though it is common to temporarily allocate a new MRN for emergency patients until their identity is confirmed. These temporary MRNs should be merged back to the original MRN for the patient using an A36 Merge MRN message.</p> <p>This number stored in HospitalPatient.Mrn and is the primary identifier used to find the existing patient records in the HIPS database.</p>
OPD	Outpatient Department – often used to describe an informal class of HL7 message types – such as appointment/booking/scheduling messages. OPD is also an Application Code used in MSH.3 and MSH.5
Enterprise Patient ID	Unique Health Identifier – this code is used in PID-3 or PID-2 to identify the Enterprise ID for the patient, which determines which PatientMaster the patient is attached to. HospitalPatient records will move from one PatientMaster to another if their Enterprise Patient ID changes. See the HIPS Merging profile for more details. It is perfectly acceptable to operate HIPS using only the MRN and not to send in Enterprise IDs.

1.6 Current Environment

The message segments defined herein are the segments used in the HIPS application and cover only the essential PMI / ADT message segments. The current environment is as follows:

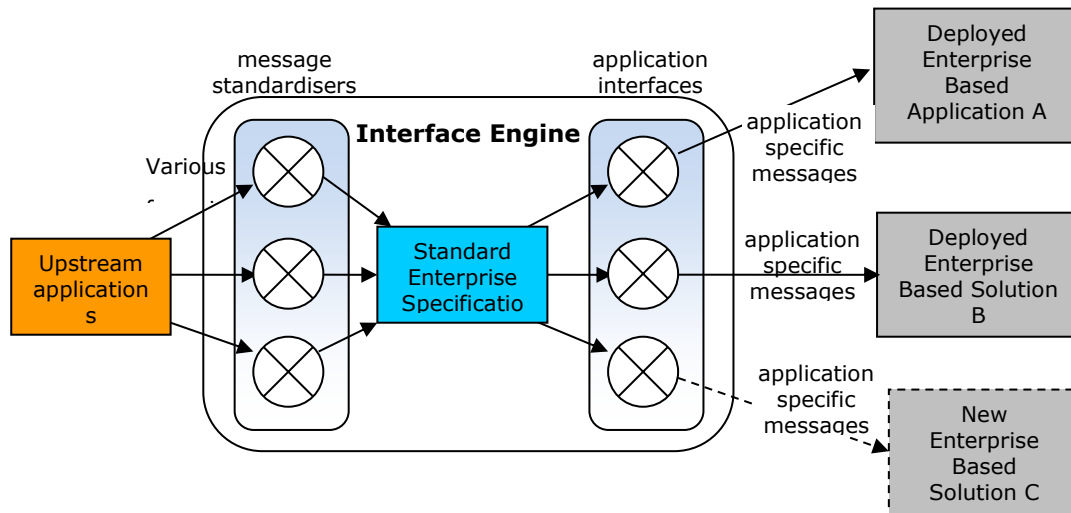


Figure 1: Standardisation transformations

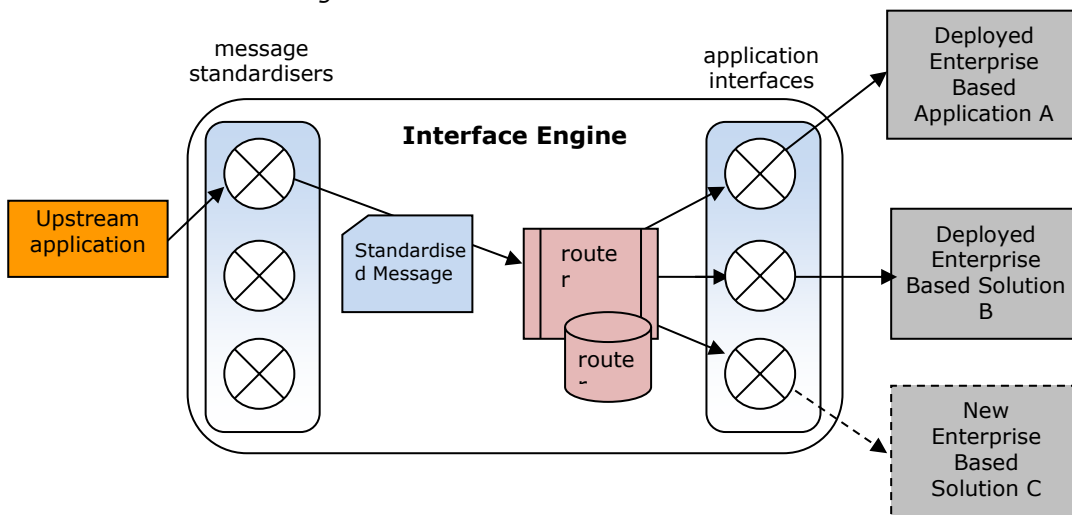


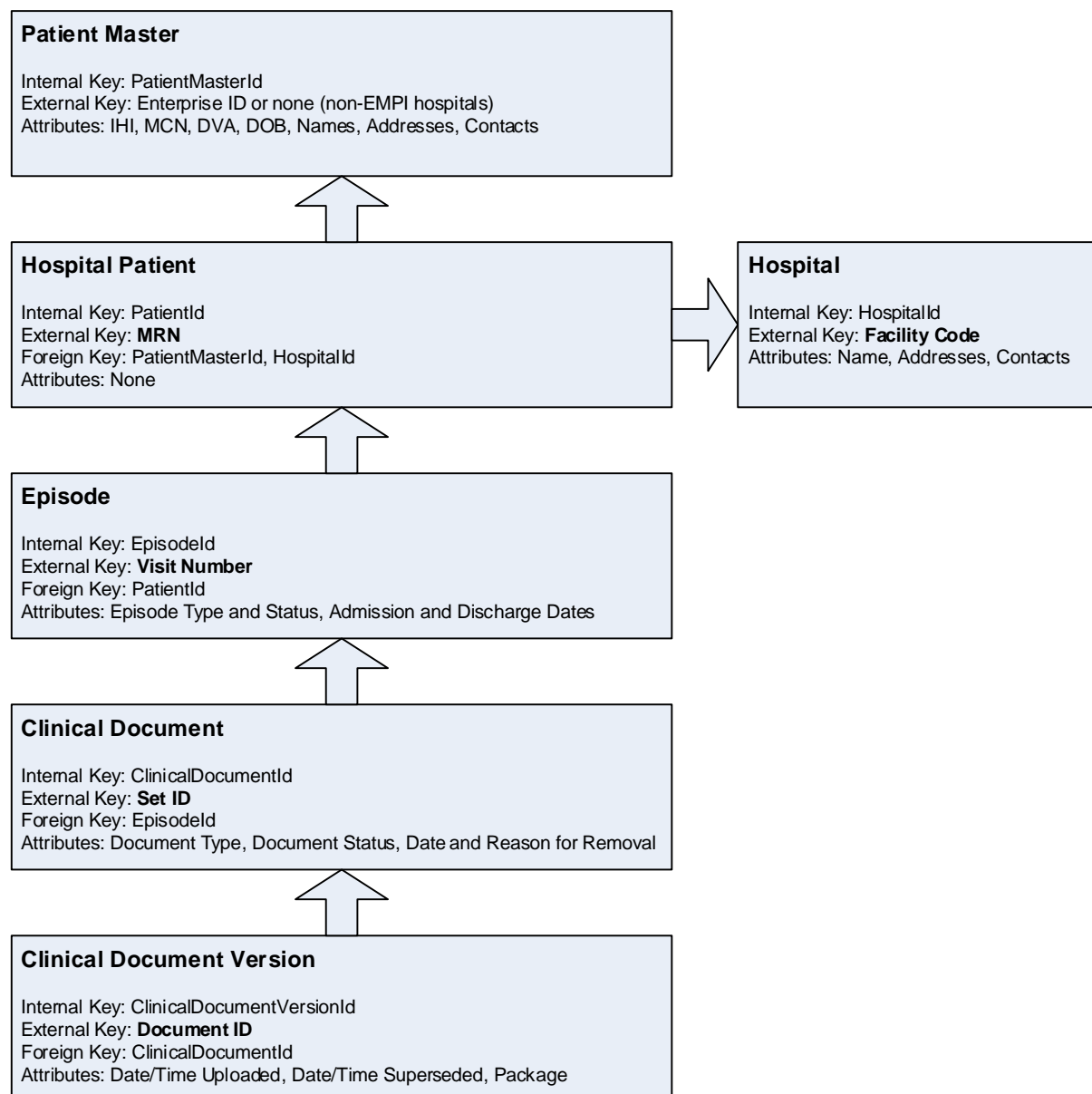
Figure 2: Message instance

2 Data Model

The HIPS 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 digital health record.
- “Clinical Document Version” represents a single version of such a document.



3 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 don't 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.		

HIPS will not allow an IHI with an unresolved alert to be used in a clinical document or for any operation on the 'My Health Record' 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.		

HIPS 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 'My Health Record' system.

3.3 Conformance Requirement 5875 – Duplicate Patient Alert

Req No	5875	Priority	Mandatory
Assignment of IHIs			
<p>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.</p> <p>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.</p>			
Related Business Use Cases	UC.010, UC.015, UC.025, UC.035		
Additional Information	<p>Storing an IHI with a patient record assists with the realisation of the clinical safety benefits of the HI Service.</p> <p>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.</p> <p>Requirement 5839 may apply if the operator determines that the patient records possessing the same IHI are for different patients.</p>		

HIPS 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 'My Health Record' system.

HIPS 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 HIPS 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

HIPS only stores Verified IHI's 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, HIPS 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	<p>To select the most appropriate IHI for the patient health record from the two available.</p> <p>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.</p>
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	<ul style="list-style-type: none"> Two patient health records are undergoing a merge process, each with a different IHI The primary patient health record has been selected
Post-Conditions	<ul style="list-style-type: none"> One IHI has been selected as the primary IHI to be associated to the merged patient health record

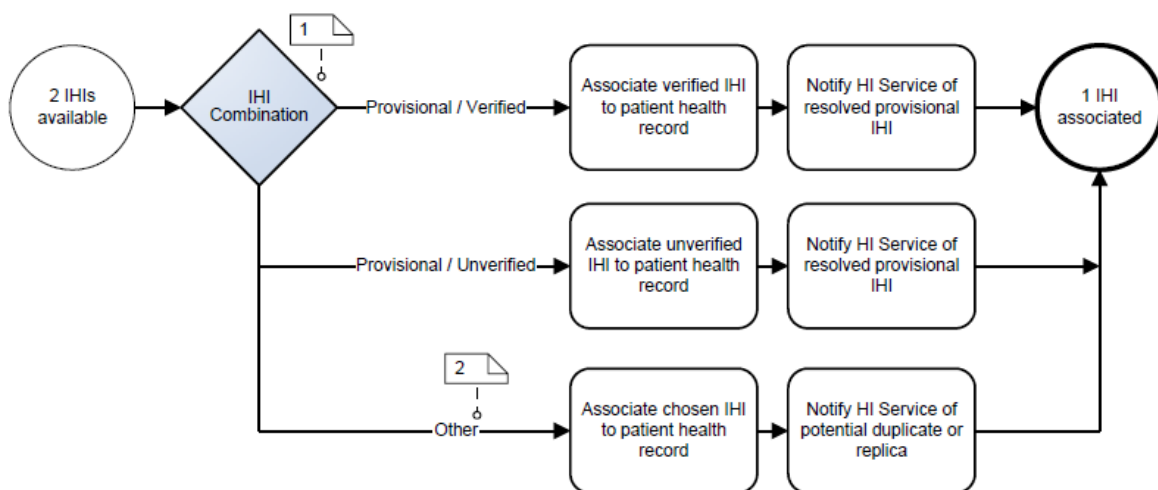
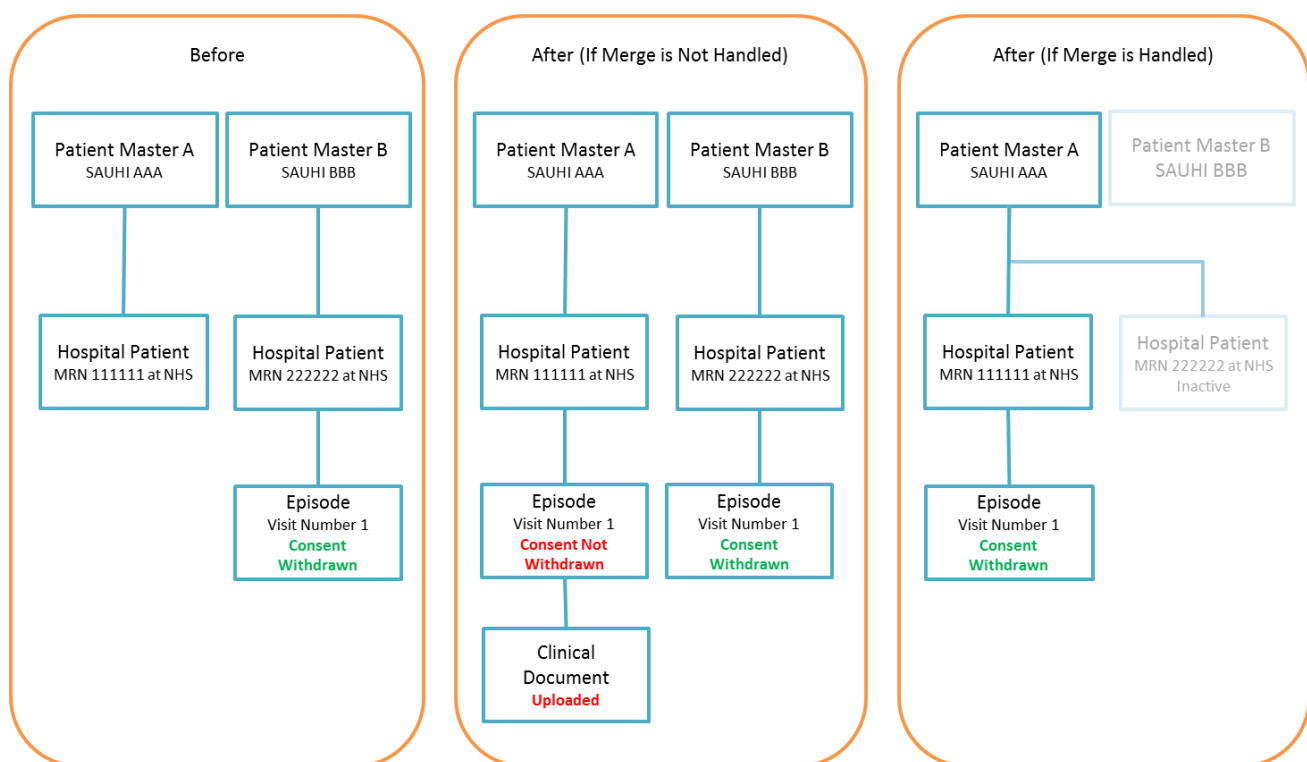


Figure 34 - Select IHI

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 HIPS has recognised that the patient withdrew consent to upload the document to 'My Health Record'.

4.1 HIPS Actions on PAS Merge

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

- 2 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.
- 3 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.
- 4 Move all episodes from the source HP to the destination HP.

- 5 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:

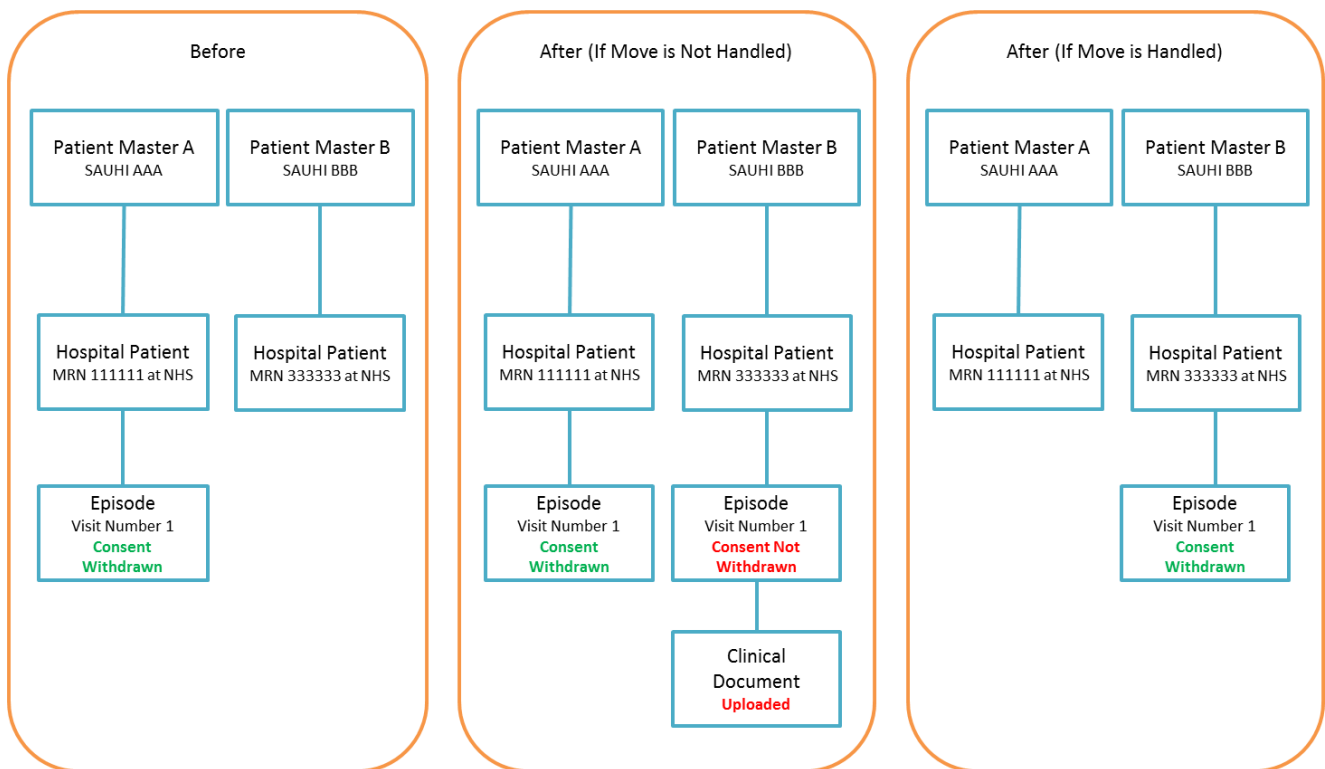
- 1 Change the MRN in the HP record to the destination MRN.

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 HIPS has recognised that the patient withdrew consent to upload the document to 'My Health Record'.

5.1 HIPS 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.

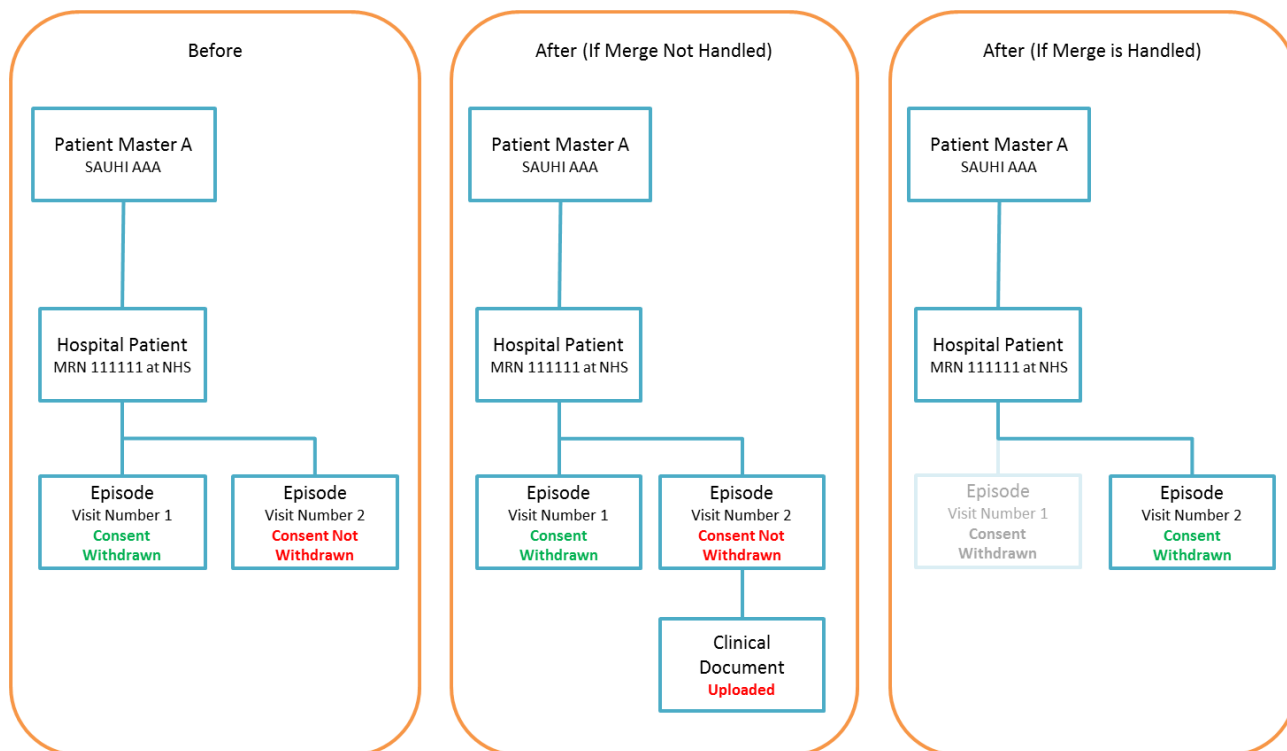
If the source Visit Number and destination MRN both exist in the database:

- 1 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 HIPS has recognised that the patient withdrew consent to upload the document to 'My Health Record'.

6.1 HIPS 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:

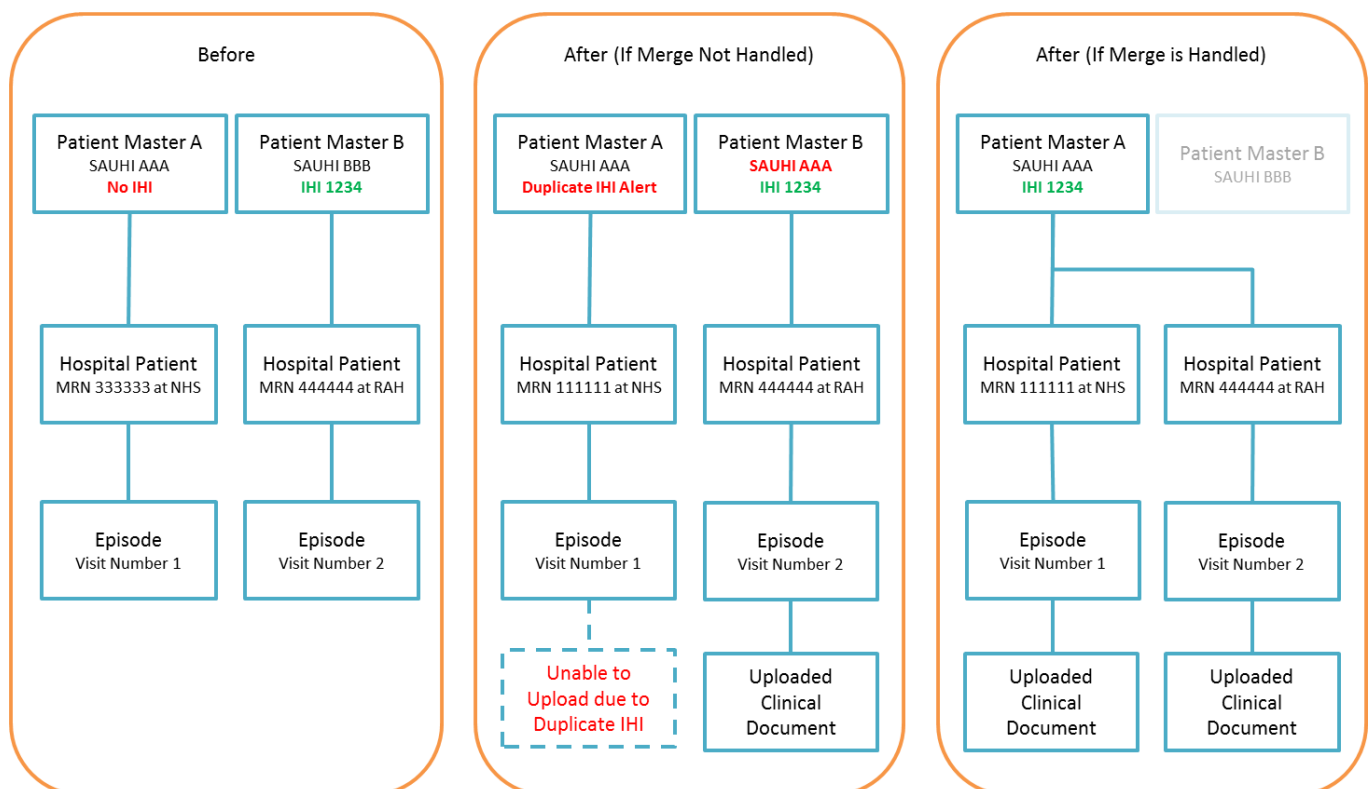
- 1 Move all previously uploaded clinical documents from the source episode to the destination episode.

- 2 If the patient had withdrawn consent to upload documents to 'My Health Record' for the source episode, then mark the destination episode in the same way.
- 3 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 HIPS 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:

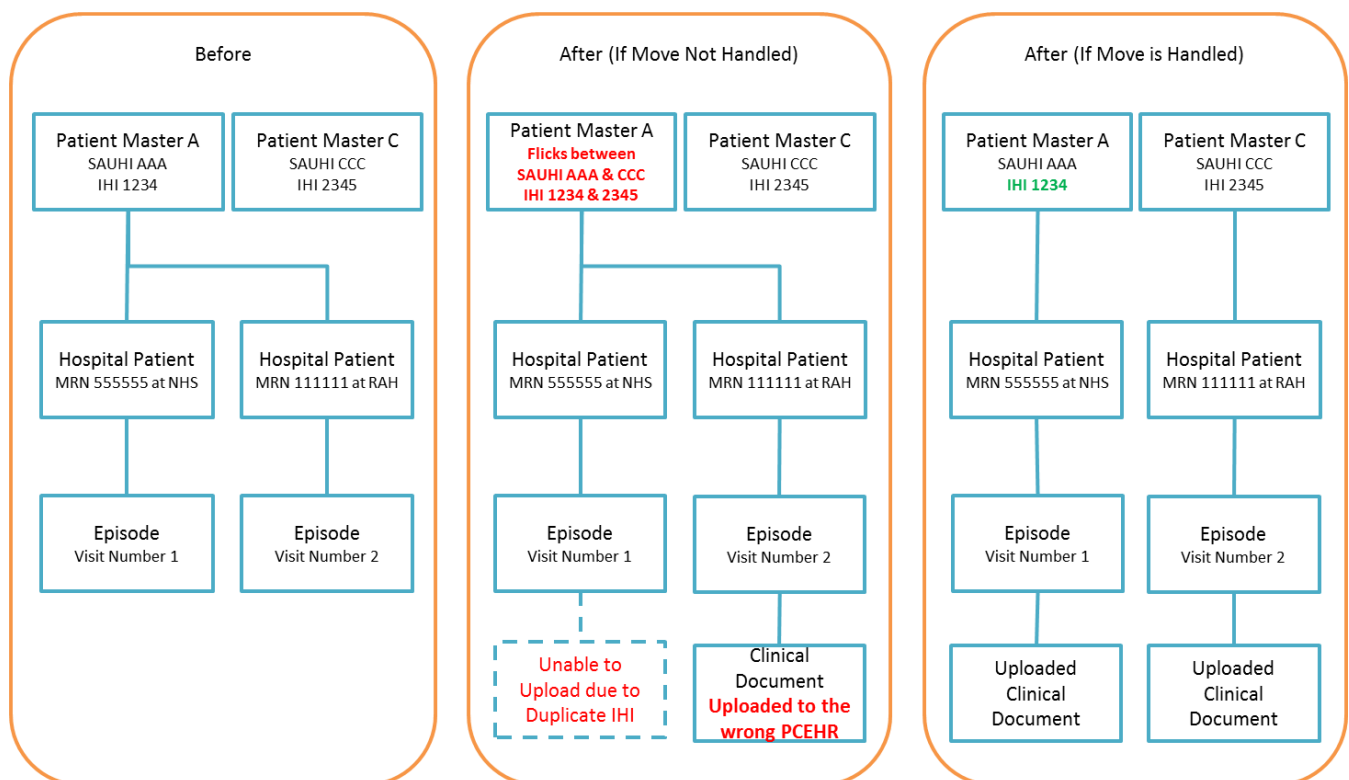
- 1 Record whether there are any MRNs from the same hospital on both patient masters. This should not happen, because the MRNs should have been merged in the PAS first. If there is a case of this occurring, record the most recently updated MRN from each PM. This will be used to create a merge conflict 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 HIPS 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 HIPS 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 HIPS 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.

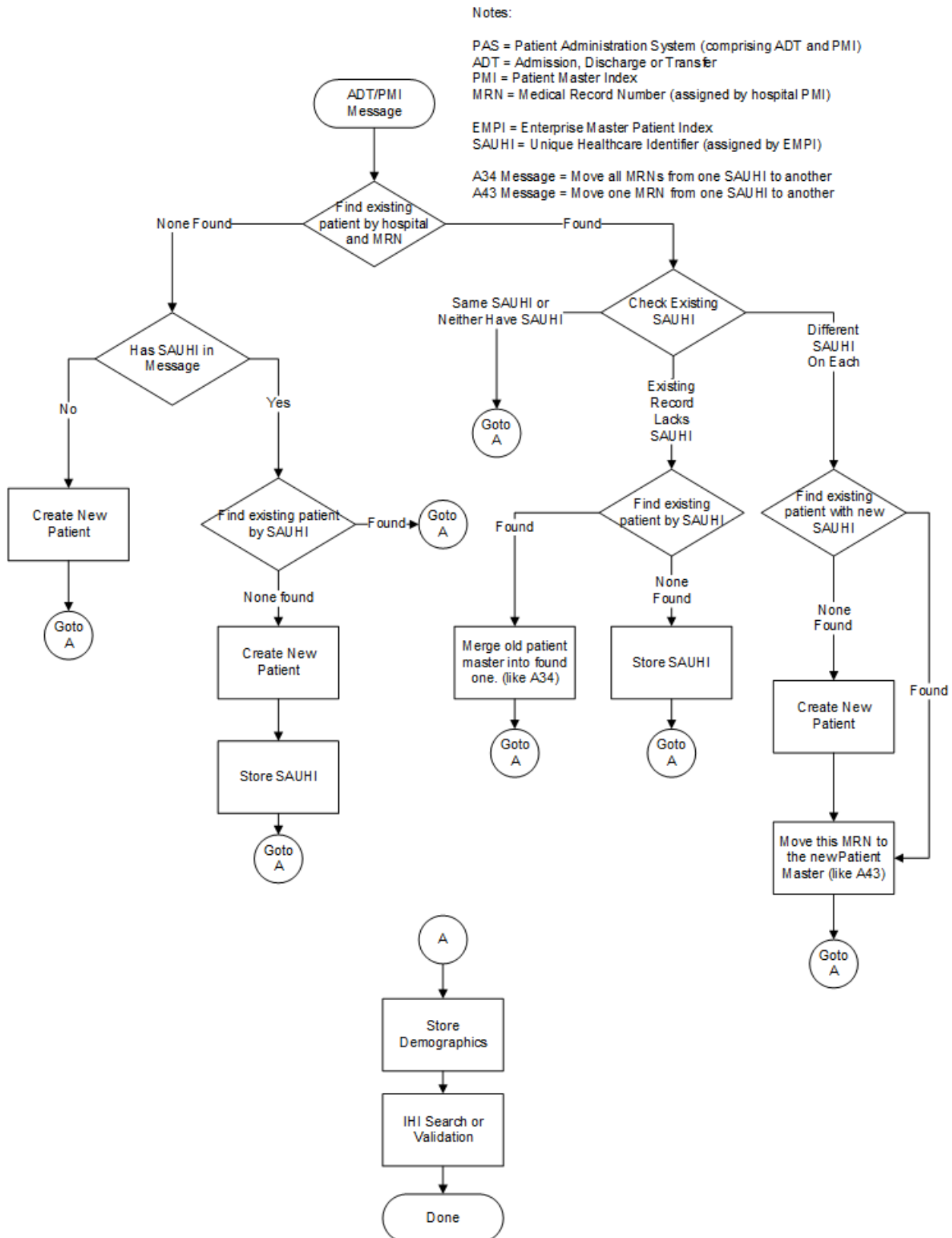
- If there is another patient master with the given Enterprise ID, merge the patient master without a Enterprise ID into the patient master with the Enterprise ID, using the logic for an A34 message.
- Otherwise store the Enterprise ID into the patient master that lacked an Enterprise ID.

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 HIPS Actions on Normal PAS Messages



10 HIPS Merge Validation

A validation check can be done in the database to determine if the merge was successful.

To validate if the merge was successful the following data can be checked:

- In the hips.HospitalPatient table validate that the source Hospital Patient (HP) PatientMasterID is correctly linked to the destination PatientMasterID record.
- In the hips.Episode table validate that any episode information now links to the destination Hospital PatientID.
- In the PatientMasterIhi table check that the newly validated IHI has the correct Patient Information.

If an error was returned.

- The hips.HL7MessageLog table will log any HL7 errors in the FailureReason field. The FullMessage sent field stores the HL7 message that the HIPS received.
- The hips.SystemErrorLog table will log any errors that occur during processing within the HIPS application. The message field and ExceptionMessage field can be used to assist with error tracing.
- The hips.IhiLookupAudit table will show the request and response for the PatientMasterIhi, if any error was returned in this step then the Response field will contain the details.