Reducing the Risk of Wrong Merge for Inborn Newborns

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1. INTRODUCTION

Patient merge is the process of merging the patient's information from the inactive to the active National Registration Identity Card (NRIC) number/Foreign Identification Number (FIN)/Hospital Registration Number (HRN) in the system and the physical medical records. This process is crucial for the hospital to have the complete information and most importantly the medical history of the patients when the patients have more than 1 NRIC/FIN/HRN due to reasons such as the change in citizenship status, forgetting to bring the identification document for the first registration and for newborns who do not have any identification document yet. It is thus important to ensure that the merge is for the same patient as the impact of a wrong merge, if not identified, could be fatal. The scope of the project focused on reducing the risk of wrong merge for inborn newborns done by our department, Department of Document Management Services (DDMS).

Objective : To reduce the risk of merging the HRN to the NRIC number wrongly for inborn newborns by DDMS

2. BACKGROUND

All newborns delivered in KKH are registered under a HRN and mother's name. Once the newborns have registered their birth and have their own NRIC number and name, the HRN is merged to the NRIC number based on the 4 merging criteria:

(1) Name/ Mother's name   (2) Gender   (3) Date of Birth   (4) Time of Birth

3. METHODOLOGY

The scope of the project had to be defined first as there are many different types of merging scenarios with varied workflows. A retrospective review of the wrong merges from 2011-2013 and an analysis of the different types of merging scenarios in 2013 were performed (Table 1) to determine the scope of the project. More than half of the wrong merges and the merging scenarios done in 2013 involved inborn newborns. Hence, the scope of the project focused on inborn newborns.

**Table 1: Breakdown of the merges done by DDMS in 2013**

Type of merging scenario	No. of merges	Percentage
Y074 to S/T	8206	63.04%
Y074 to X07/Y07n (where n≠4) /F/G	7	0.05%
Y07n (where n≠4) to F/G	245	1.88%
Y07n (where n≠4) to S/T	334	2.57%
X07 to F/G	273	2.10%
X07 to S/T	3115	23.93%
X07/Y07n (where n≠4) to X07/Y07n (where n≠4)	60	0.46%
A/B/H/K to S/T/F/G	5	0.04%
F/G to S/T/F/G	772	5.93%
TOTAL	**13017**	**100.00%**

Legends
- S/T – NRIC
- F/G – FIN
- Y074 – Inborn newborn
- Y07n (where n≠4) – Any patient, generated from OAS system
- X07 – Any patient, generated from SAP system
- - A/B/H/K – Malaysian's NRIC

A cause and effect analysis was done using the Fishbone diagram (Figure 1) and 3 main root causes were identified.

Figure 1: Fishbone diagram
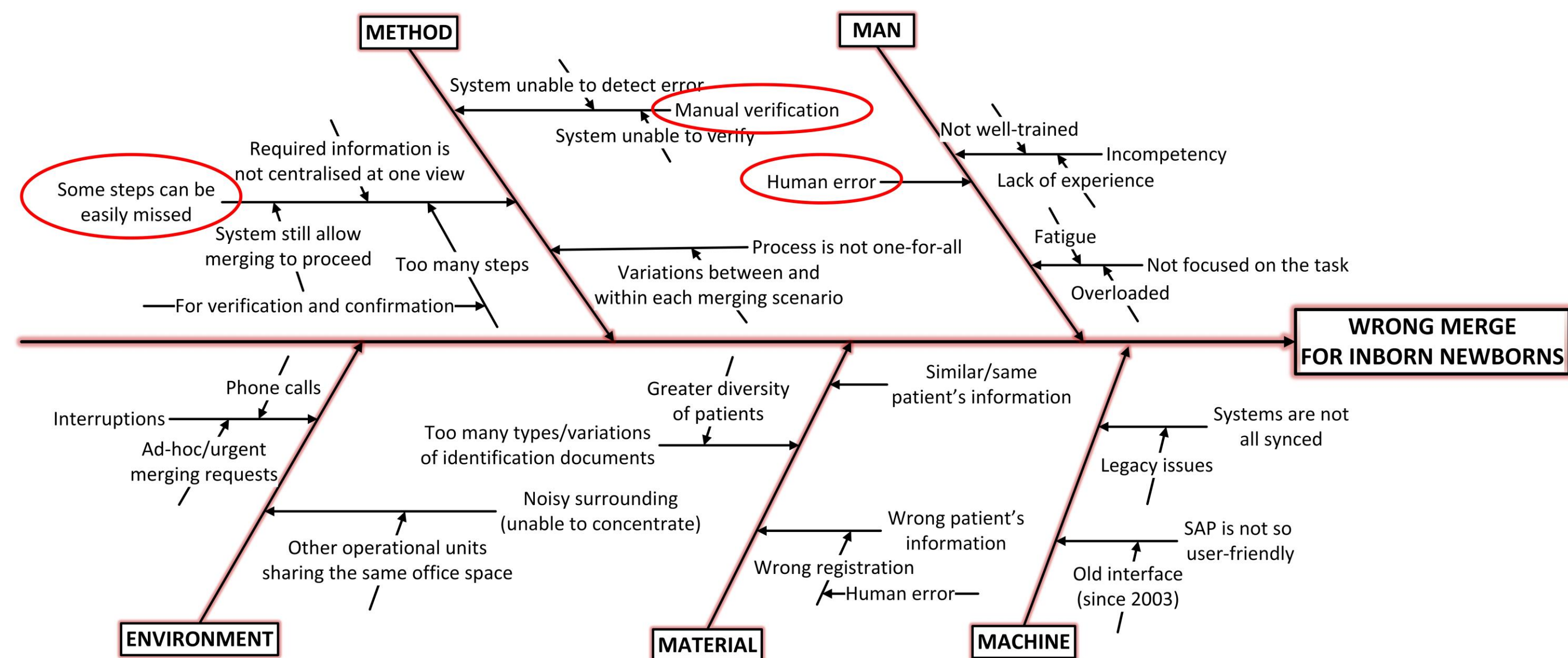
Next, process mapping was done and the level of risk associated with each step was assessed, evaluated and colour-coded (Figure 2a). Solutions were developed with the aim to address the 3 root causes identified and to eliminate/reduce the level of risk in the orange (potential risk) and red (high risk) steps.

4. SOLUTIONS

Three system enhancements were introduced in SAP (Figure 2b):

1) **Additional 'Time of Birth' field and check**
2) **Additional 'Mother's NRIC' field and check**
- Instead of having to identify if it is an inborn newborn merging case and look for the time of birth and mother's NRIC in the system, and then verify them against the physical Birth Certificate (BC) manually, the system will prompt the staff to key in the time of birth and mother's NRIC that is on the BC if the system detected that it is an inborn newborn merging case. The system will then verify whether the inputs (what the staff saw on the BC) tally with the patient's master data in the system (the inputs are just for verification purpose and will not be stored in the system).
- An additional criteria and an unique identifier – 'Mother's NRIC' is introduced to reduce the risk of verification error for mother's name

3) **Enhanced overview screen**
- Instead of having to go to the different transactions in SAP to verify the patient's information before proceeding to the merging screen, all the key information required for verification for merging are shown on the overview screen during the merging process.
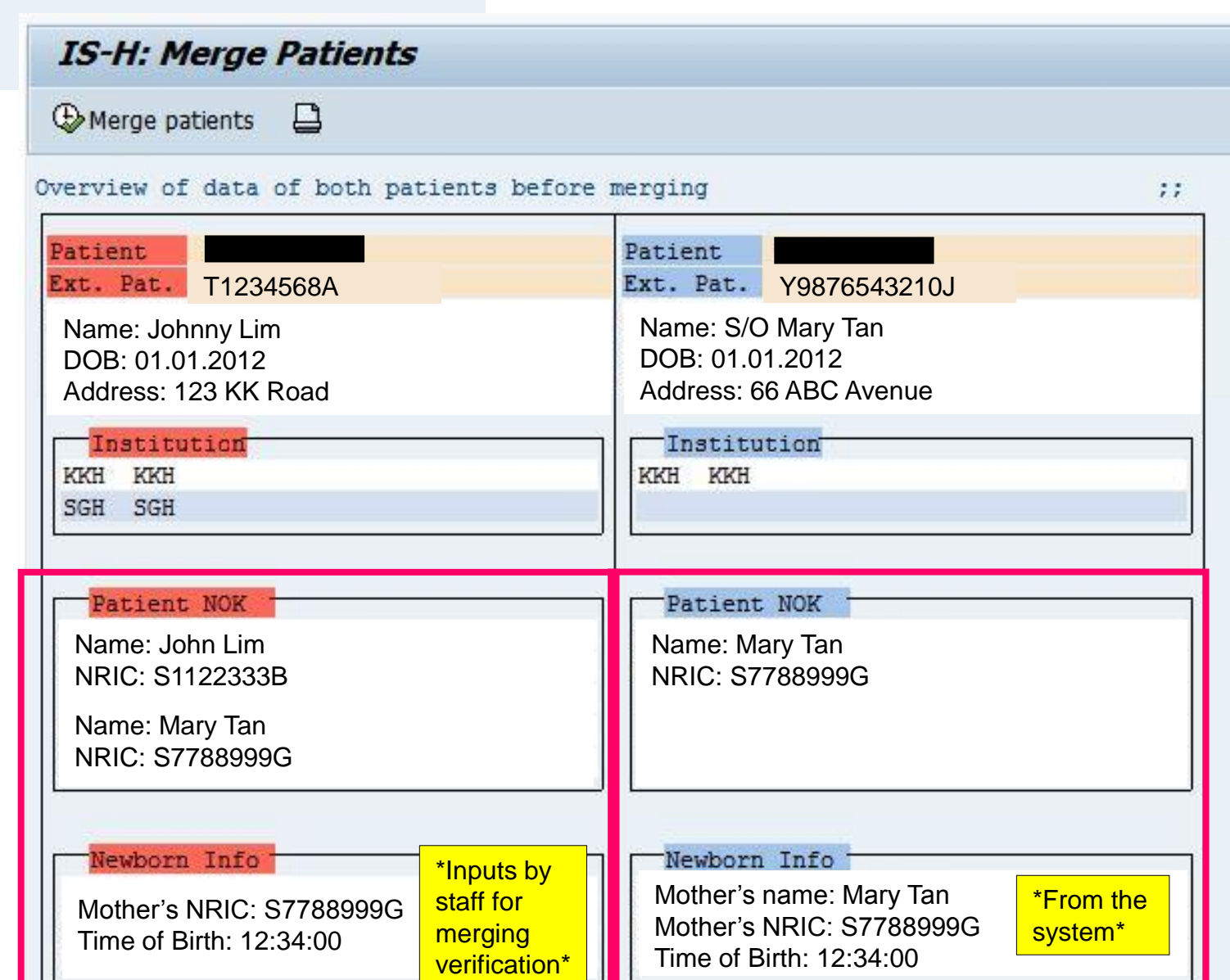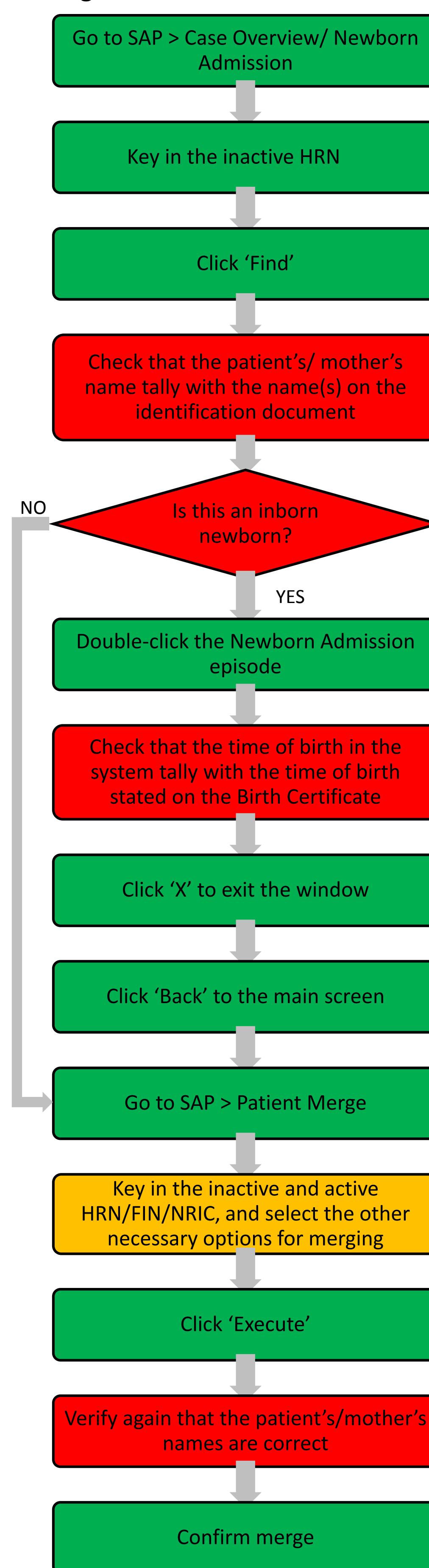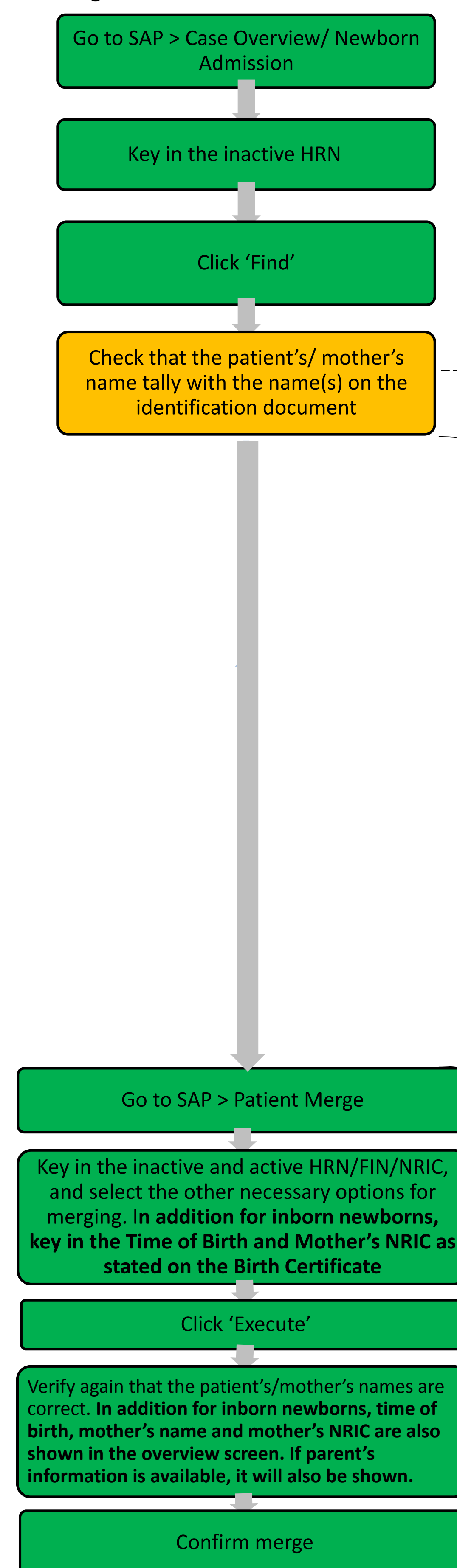

Figure 2a: Workflow - BEFORE

Figure 2b: Workflow - AFTER

| Level of risk	Colour code
No risk	Green
Potential risk	Orange
High risk (at least 1 wrong merge due to this step)	Red

An additional criteria – 'Mother's NRIC' is introduced to reduce the risk

Additional steps for merging inborn newborns are integrated into the general merging steps

'Time of Birth' is a mandatory field for inborn newborns. System will not allow user to proceed if the time of birth is not keyed in or keyed in wrongly.
'Mother's NRIC' is not a mandatory field as there are mothers who are foreigners but the system will not allow user to proceed if the mother's NRIC is keyed in wrongly.

Enhanced overview screen showing all the key information for merging

5. RESULTS

No. of wrong merge of HRN to NRIC for inborn newborns

2011	2012	2013	2014	2015	2016 (First Half)
1	1	1	0	0	0
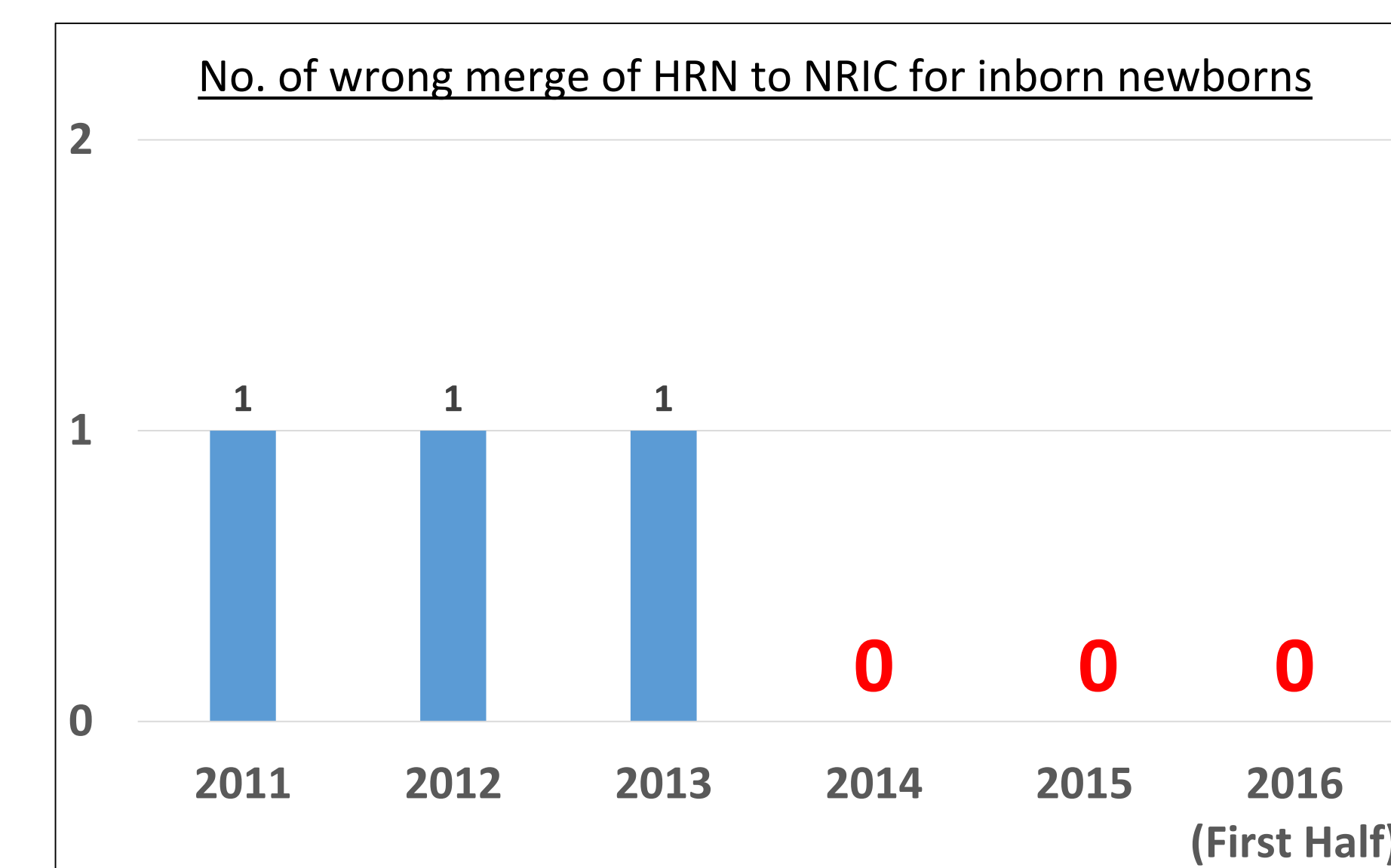
OBJECTIVE ACHIEVED!

Since the implementation in Feb 2014, there is ZERO wrong merge of HRN to NRIC for inborn newborns by DDMS.

PATIENT SAFETY IS ENHANCED!
- Human error is reduced with the replacement of human checks with system verification

SGH has also ADOPTED the system enhancements!
- KKH and SGH shared the costs of the enhancements
- Risk of wrong merge at SGH is also reduced

COST & MAN-DAYS SAVINGS!
- For a simple case with 2-3 episodes, it takes at least 1 month and concerted effort from >5 departments and other institution(s) to rectify a wrong merge

STREAMLINED WORKFLOW!
- No. of steps reduced from 14 to 9 steps

6. CONCLUSION & FUTURE PLANS

With the system enhancements and the re-designed workflow, the process of merging HRN to NRIC for inborn newborns by DDMS is streamlined and the risk of wrong merge is reduced significantly. Moving forward, we will look at reducing the risk of other merging scenarios and also merging across the other institutions in the Cluster.