MOH OFFICE FOR HEALTHCARE TRANSFORMATION

Reducing Hospitalisation of Neo-natal Jaundice (NNJ) Infants with Mobile Inpatient Care-at-Home (MIC@Home): A Use Case Development Case Study

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Aim / Objectives

To identify the clinical, operational and policy enablers that supported NNJ@Home's approval and spread as a scalable MIC@Home use case.

Background

MIC@Home was mainstreamed across Singapore's public healthcare institutions in 2024 as an alternative inpatient service to deliver acute hospital-level care at home. Admission sources for MIC@Home mirror inpatient pathways, such as the Emergency Department (ED) and Specialist Outpatient Clinics (SOC). Many potential direct admission use cases (e.g., from primary care) have yet to be approved, with the exception of NNJ direct admissions from polyclinic.

NNJ is a common newborn condition characterised by elevated serum bilirubin levels and is typically treated with phototherapy. Under MIC@Home, clinically suitable infants with NNJ may receive home phototherapy instead of ward admission ("NNJ@Home").

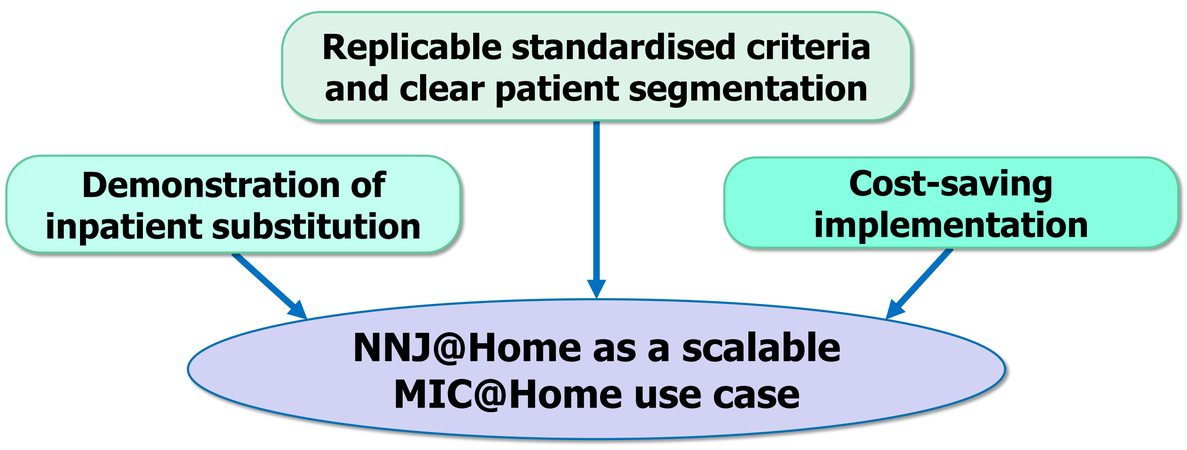
Methods

A retrospective process review was conducted to examine how NNJ@Home was developed and approved as a MIC@Home use case. The review comprised of NNJ@Home approval documents, workflow development materials, and correspondences between clinicians and regulators. Other proposed MIC@Home use cases and potential referral sources were also reviewed to identify common issues that delayed approval.

Key themes analysed were based on the new use case proposal requirements: use case, target conditions, target patient profile, patient load, operations, financing and regulatory considerations. This is to identify enablers that supported approval and implementation.

Results

We identified 3 key enablers that supported the swift approval and subsequent scale-up of NNJ@Home:



1. Demonstration of inpatient substitution (Policy)

At KKH, about 2 in 5 NNJ referrals were suitable for NNJ@Home, reducing avoidable ward admissions and helping to ease Special Care Nursery bed constraints to care for patients requiring more intensive care. Physical NNJ admissions has reduced while overall numbers remained stable, demonstrating absence of induced acute care demand.

2. Replicable criteria and clear patient segmentation (Clinical)

NNJ@Home established clear boundaries with both outpatient care and in-hospital care, with the following referral criteria and acceptable phototherapy limits, with reference to the College of Paediatrics and Child Health, Singapore (CPCHS) guidelines:

Inclusion criteria	Exclusion criteria
1. Infants >48-hours, with neonatal jaundice, **requiring single blue*** phototherapy without any other co-morbid conditions. 2. Infants with serum bilirubin levels below double blue light level, including "high risk" infants whose bilirubin levels are not higher than double blue levels. 3. Suitable home environment, parents agreeable	1. Serum bilirubin level **< single blue** – no admission required 2. Serum bilirubin level **> double blue*** phototherapy threshold as per the KKH guidelines, or any other co-morbid conditions – physical admission recommended for closer monitoring and more frequent blood testing 3. Bilirubin levels close to intense phototherapy/exchange transfusion levels

*__Single blue__ phototherapy exposes one body surface to blue light, **while double blue** phototherapy exposes two body surfaces simultaneously. Double blue thresholds vary by infant age and NNJ risk stratification.

Normal Risk Infants — **Eligible for NNJ@Home**

AGE	STOP PHOTOTHERAPY	SINGLE BLUE PHOTOTHERAPY	DOUBLE BLUE PHOTOTHERAPY	INTENSE BLUE PHOTOTHERAPY	EXCHANGE TRANSFUSION
0 - 12 hours	PLEASE SEE - SERUM BILIRUBIN LEVELS IN "HIGH RISK INFANTS" CRITERIA				
13 - 24 hours					
25 - 36 hours	160	200	250	275	300
37 - 48 hours	185	225	300	325	350
49 - 72 hours	210	250	300	325	350
73 - 96 hours	235	275	325	350	375
97 – 120 hours	235	275	350	375	400
121 hours–7 days	260	300	350	375	400
8-14 days	285	325	375	400	425

High Risk Infants — **Eligible for NNJ@Home**

AGE	STOP PHOTOTHERAPY	SINGLE BLUE PHOTOTHERAPY	DOUBLE BLUE PHOTOTHERAPY	INTENSE BLUE PHOTOTHERAPY	EXCHANGE TRANSFUSION
0 - 12 hours		100	150	175	200
13 - 24 hours		150	200	225	250
25 - 36 hours	135	175	225	250	275
37 - 48 hours	160	200	250	275	300
49 - 72 hours	185	225	275	300	325
73 - 96 hours	210	250	300	325	350
97 – 120 hours	210	250	300	325	350
121 hours–7 days	235	275	325	350	375
8-14 days	260	300	325	350	375

The replicability of the NNJ@Home protocol was evident with the full adoption of the protocols and referral criteria by the other 2 clusters. NUHS@Home received approval in 10 months, and SGH@Home received MOH's approval for NNJ@Home in just over a month.

3. Cost saving implementation (Resourcing)

NNJ@home is cheaper than ward-based phototherapy due to less consumable use (key savings), tests and procedures done.

Median bill size for SG citizens	Min subsidy	Max subsidy
Ward	$560	$1380
NNJ@Home	$470	$1170
Cost savings	**$90**	**$210**

Conclusion and lessons for future use cases

NNJ@Home offers families an alternative to physical admission, supporting parent-infant bonding, breastfeeding, reduced parental anxiety and lower risk of hospital-acquired infections, while preserving escalation pathways for higher-risk cases. The NNJ@Home experience suggests that future MIC@Home use cases are more likely to be approved when they are standardisable, replicable, guideline-anchored, financially reasonable, and operationally feasible without inducing inpatient demand. These adequately addressed the policy, clinical and resourcing considerations of any MIC@Home use cases.