A Day at a Time: Reducing the Wait for Inpatient Transthoracic Echocardiograms for Cardiology Patients

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National Healthcare Group — Adding years of healthy life

Mission Statement

Improve the mean waiting time of Cardiology inpatient (IP) transthoracic echo appointments, from 4 to less than 3 work days in TTSH, within 6 months.

1. **Process Measure**:
   - Review of days from (weekday) order to scan
   - C-Doc entry on requests for scans to be “expedited”
   - Calls to Non Invasive Cardiac Laboratory (NICL) to “expedite” scan
2. **Outcome Measure:**
   - Time from (weekday) order to transthoracic echocardiogram (TTE) performed (mean)
   - Tally on the number of appointment movements on SAP
3. **Balance Measure:**
   - Time from (weekday) order to TTE performed for other departments
   - Appointment movements of IP echo of other departments

** Weekly sampling performed: e.g. Monday to Friday*

Team Members

	Name	Designation	Department
Team Leader	Dr Tong Jieli	Consultant	Cardiology
Team Members	Dr Evelyn Lee	Senior Consultant NICL Director	
	Lin Jiabi	Principal Cardiac Technologist	
	Nadiah Binte Ramli	Senior Patient Service Associate	
	Estee Soh Ai Ching	Clinic Operations Manager	
	Dr Pang Rui Yi	Senior Resident	

Evidence for a Problem Worth Solving

Waiting times for Inpatient Transthoracic Echocardiograms (TTE) are Long

Appointment times are unpredictable

- Frequent shifts and changes on appointment system
- Impact on patient, primary team, nursing, NICL staff.

Local Data

1. Within TTSH
   - Average (mean) for all IP scans: 4 days
2. Within Singapore
   - No data on IP waiting times available online
   - Average LOS of AMI patients[1]: 3-4 days
   - Average LOS of HF patients: 5-7 days

[1] MOH FEE BENCHMARKS AND BILL AMOUNT INFORMATION HEART, EXPANSION OF BLOCKED HEART VESSELS (1 VESSEL) (COMPLEX). *HTTPS://WWW.MOH.GOV.SG/COST-FINANCING/FEE-BENCHMARKS-AND-BILL-AMOUNT-INFORMATION/OLDDETAILSBYHOSPITAL/SD712H--1--DAY---SURGERY---(SUBSIDISED)*

International Data (Canada)

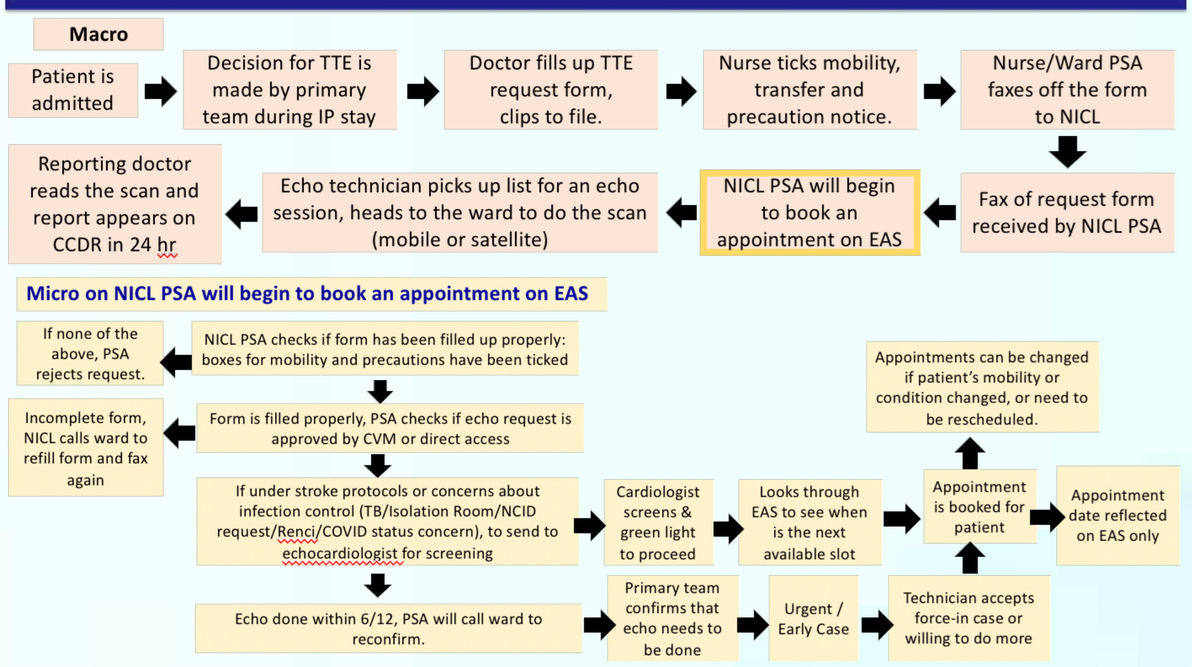
TABLE 1
Recommended wait time benchmarks (in days) for echocardiography for patients with class 1 or 2 indications

Urgency category	Recommended wait time*
Emergent: hemodynamically unstable patients with suspected certain cardiovascular conditions (eg, pericardial effusion with tamponade, mechanical complications, postmyocardial infarction)	Within 1 day
Urgent/semiurgent: critically ill patients who do not meet the definition of emergent and patients with a condition that could deteriorate rapidly (eg, symptomatic aortic stenosis)	Within 7 days
Scheduled: all patients who do not fall into the previous categories (eg, assessment of murmurs in asymptomatic individuals, assessment of left ventricle mass)	Within 30 days

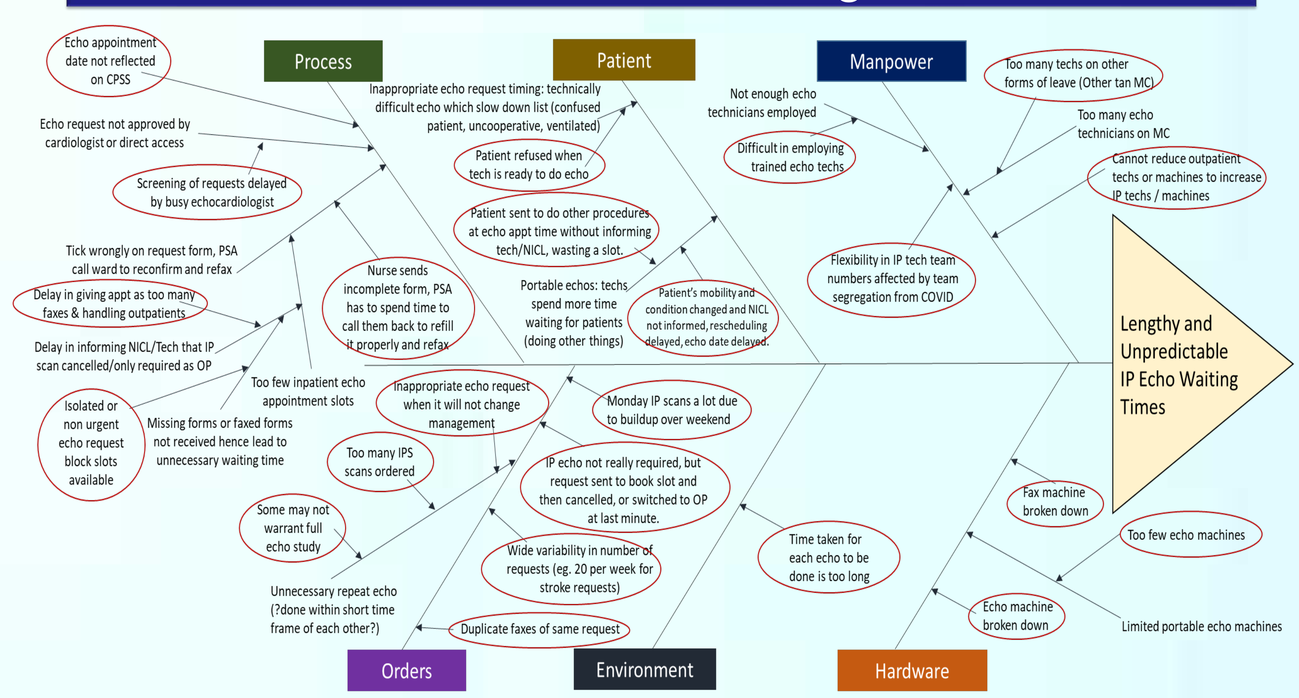
*From receipt of the request (either written or verbal for urgent and semiurgent cases) to the receipt of the final interpretation of the final echocardiographic report (or at least a preliminary report for urgent or semiurgent cases)

Source: Can J Cardiol. 2006 Oct; 22(12): 1029–1034. doi: 10.1016/s0828-282x(06)70318-x

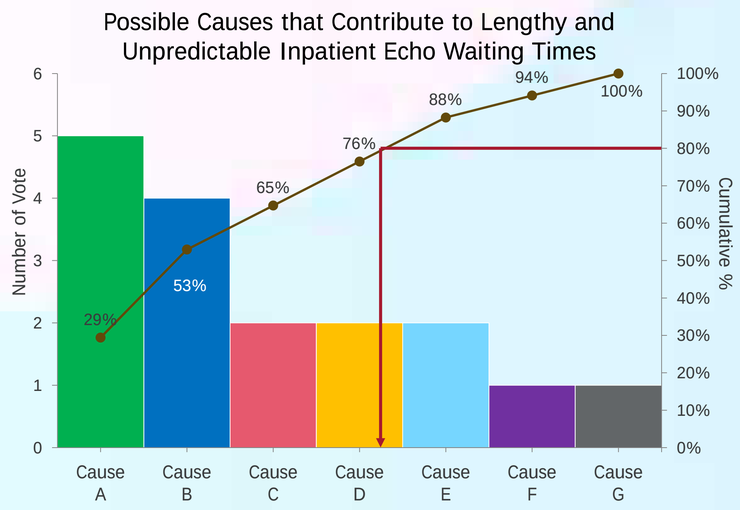
Flow Chart of Process



Cause and Effect Diagram



Pareto Chart



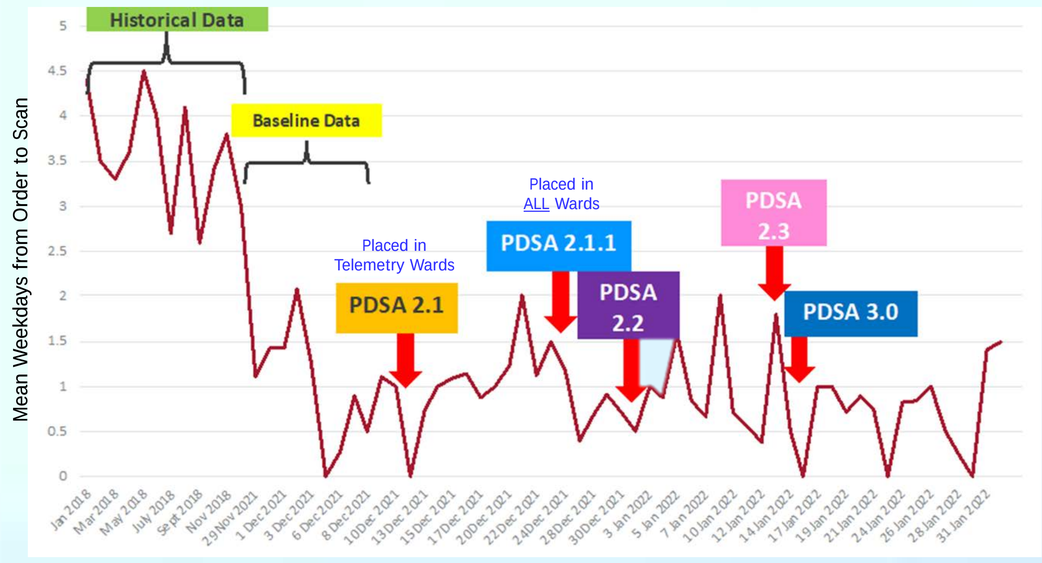
Cause A	Wide variability in number of requests day to day
Cause B	Request form errors, PSA has to call ward to clarify and ask them to refax forms.
Cause C	PSA unable to focus due to interruptions at the counter
Cause D	Changes to patient's plans, mobility and condition but NICL was not informed till last minute.
Cause E	Missing forms or faxed forms not received hence lead to unnecessary waiting time
Cause F	Too few inpatient echo appointment slots
Cause G	Inappropriate or non urgent echo requests taking up IP slots

Implementation

CAUSE	INTERVENTIONS	DATE OF IMPLEMENTATION
Cause A: Wide variability in number of requests day to day	**PDSA 1:** 1) More Inpatient (IP) slots for Monday, reduce Outpatient (OP) slots for Monday. 2) Ringfence IP slots for Cardiovascular Medicine (CVM) IP patients 3) Buffer groups for non-urgent IP patients a) IP but outside main waiting time target b) IP that can be converted to OP	29 November 2021 Due to concerns from senior management and operations team, this intervention was withheld till further notice.
Cause B: Request form errors, PSA has to call ward to clarify and ask them to refax forms.	**PDSA 2.1:** Posters/Sample forms that are correctly filled up, reminders before faxing the form. To be placed in the wards (Reminder Card & Checklist for Nurse / PSA)	13-17 December 2021
	PDSA 2.2: Change stamp on inpatient TTE request forms to reduce room for errors	1 January 2022
	PDSA 2.3: Improve feedback system from NICL back to ward. Instead of calling each ward, erroneous forms are annotated and faxed back to the ward at pre-specified times twice daily.	15 January 2022
Cause C: PSA unable to focus due to interruptions at the counter	**PDSA 3:** Increase manpower of NICL PSAs (Dedicated Inpatient PSA)	17 January 2022

Results

Waiting Time for Inpatient 2D Echo Appointment



Cost Savings

	Pre-Intervention	Post-Intervention
Mean Waiting Time for CVM IP TTE (Per Patient)	3.6 Days	0.9 Days
No. of Bed Days Saved (Per Patient)	3.6 - 0.9 = 2.7 Days	
Cost of CVM IP Stay (Per Patient) *(in GW while awaiting scan, without factoring in cost of other procedures)*	3.6 x $1,114 = $4,010.40	0.9 x $1,114 = $1,002.60
Difference in Cost of CVM IP Stay (Per Patient)	$4010.40 - $1002.60 = $3,007.80	
Assume No. of Cardiology Patients who require Inpatient Transthoracic Echocardiograms = 100		
Total No. of Bed Days Saved (Annualized)	2.7 Days x 100 = 270 Days	
Difference in Cost of CVM IP Stay (Annualized)	$3007.80 x 270 = $812,106	

Problems Encountered

- COVID pandemic resulting in drop in admissions
- Getting buy-in from stakeholders initially
- EPIC rollout eventually