

Project Title

Chest Pain Triaging With Automated Appointment Booking

Project Lead and Members

Project lead: Mr Franklin Tan

Project members:

A/Prof Yeo Khung Keong, Senior Consultant Cardiology, NHCS

Dr Derek Tse, Director, Regional Clinical Services, East, SHP

Ms Lee Chen Ee, Group Director, Organisational Transformation, SingHealth

Dr Goh Su-Yen, Head, Department of Endocrinology, SGH

Ms Charity Wai Sue Lea, Dy GCOO(Shared Services), SingHealth

Ms Amber Yeong Hor Kwan, Director, Operations (Management Information & Performance), NHCS

Dr Ian Phoon Kwong Yun, Consultant, Pasir Ris Polyclinic, SHP

Dr Soo Wern Fern, Consultant, Bukit Merah Polyclinic, SHP

Dr Jonathan Yap Jiunn Liang, Consultant, Cardiology, NHCS

Dr Wang Zhen Sinead, Consultant, Outram Polyclinic, SHP

Dr Huang Weiting, Associate Consultant, Cardiology, NHCS

Mr Amos Lim Tee Yong, Director, Partnership Enablement, IHiS

Ms Susan Lee, Director, SGH IT, IHiS

Mr Franklin Tan, Director, Office for Service Transformation, SingHealth

Ms Chiong Siau Chien, Senior Manager, Cardiac Laboratory, NHCS

Ms Chong Thye, Assistant Director, Nursing, Cardiac Rehabilitation Unit, NHCS

Ms Teeu Keng San, Senior Manager, Cardiac Clinics, NHCS

Mr Poh Ee Siong, Senior Manager, Clinic Operations, SHP

Ms Eunice Goh Li Rong, Assistant Manager, Clinical Services, SHP

Ms Danielle Tan Yi Ting, Executive Database, NHCS

Ms Noel Teo Xiu Wen, Senior Executive, Operations (Management Information & Performance), NHC

Organisation(s) Involved

Singapore Health Services Pte Ltd (SHHQ)

National Heart Centre Singapore (NHCS)

SingHealth Polyclinics (SHP)

Singapore General Hospital (SGH)

Integrated Health Information Systems (IHIS)

Project Period

Start date: May 2018

Completed date: August 2019

Aims

With Singapore's ageing population, there is an increasing burden on healthcare resources. It is important that healthcare providers improve right-siting of care. The use of the platform guides primary care doctors to refer chest pain cases to NHCS more accurately, with necessary tests to be frontloaded ahead of their visit to the cardiologist.

For patients referred to NHCS without any tests done, the first visit is often suboptimal as the cardiologist has to order the tests and the patient has to come for another consult after the required tests are done. The suboptimal care paths for these patients have lengthened the time to diagnosis.

Inappropriate referrals have also added unnecessary anxiety and cost to the patients and their caregivers in addition to taking up precious appointment slots that could have been better used to serve patients who truly required specialist treatment.

With the automated appointment-making feature, patients who require an appointment with NHCS can get their appointment without having to wait at the polyclinic for counter staff to arrange for it. This reduces the reliance on counter staff to manually arrange the specialist appointments.

Background

The team piloted a Chest Pain digital triaging platform, at Outram and Bukit Merah polyclinics. If an appointment with NHCS is required, appointments for specialist care is automatically made without manual intervention. The team first started work on this since May 2018. This has been implemented since 29-Aug-19.

The team comprised of clinician and ops representatives from both NHCS and SHP, together with the SingHealth Office for Service Transformation, under the ambit of the SingHealth Future Outpatient Journey Task Force, which is part of the MOH Ministry Family Digitalisation Plan. The platform was developed by vendor Key Reply, with IHiS ensuring compliance with relevant security and tech standards.

Methods

The team intends to measure improvement in manpower savings, reduced time from referral to diagnosis and referral appropriateness.

Time-motion studies conducted prior to the implementation of the platform would serve as the baseline. Through this effort, there are time savings for counter staff when appointments to NHCS are made (see section below). On average, it takes 6 min 38 sec for each appointment making transaction.

The team also intends to measure time from referral to diagnosis as well as track referral appropriateness. These are still preliminary and would require retrospective analysis to elucidate.

Results

For the 6 months from Aug-2019 to Jan-2020, 75% of NHCS appointments from Outram & Bukit Merah Polyclinics were automatically booked without manual intervention (982 appointments). This translates to 109 man-hours of counter staff time saved, and saves almost 400 hours of patients' on-site time at the polyclinic.

By scaling this initiative to all SHPs' referral into NHCS, it has the potential to save more than 13,600 man-hours of counter staff time a year.

Patient satisfaction survey results are still early phase, due to the low survey completion rate amongst patients complaining of chest pain at the 2 pilot sites. Nonetheless, the team expects satisfaction to improve due to reduction in waiting time on-site.

Referral appropriateness is also expected to improve with the adoption of this triaging platform although more time is required for analysis and validation of the results.

Lessons Learnt

Through this project, we have learnt the following lessons:

- As Chest Pain is seen as a high risk symptom, we had to convince all stakeholders that our triaging platform is backed by high quality clinical evidence – this was essential in garnering support to try this out.
- As this is a digital innovation project which directly affects clinical decision making and patient care, there were numerous considerations regarding data security, as well as the integration with production systems
- System slowness (in SCM) is a significant bugbear that has to be addressed in order to improve adoption by clinicians
- End-user processes must be evaluated and any new workflows suggested must benefit staff & patients
- Sufficient time and resources must be allocated to accommodate Change Requests (CRs) that arise after 1st version of pilot has been launched given that the path to finalising the desired product is an iterative process.

This project is still ongoing, as the project team continue to improve and refine the product as well as incorporating the CRs to make this solution a better one. The project team is also actively exploring to scale the platform beyond the pilot sites, as well as including other conditions beyond chest pain

Conclusion

It is important to always remember our “Why”, which for us is to put patients at the heart of all that we do to deliver seamless patient-centric care with good care outcomes in a sustainable manner. Through this effort, we also understand the importance of deep and honest engagement with stakeholders, coupled with supportive leadership that allows us to

experiment with new ideas. In addition, it is imperative that process issues be resolved and addressed first, augmented by technology (ie: technology should not be implemented for technology's sake).

With our work, we are the first in public healthcare in Singapore to successfully implement a specialist chest pain triaging platform at a primary care setting, coupled seamlessly with automated appointments for investigations or cardiologist referral.

Project Category

Workforce Transformation

Keywords

Workforce Transformation, Access to Care, Singapore Health Services, National Heart Centre Singapore, SingHealth Polyclinics, Singapore General Hospital, Integrated Health Information Systems, Waiting Time, Automated Appointment Booking, Right-Siting, Cardiology, Chronic Ischemic Heart Disease, Diagnostic Test Laboratory, Triaging, Coronary Artery Disease, Patient Satisfaction Survey, Referral Appropriateness, Change Requests

Name and Email of Project Contact Person(s)

Name: Mr Franklin Tan

Email: franklin.tan.c.p@singhealth.com.sg

Chest Pain Triageing With Automated Appointment Booking

YEO Khung Keong¹, Derek TSE², GOH Su-Yen³, LEE Chen Ee⁴ and All members of Future Outpatient Journey Task Force Workgroup 1.

¹ Senior Consultant, Cardiology, National Heart Centre Singapore

² Director, Regional Clinical Services East, SingHealth Polyclinics

³ Head & Senior Consultant, Department of Endocrinology, Singapore General Hospital

⁴ Group Director, Organisational Transformation, Singapore Health Services Pte Ltd



Background

Chest pain is a common condition referred to the National Heart Centre Singapore (NHCS). However, some of these referrals may not be appropriate. Inappropriate referrals add unnecessary anxiety and cost to the patients and their caregivers and impose additional burden on our precious healthcare resources.

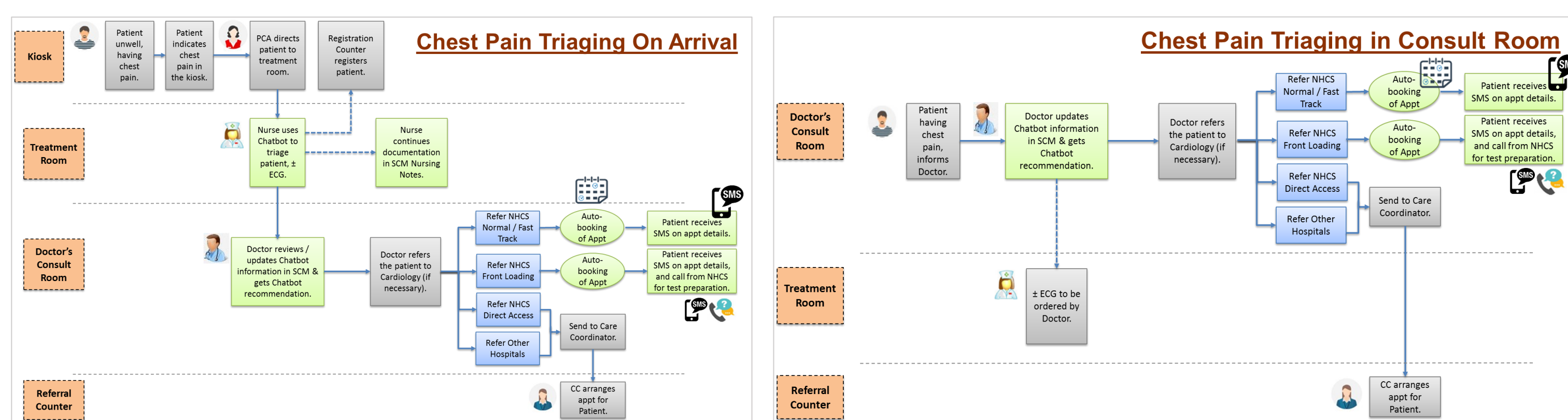
Currently, referrals to NHCS for investigations or specialist reviews are still manually done. As a result, it is manpower dependent and patients also have to wait at the polyclinic while their appointment for specialist care is being booked.

Aims

- ✓ To develop a digital Chest Pain triaging platform to assist primary care clinicians
- ✓ To automate process for referrals from SingHealth Polyclinics (SHP) to National Heart Centre Singapore (NHCS) for relevant investigations and specialist reviews.

Methodology

- ❖ Engagement of all stakeholder groups, including clinical as well as ops staff from both NHCS and SHP, to map out the operational workflows



- ❖ Implemented a risk scoring matrix from the internationally recognised Coronary Artery Disease (CAD) Consortium. The risk-adjusted recommendations are as follows:

Risk Score	Recommendation
<3%:	No test/referral unless patient requests. KIV direct access
3-8%:	Direct access if clinically relevant
8-20%: (within 2 months)	<40y Threadmill (TMX) first choice If unable to exercise, DSE
	>40y Myocardial perfusion scan (MIBI) first choice CTCA if available
20-50%: (within 1 month)	<40y TMX echo first choice If unable to exercise, DSE
	>40y MIBI first choice (Computed Tomography Coronary Angiogram) if available
>50%	Fast track (within 2 weeks). Start antiplatelet therapy, Glyceryl Trinitrate, statin, beta-blocker if no contraindications

- ❖ Through a Call-For-Collaboration by IHiS, we worked with Key Reply vendor to implement the CAD questionnaire into an electronic platform

- ❖ Worked closely with IHiS & Ops staff to enhance our appointment system to enable automatic booking of NHCS appointments

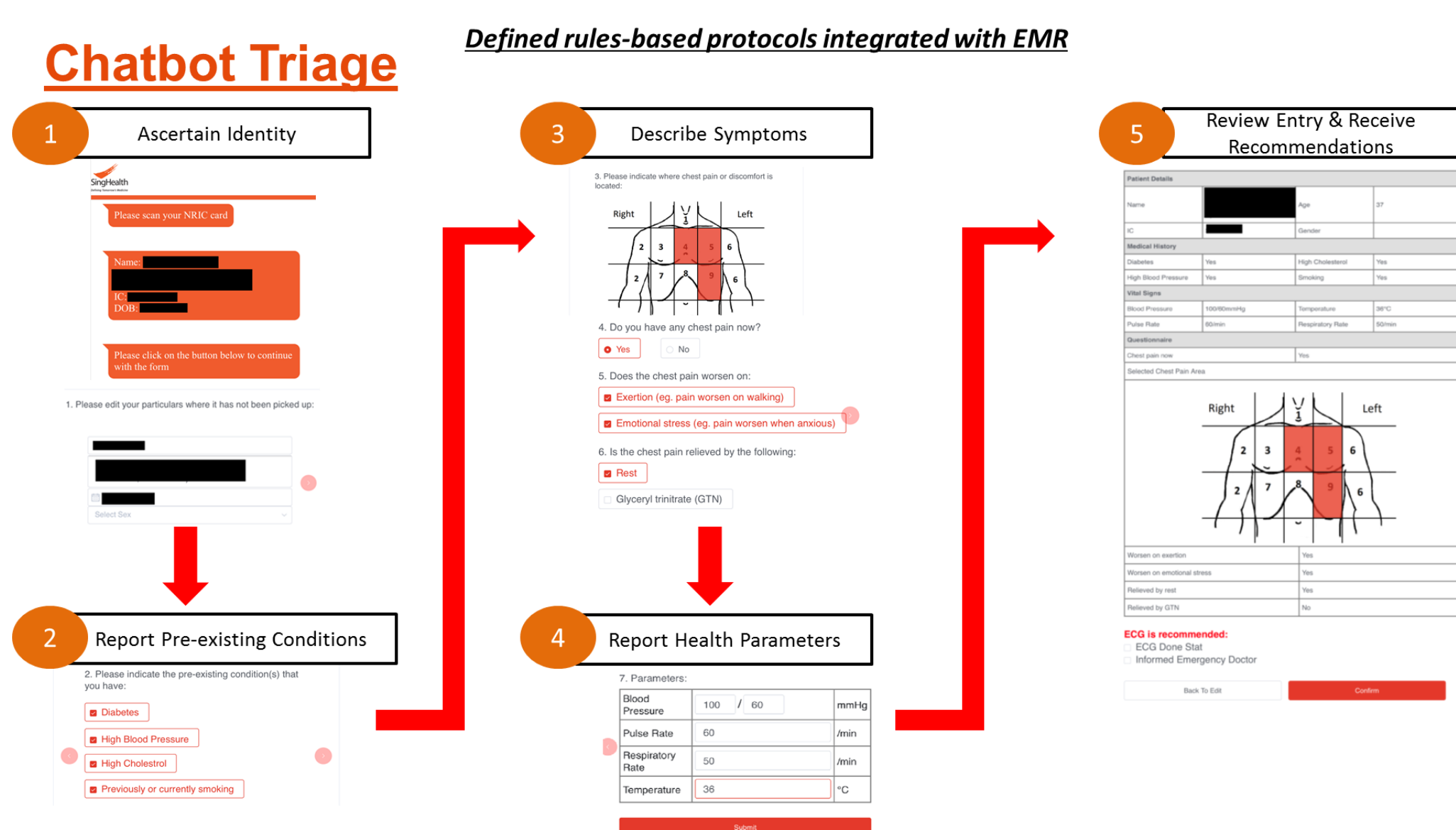
Benefits

- ✓ Support clinical decision making and Improve referral appropriateness for Chest Pain to NHCS
- ✓ Reduce unnecessary SOC visits through frontloading tests
- ✓ Reduce time to diagnosis
- ✓ Improve productivity by reducing reliance on counter staff for appointment making
- ✓ Reduce patients' waiting time at SHP for appointment making

Results

Electronic Triageing Platform

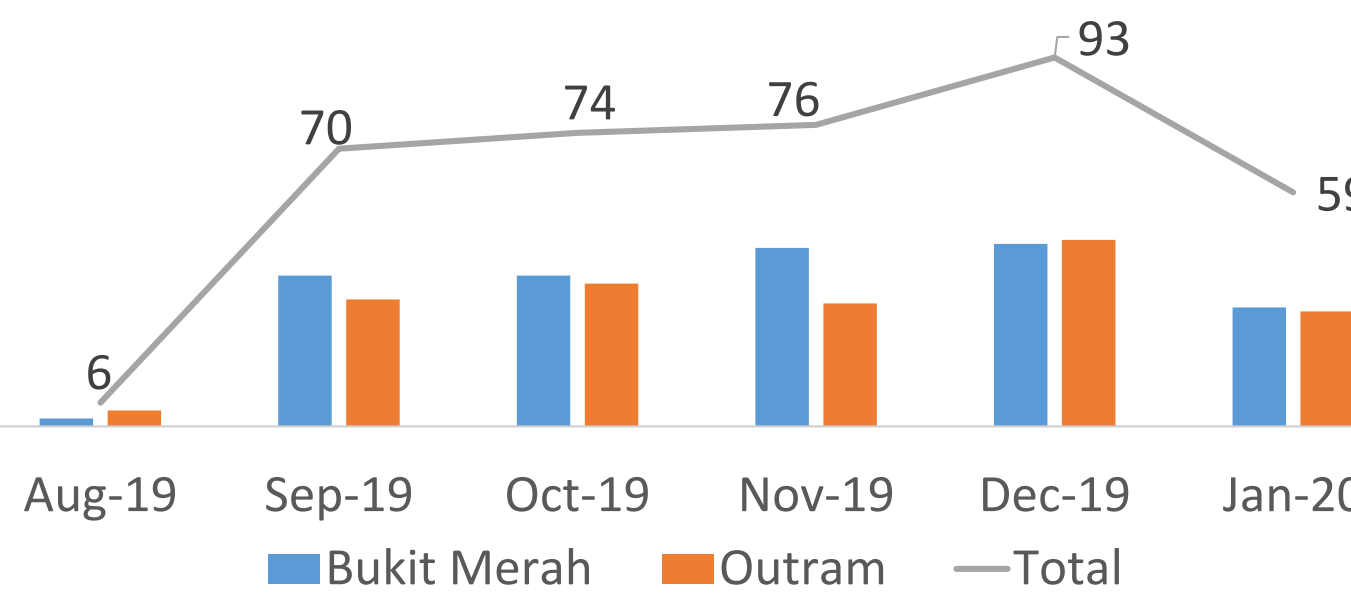
Implemented since Aug-19



Recommendations based on risk stratification

Automatically & seamlessly get appointment for front-loading tests & NHCS consult (via SMS)

Adoption of Triageing Chatbot by Doctors (SCM Pg. 7)



SMS Sent	No.	%
Success	931	94.8%
Not Successful	51	5.2%

Auto-Booked Cases to NHCS from Aug 2019 to Jan 2020

Polyclinic	Referral to NHCS Fast Track	Referral to NHCS Normal	Referral to NHCS Front-Loading	Total
Bukit Merah	131	273	32	436
Outram	215	286	45	546
Total	346 (35.2%)	559 (56.9%)	77 (7.8%)	982 (100%)

Auto-booking	No.	%
Success	732	74.5%
Partial Success	6	0.6%
Not Successful	244	24.8%

*Partial Success refers to the frontloaded cases where either the test or consult appointment is successfully auto-booked

Conclusion

We are the first in public healthcare in Singapore to successfully implement a specialist chest pain triaging platform at a primary care setting, coupled seamlessly with automated appointments for investigations or cardiologist referral. Through this project, we addressed process issues and worked closely with all stakeholders to test the workflow and feasibility of leveraging technology to augment clinical decision with auto-booking of appointments. Even beyond this initial pilot, the project team is also actively exploring to scale the platform beyond the pilot sites, as well as including other conditions beyond chest pain. This will enable us to deliver more seamless patient-centric care while still ensuring good care outcomes in a sustainable manner.