ORCHARDS FROM SEEDLINGS

EMBRACING CLINICAL PRACTICE IMPROVEMENT

National Healthcare Group

Adding years of healthy life

QUALITY IS NEVER A COINCIDENCE.
IT IS ALWAYS THE RESULT OF HIGH INTENTION,
SINCERE EFFORT, INTELLIGENT DIRECTION AND
SKILLFUL EXECUTION

—William A Foster—

This book offers an insightful perspective for our readers to understand the significant milestones in the National Healthcare Group's (NHG) quality movement. This long and arduous journey has been documented using parallels in agriculture.

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MESSAGE FROM THE BOARD

Over the last decade and a half, Quality Improvement has been the mainstay in National Healthcare Group's (NHG) development. The process redesign and improvement initiatives were made possible by countless teams of dedicated professionals. One factor common to all these initiatives is their association with the Clinical Practice Improvement Programme (CPIP).

Quality is the core of how NHG delivers care. Today, the culture of Quality Improvement that has been planted into NHG has grown well. In order for this seed to germinate and grow deeper roots, individuals at every level need to take personal accountability for learning and internalising quality in their everyday work. Senior management sets the climate, consistently focuses on systems of care and supports all local leaders in integrating improvement activities across the institutions. The system, as a whole, takes on a generative approach of having the capacity to produce, renew and continuously innovate to improve good practices and processes to improve care for our patients.

One of the projects featured here is the NHG Pharmacy's "Pick-to-Bin", which integrates with other medication safety initiatives and can be spread to all polyclinics. Such projects increase the medication safety processes in both the polyclinic and the hospital setting. This improvement to the pharmacy process was made possible through a collective effort, using a systematic methodology such as CPIP.

Today, the CPIP has trained over 1,600 of our colleagues within and external to NHG, with 1,100 improvement projects initiated. The programme has deepened our leaders understanding of the Science of Improvement and opens the path to collaboration beyond NHG institutions.

This book celebrates the good work of CPIP and the people who made it happen. It also charts the course and brings you through the journeys our own colleagues made, and the lessons they have learnt. As you walk on this path with them, I hope you will be as inspired as they were, to achieve better care for our patients, ready to serve the greater needs and demands of healthcare at present and in the future.

MDM KAY KUOK
Chairman, National Healthcare Group Board

FOREWORD

Donald Berwick, founding CEO of the Institute for Healthcare Improvement (IHI), once said, "Patients are not getting what they need, but it is not a matter of skill or will. Doctors and nurses can't give the care they want to give. It's time for new systems. It's not about blame. It's about change."

As the Regional Health System (RHS) of Central Singapore, we need to deliver the right care for every patient, every time. With issues like our ageing population, rising costs and manpower constraints, NHG has to continue to raise the bar and improve our processes in order to provide quality care. Thus, we are continually seeking ways to build safety and efficiency into our work processes via improvement methodologies and frameworks.

Continuous Quality Improvement is an important part of our DNA. The Clinical Practice Improvement Programme (CPIP) is a movement and major component in our quality culture. It engages clinicians and leaders at different levels of our organisation to be personally committed to improving patient outcomes through in-depth analysis of our problems and challenges, driving changes in clinical processes and sustaining these changes over time. In order to do so, individuals across level and function have to take a personal responsibility in what they do.

I believe our direction has been set right. While the improvement journey is continuous and demanding, the sense of satisfaction upon seeing the positive results makes walking down this road worth it. We may not always have the "right" answers for our problems, but we can work towards an environment conducive for us to engage in systems thinking and be a matured, learning organisation.

I am pleased to see the positive outcomes and results from these improvement projects, as well as the benefits our patients are receiving since planting the seeds of CPIP over the last 15 years. I hope each of us will plant our own seeds, and eventually, have our ideas spread and cross-pollinate, continuously fuelling the cycle of improvement.

I would also like to thank the teams for their efforts, as well as our local faculty, facilitators and coordinators for their contributions to adding years of healthy life in a sustainable, cost-saving and relationship-based environment.

PROFESSOR PHILIP CHOO
GCEO, National Healthcare Group

PREFACE

The most memorable event of my journey with CPIP was probably when we went to Chiang Mai, Thailand, to teach the nurses in their various hospitals. There was a team of nurses there who were desperately trying to control diabetes in the hill villages. Against the lack of support and their difficult, environmental situation, they continued to push through their six-month long project with their drive and patient support. It was an incredibly humbling experience.

Over the last 15 years, we have been blessed with many good people who understand the core of what we do. We have had brilliant individuals who were the first to engage, understand our message, and in turn, recruit others to help us spread the foundation of our message.

Beyond quality improvement and safety outcomes, the demands of our healthcare system require us to change "the way things have always been done". With learning, imagining and improvement serving as the next frontier, we will benefit these main groups: staff, insurers, payers, and most importantly, our patients.

CPIP is a tool used to arm our professionals to better understand our healthcare landscape and how it changes over time. 15 years have passed since we planted this seed in our organisation, and it has, indeed, grown into a very strong sapling; youthful, resilient, strong and reaching for the sky.

Our projects have gone on to become sustainable, hospital-wide, cluster-wide, and even national protocols. We have had prize winners, national recognition with the Ministry of Health (MOH), and international recognition through presentation at conferences and peer-reviewed journals. The CPIP has helped our people look at the system and opened up a new spectrum of insights for them.

The ground has moved tremendously. As we continue to have a better understanding of the healthcare from various perspectives (our Payer, Patient and Providers), we continue to bring the movement forward. With that, I would like to extend my sincerest appreciation to our faculty, our CPIP alumni, and our current CPIP participants.

Once again, I would like to congratulate all our colleagues and supporters who played a part in building and driving the spirit of quality improvement in our care. Our movement will progress into the future just like a mighty forest as we continue to prepare the soil and tend to our thriving plants today.

I am confident for our future.

ASSOCIATE PROFESSOR THOMAS CHEE
Chair, NHG CPIP Faculty

PART 1

OVERVIEW

TILLING THE SOIL

At the onset of NHG's incorporation in 2000, Mr Tan Tee How (past NHG CEO) and the senior management team decided to make Quality the hallmark of NHG. The 1st annual NHG Quality Week with the theme, "Synergy in Quality" was organised in March 2000. In the same year, the NHG Quality Framework was established.

One of the most crucial developments in NHG's quality movement was the involvement of doctors in driving the improvement of quality care and patient service. Two senior doctors were identified for training and to start the quality improvement initiatives in NHG. The tilling of the soil had begun.

The Clinical Practice Improvement Programme (CPIP) was established by the New South Wales Council on Quality in Healthcare [CQHC], Australia, in recognition of the lack of effective change management in the clinical processes of care.

I remember being approached by NHG in 2001, as one of the pioneer batch to attend the five day residential CPIP workshop in Sydney. One of the requirements of the workshop was to embark on a six-month journey of hands-on quality improvement activities and to complete a clinical project. It suddenly struck me on the plane to Sydney that this was not going to end with the lectures and academic discussions that we clinicians are so used to!

It was therefore with some trepidation that I joined my Australian course mates on the first day who, like me, were busy clinicians and healthcare professionals. At the course, it became clear that we all will have to dedicate the following months to complete the CPI journey, on top of our clinical work.

The initial feelings of apprehension however gave way to great interest and excitement during the workshop as we all shared our experiences and looked at the potential to improve. I knew we struck gold when our senior management embraced the CPI initiative, which triggered greater engagement and capacity building amongst our NHG clinicians.

ASSOCIATE PROFESSOR THOMAS CHEE
Chair, NHG CPIP Faculty
Sharing adapted from Embracing Clinical Practice Improvement, A Tribute 2008

CULTIVATION OF CROPS

One of the distinguishing characteristic of the NHG quality improvement program was to have senior clinical leaders drive, lead and be actively involved and engaged in clinical improvement. With senior management's commitment and as part of preparation to grow NHG clinical leaders for quality improvement work, two international experts were brought to Singapore in March 2002. One of the experts was Dr Ross Wilson, a highly acclaimed Intensive Care physician from Australia, who was also a leading expert in quality improvement and patient safety. The following is a short excerpt of his message.

As healthcare systems, our role is to deliver the highest quality healthcare services to all our patients, at all times.

So how do we succeed in this challenge?

First requirement is the leadership to provide vision and resources. This baton is carried by many past and present leaders in the NHG family. The sustained nature of this leadership is crucial; as is the focus on an explicit and unwavering goal — faster, better, cheaper and safer care.

Second requirement is the need for an improvement method which allows process redesign in a clinical context. … it does not seem to matter which particular method has been chosen. Selecting an improvement method and then building that capacity throughout the organisation is the key. Without an improvement method which involves process redesign, the organisation is without the tools to respond to poor performance against a target, or a shortfall against an accreditation standard.

Exhortation is not an improvement method!

DR ROSS McL WILSON
Mentor, NHG CPIP Faculty
Message adapted from Embracing Clinical Practice Improvement, A Tribute 2008

The NHG senior leadership felt the urgent need for action after the conclusion of NHG 2001 Adverse Event Study.

> We had our first Adverse Events (AE) Study in 2001. This was to understand the incidence of harm and adverse events within our systems. The results were not surprising — our AE rate was on par with the developed world, no better or worse — but the study was the impetus for us to embark on our patient safety framework. Through this framework, we made changes to processes of care and professional education that resulted in better quality and improved safety across our cluster. Two subsequent AE studies found our AE rate significantly reduced.
>
> **ADJUNCT ASSOCIATE PROFESSOR TAI HWEI YEE**
> *Group Chief Quality Officer, National Healthcare Group*
> *Adapted from Conversations On First Steps, 2016 Quality Assurance to Quality Improvement in 15 Years*

NURTURING THE SEEDLINGS

Leaders in NHG recognised the need for strong structures and mechanisms to support the clinician leaders to lead and execute on their improvement projects. Similar to the way that young saplings and seedlings need shade and trellises to help shape their growth, NHG leaders proactively developed supporting mechanisms to enable the culture of continuous improvement to take root and flourish. We will share with you the NHG CPIP Faculty structure and how we engaged senior clinical leadership and established a cadre of clinicians who were willing to assume the roles of facilitator, coaches and faculty. Learn more in Part 2 of the book.

METHODS AND TOOLS

Part 3 shows the Cycle of Improvement, illustrating the journey that participants undertake to complete their improvement project and some of the quality tools that participants learn to use during the improvement process.

OUR ORCHARDS AND CROSS-POLLINATION

By 2016, more than 1600 healthcare professionals from NHG, other healthcare institutions as well as NHG Regional Health partners have graduated from the CPI programme. These individuals have taken to heart the quality improvement culture and completed more than 1,000 improvement projects. Quality improvement has even been redefined as the process of creating change for better value and outcomes as "Everyone in Healthcare really has two jobs when they come to work every day: to do their work and to improve it".[1] The difficulty associated with instituting change cannot be underestimated.[2]

In Parts 4 and 5, you can read the personal accounts from our project leaders — their motivations, challenges and successes while they embarked on this journey is illuminating!

We hope that the sharing of our work and successful stories will be an inspiration to all who desire to improve patient care and their healthcare system.

A Warm Welcome to Our Orchards!

[1] Batalden P, Davidoff F. What is "quality improvement" and how can it transform healthcare? Quality and Safety in Health Care 2007;16(1):2-3. 45.
[2] Greenhalgh T, Robert G, Bate P, Macfarlane F, Kyriakidou O. Diffusion of Innovations in Health Service Organisations. A systematic literature review. Oxford: Blackwell, 2005.

PART 2

NURTURING THE SEEDLINGS

NHG CPIP DRIVER DIAGRAM

NHG needed to equip clinicians with quality improvement knowledge so that they could effectively make changes to the clinical care processes and systems for better patient outcomes. As with any other improvement strategy, an overarching theory of how to achieve this provided the course organisers with a clear map and pathway to achieve the desired outcomes. See Figure 1 for CPIP Driver Diagram.

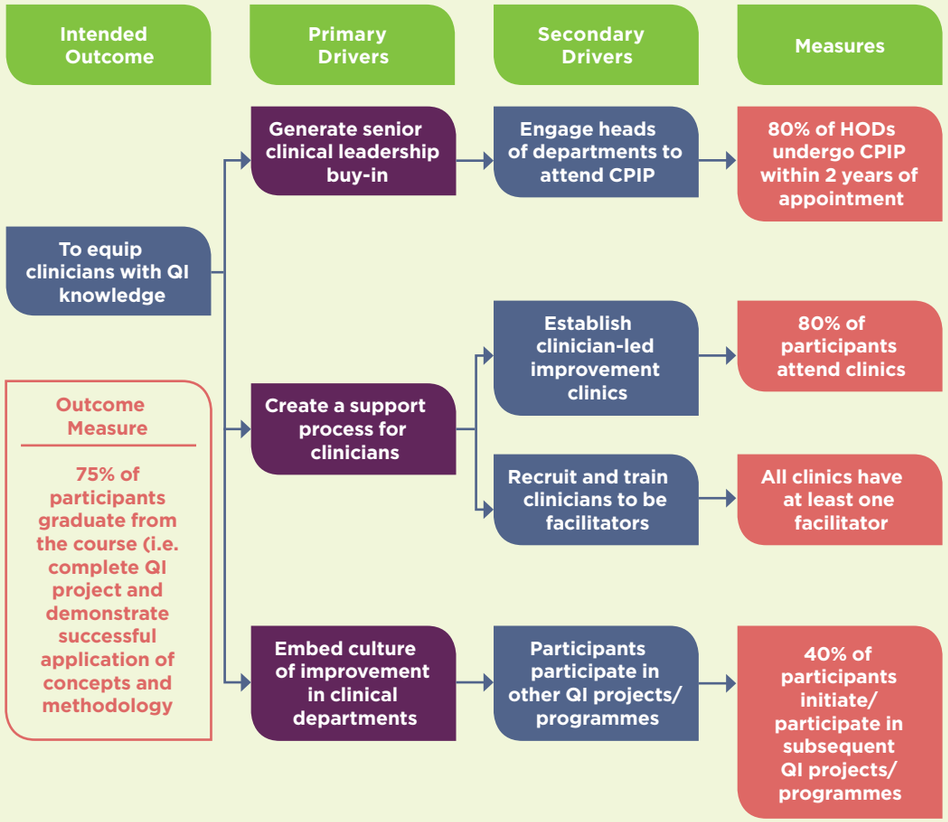


FIGURE 1: NHG CPIP DRIVER DIAGRAM

ENGAGING SENIOR CLINICAL LEADERSHIP

An executive decision was made to engage and train all senior leadership for NHG institutions, so that they understood the basic foundations of quality improvement and could support their staff involved in improvement projects. Board members and senior hospital executives also participated in a seminar, delivered by Dr Ross Wilson. They learnt about quality concepts and the CPIP course deliverables. Clinical Professor Chee Yam Cheng, who was then Assistant CEO (Clinical), NHG, was a strong supporter of the programme.

CPIP started during Mr Tan Tee How's time, with the one-day seminar by Dr Ross Wilson. We were trying to get buy-in from the Senior Management, especially after A/Prof Thomas Chee and Dr Kok Mun Foong shared their experiences as the first two who went for the training.

Dr Wilson was coming from an international level, and NHG wanted to experiment with more quality improvement tools and move forward. With the introduction of the Institute of Medicine's report "Crossing the Quality Chasm" and our Adverse Events Study (AES) at that time, convincing the clinicians that change and improvement was the way to go was not that much of a challenge.

CLINICAL PROFESSOR CHEE YAM CHENG
President, NHG College

In an effort to push CPIP forward as a movement to drive change and improvement, the first group to be trained was that of the Heads of Departments. All had to undergo the full course and complete an improvement project within six months. This set the tone and helped set the expectation that clinical leadership involvement was necessary to drive change management and clinical improvement.

I was fortunate to be nominated for the first CPIP as a young clinical leader (HOD) when the programme started. NHG and TTSH were on the verge of a great paradigm shift from the cottage-based personalised practice that was then healthcare, to a high reliability knowledge-based industry predicated on quality, safety and efficiency (standardisation).

As I participated in the journey from novice practitioner to faculty, and later as an Institutional leader and sponsor, one could see the benefits of the convergence between a bottom-up cultural shift in clinicians' mindset, and the top-down mandate to support this movement systematically throughout the organisation.

15 years later, our key opinion leaders in NHG have internalised its methodology, vocabulary, and mental models. Along the way, we have adopted a broader industrial-process (Lean) methodology and in recent times, a (re)orientation towards a service-culture and person-centred approach to the patients and their family under our care.

Now, we stand on the cusp of another paradigm shift, one in which the very institutions and models we have created for clinical excellence must be re-orientated or disrupted on a huge scale, to ensure its relevance and sustainability in the face of high cost, longevity, burden of disability, and the risk of global pandemics and large-scale disruptions. What will be CPIP's contribution for the future?

The challenge in the next 15 years of the CPIP will be to keep the journey fresh, and for each of us to discover new knowledge and reasons to improve systems, service and self.

ASSOCIATE PROFESSOR THOMAS LEW
Chairman, Medical Board, Tan Tock Seng Hospital, CPIP Batch 1

Great civilisations continue to be great because of systems and people in place.

First and foremost, CPIP is patient-centric. The tool makes the job intuitive for the ground, and lets us look at issues from the patients' point-of-view.

Secondly, it's a structured tool we use in our work — CPIP takes staff through all the steps within its methodology.

Thirdly, CPIP brings staff from different departments together. My project (Door-to-Needle) wouldn't have reached its level of success if not for Dr Lim Ghee Hian and Nursing Officer Ee Geok Kwee. We knew where our end point was, the "how-to" and the task of putting our interventions in place had the enthusiastic support of the team.

Over the past 15 years, the programme has shown that systems and people play important roles in creating change. Moving forward, I hope to see more open minds, listening to the ground, and more mentees seeking advice from willing mentors.

CLINICAL ASSOCIATE PROFESSOR EILLYNE SEOW
Senior Consultant,Tan Tock Seng Hospital, CPIP Batch 1

As a leader, or a person in a senior role, you need skills to deal with the problems you encounter. So, a leader with no tools to fix problems is not effective as a leader.

Before CPIP, processes could be improved but people didn't know how to do so in a systematic way and sometimes, changes that were supposed to make things better didn't really work. It was not until CPIP training became an integral part of NHG culture, that people started to see it as a very powerful tool for healthcare teams to make improvements. Practiced across many levels, CPIP continues to be relevant as we continue to find 'problems worth solving'.

We realise that having the ability to do CPIP is like bringing a bit of 'magic' to our day-to-day work; which really helps us improve on patient care and our work processes... And they don't teach you this 'magic' in medical or nursing school... not yet.

ADJUNCT ASSOCIATE PROFESSOR CHUA HONG CHOON
DGCEO (Clinical) NHG and CEO, Institute of Mental Health, CPIP Batch 14

FIGURE 2: PARTICIPANTS AT THE CLINICAL PRACTICE IMPROVEMENT WORKSHOP

PROGRAMME DESIGN AND SUPPORTING STRUCTURE

The NHG CPIP comprises five and a half training days with mandatory completion of a six month improvement project. The training commences with a three and a half day workshop, followed by two days of project reviews - the mid-point review (3rd month) and final review (6th month).

During the three and a half day workshop, participants learn about the Science of Improvement, quality improvement methods and tools, and the importance of change management to achieve the desired outcomes. Clinicans learn how to translate evidence-based medicine into reliable care processes. The pedagogy utilises a mixture of formal lectures, facilitated group work, interactive games, and group interactive discussions. Using a collaborative, peer-supported methodology, participants select an improvement project to work for the next six months.

Another unique feature of CPIP is the support structure for timely guidance at every stage of improvement. This supporting structure was developed at Tan Tock Seng Hospital and subsequently adopted by all the other NHG institutions. This support consists of a Pre-CPIP briefing to help participants identify a problem area for their project; a post-CPIP clinic to prepare participants with their newly formed teams; a pre-Midpoint Review clinic to review progress through the project's diagnostic journey and a pre-Final Review clinic to provide guidance on PDSA tests. These clinics are conducted by nominated past CPIP participants. They provide guidance and act as facilitators, mentors and coaches. See Figure 3 for CPIP Support Structure.

Participants who have demonstrated their ability to implement and execute on the improvement methodology at the six month mark will "graduate" from the CPIP course. After graduation, teams continue their intervention, and are encouraged to sustain their improvement for at least six to twelve months.

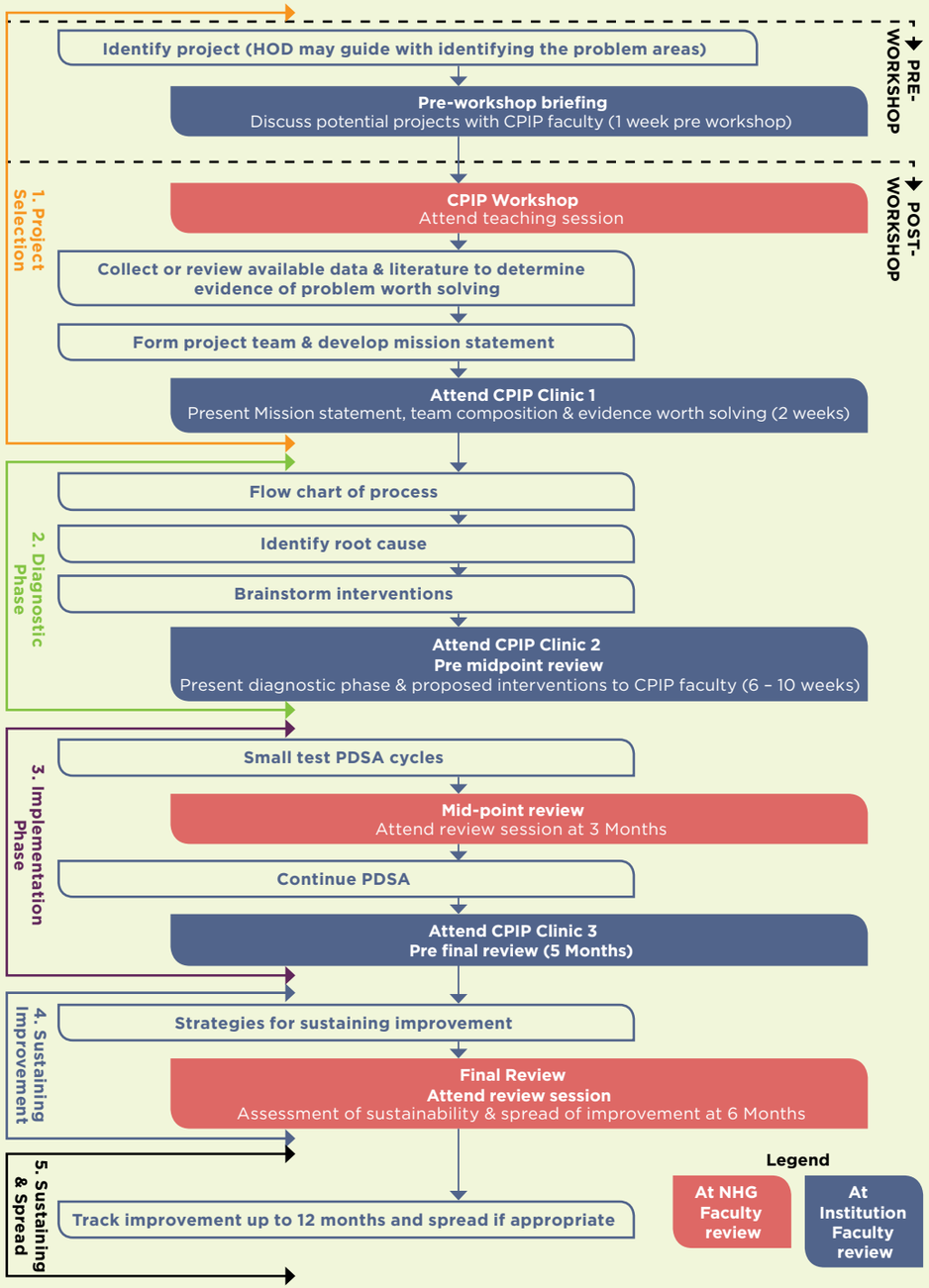


FIGURE 3: THE CPIP SUPPORTING STRUCTURE IN RELATION TO THE FORMAL CPIP TRAINING SESSIONS

COMPOSITION OF NHG FACULTY

The NHG CPIP Faculty comprises of senior clinicians who have undertaken the CPIP journey and have been inspired to contribute by passing on the improvement knowledge and skills to other clinicians. The roles of the faculty are:

- To play a significant role in delivering each CPIP course and help ensure that participants can successfully acquire improvement capabilities through their improvement project.
- To identify good projects for spread and encourage learning across NHG institutions.
- To ensure that the CPIP curriculum is updated and kept current with international developments and knowledge base.
- To develop future capacity, capability and sustainability for improvement by ensuring a pipeline of new facilitators and faculty.

With buy-in from leadership, nurturing processes and supporting mechanisms, CPIP was able to expand and grow in a few short years and became a key clinical training program especially for clinician leaders.

I am impressed with the CPI methodology for its intuitive, and yet logical and systematic approach to quality improvement.

I find that one can potentially do a lot of good with a well-executed CPIP, especially when it is spread to other teams and across similar clinical settings. When teams achieved positive outcomes, they are frequently motivated to push on in their journey of continuous improvement.

After my own project, I was given the privilege to work as a facilitator. It gives me great satisfaction of being able to share with others the joy of quality improvement.

DR TUNG YEW CHEONG
Director, Quality and Patient Safety, NHG Polyclinic, CPIP Batch 17

CPIP's relevance came with the focus on clinical practice. While it served as a tool to help us deliver better care to our patients, it also taught us about thinking out of the box and cost reduction.

The idea of PDSA, Pareto charts, and other basic quality improvement tools were quickly embedded in NSC, and gave us a good avenue for collaboration across levels and departments.

DR LEOW YUNG HIAN
Senior Consultant, National Skin Centre, CPIP Batch 8

PART 3

METHODS AND TOOLS

SUSTAINING IMPROVEMENT

- ONGOING MONITORING OUTCOMES
- FUTURE PLANS

Specific steps must be taken to implement successful tests and to sustain the changes over time.

IMPACT

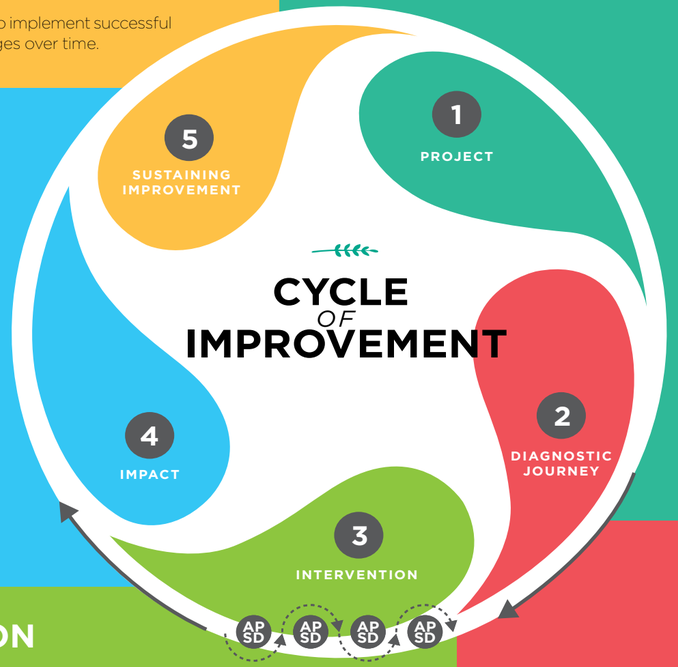
- ANNOTATED RUN CHART
- SPC CHARTS

Teams need to quantify the impact of changes to ascertain that the intervention has resulted in improvement. This is where the project measure needs to be tracked, analysed and reported to substantiate improvement. Additional data or information may also be collected and reported, e.g. cost impact data, staff and patient satisfaction with the new processes.

INTERVENTION

- PLAN A CHANGE
- DO IT IN A SMALL TEST
- STUDY ITS EFFECTS
- ACT ON THE RESULTS

Once the potential solutions are identified, teams come up with specific interventions, test these solutions until they have found a successful approach to mitigate the problem. The CPI model is based on a rapid, small cycle "testing and learning" approach i.e. the Plan-Do-Study-Act (PDSA).



PROJECT

- MISSION STATEMENT
- PROJECT TEAM

The first phrase, to start the improvement process, is to decide on the problem to work on, develop a formal Mission Statement and establish the project measure.

MISSION STATEMENT

i. What is the problem?
- Identify problematic clinical process that requires improvement based on data or other available evidence.

ii. Is the problem worth solving?
- Is the problem of a high priority area, of sufficient importance or magnitude so that the decision to embark on solving it is clear.

iii. Who else think is the problem?
- Are there other staff who are convinced that this problem should be tackled?

Develop a Mission Statement or aim using "SMART — Specific, Measureable, Appropriate, Results-oriented and Time-scheduled", and identify a "stretch goal" that is attainable, yet presents a significant challenge. Reference to good practices and best performing organisations elsewhere can help the team to make the difficult decision on what target to aim for.

PROJECT TEAM

i. Organising a team to drive improvement must consider three types of expertise and responsibilities
- Senior leadership, day-to-day leadership and technical expertise

ii. Some of the important attributes of a team and its members include:
- Multi-disciplinary
- Involved in the process, equipped with core knowledge
- Engaged, willing and adaptable
- Have mutual trust among members
- Have a shared mental model

DEFINE THE PROJECT MEASURE

What is the measure for the overall project that is linked to the Mission Statement.

DIAGNOSTIC JOURNEY

- CONCEPTUAL FLOW CHART
- BRAINSTORMING/OBSERVATION/TALLY SHEET
- AFFINITY
- FISHBONE
- PARETO CHART
- BASELINE DATA
- SPC CHARTS

During this phase, the team will have to establish a good understanding of the problem, and ascertain the causes and potential solutions to the problem.

METHODS AND TOOLS

The NHG CPIP aims to equip participants with the tools and skills to improve the quality of patient care systematically by defining patient care processes, prioritising opportunities to improve the care, as well as using diagnostic techniques, statistical process control and effective team management skills to harness individuals with fundamental knowledge of the care process to design intervention. In the following page, the Cycle of Improvement depicts the five phases in the improvement journey. It will offer you an understanding on the fundamentals of quality improvement and the basics of improvement methodologies and tools used.

PART 4

WELCOME TO OUR ORCHARDS

LESSONS FROM OUR PROJECT OWNERS

WELCOME TO OUR ORCHARDS

CPIP owes its success to its unique ability for clinician leaders to appeal to and engage fellow clinicians and healthcare professionals. CPIP as an educational tool has so far enjoyed successes in introducing and teaching quality improvement to clinical leaders in NHG.

The training course has adapted traditional improvement methodology and sciences to fit the training, values and language of the healing professions. It focuses largely on the science of improvement and their applications in clinical settings, to improve patient care without relying on the language of frequently changing and rapidly re-packaged industrial quality control teaching methodology.

QUANTITATIVE ACHIEVEMENTS

At the end of the 15-year journey, the NHG Clinical Practice Improvement Programme achieved the target of 75% participants who completed their projects (Figure 1).

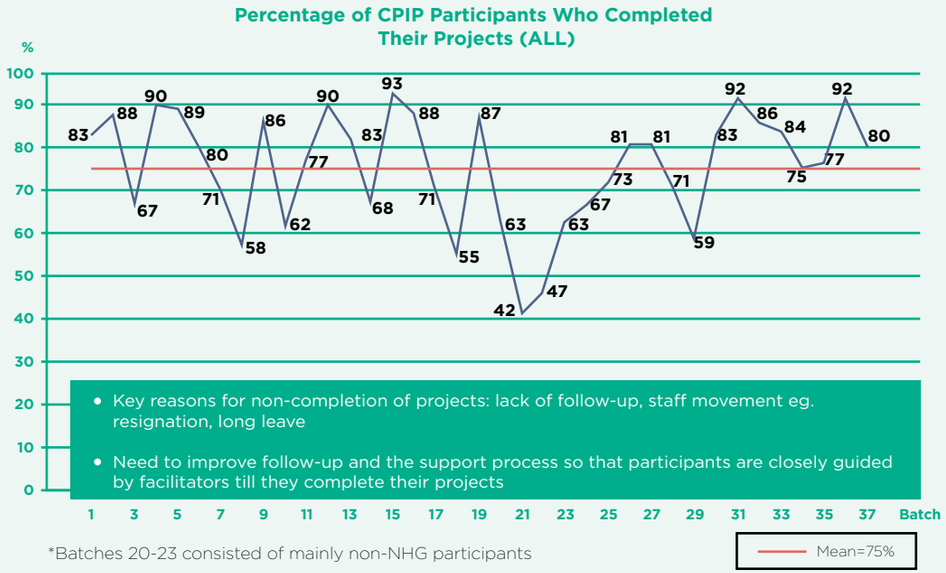


FIGURE 1: QUANTITATIVE OUTCOMES OF 15-YEAR NHG CLINICAL PRACTICE IMPROVEMENT PROGRAMME.

AWARDS AND RECOGNITION

In 2006, Dr Tai Hwei Yee, then Assistant Chairman, Medical Board (Clinical Quality and Audit), Tan Tock Seng Hospital, submitted a poster "CPI programme — a Journey of Excellence" to the Hospital Management Asia Conference. In her submission write-up she said "For CPIP to succeed in any healthcare setting, a strong mandate from leadership is very important. Management or leadership participation is crucial to get buy-in from the rest of the healthcare workers. Support, encouragement and guidance should be given to clinicians who are involved in doing the projects". This poster went on to win the 'Most Outstanding' Award for the "Patient Safety/Quality Medical Care" category (Figure 2).

FIGURE 2: TEAM WITH THE WINNING POSTER "CLINICAL PRACTICE IMPROVEMENT PROGRAMME – A JOURNEY OF EXCELLENCE"

Over the 15 years, numerous CPIP projects have been presented at international quality conferences and a number have also been published in peer-reviewed journals. The opportunities to share NHG's results and best practices and improvement experiences with the healthcare community has promoted cross-fertilisation of ideas and created a sense of achievement in our clinicians. The CPIP has enabled NHG to plant a culture of continual clinical quality improvement and has empowered a critical mass of clinician champions throughout our institutions to take the lead in projects that significantly impact on safety and quality of care.

CPIP JOURNEY MILESTONES

2001 START

- A/Prof Thomas Chee and Dr Kok Mun Foong attended the 4th New South Wales CPIP in Sydney

2002

- A/Prof Quek Swee Chye, Dr William Chan and Dr Goh Poh Sun attended CPIP in Sydney
- NHG senior leaders were introduced to CPIP through a workshop conducted by Dr Ross McL Wilson in Singapore and this kick-started CPIP in NHG
- CPIP was officially launched in March and the first course was held at Jurong Bird Park

2004 TO 2005

- Inclusion of participants from SingHealth and private hospitals (Parkway Health and Raffles Medical Group)
- "Spread and Sustainability of Successful Practice Improvement" workshop was conducted by Dr Ross McL Wilson

2006

- Formation of NHG CPIP Panel, Teaching Faculty and Institution Faculty
- Initiated NHGP CPIP Facilitator workshop to build capability in facilitation skills
- Introduction of "Best Practice" and "Sustainability" Awards
- More than 30% of senior doctors were trained in CPIP

2006 TO 2007

- Spread of successful projects: (i) Reducing incidence of IV Peripheral Phlebitis (ii) Warfarin management (iii) Reducing door-to-balloon time for patients with AMI
- Formalised the supporting processes for pre-workshop preparation and post-workshop follow up clinics

2007 TO 2008

- Production of "Best Project" videos
- Publication of "Embracing Clinical Practice Improvement: A Tribute" for organisational learning

2009

- Inclusion of participants from community hospitals
- Local faculty took over teaching of CPIP with the withdrawal of Dr Ross McL Wilson as Faculty
- Local faculty went on a study trip to attend CPIP conducted by South Australia Health, Australia

2010

- CPIP Faculty collaborated with Temasek Foundation to conduct three CPIP courses in Thailand attended by senior nursing leaders, lecturers and nurses from three universities and their affiliated hospitals
- Staff from National University Hospital and SingHealth Services were invited to be part of NHG Faculty.

2011

- Inclusion of participants from Jurong Health Services.
- Publication of QI Toolkit handbook

2012

- Celebration of CPIP 10th year

2013

- Total of 1,393 participants trained across 33 batches and 997 projects completed
- Conducted 1st Advanced Facilitator workshop

2014 TO 2015

- Collaborated with AIC to conduct Patient Safety and QI Toolkit workshops for day care centres and nursing homes
- Commenced Technical Mini Courses for CPIP facilitators

2016

- Celebration of CPIP 15th year

LESSONS FROM OUR PROJECT OWNERS

ACCESS TO CARE

THE DETECTIVE AND HIS LABORATORY INVESTIGATORS

Glomerular filtration rate (GFR) is a test to measure your level of kidney function and helps the doctor to determine stages of kidney disease and plan subsequent treatment. GFR is derived from the results of patient blood creatinine test, with age, body size and gender. The lower the rate is, the lower the kidney function, and patients need to be referred for renal specialist assessment as soon as possible.

BACKGROUND

At Choa Chu Kang (CCK) Polyclinic, Dr Florencio Santos III was concerned with patients who had deteriorating renal function. Patients who have a GFR score below 45 need to have further renal assessment and treatment. There was varying practice amongst his fellow colleagues in referring to a renal specialist for further assessment and treatment.

Dr Santos referenced the 4th Edition NHGP Clinical Guidelines for Primary Care and the Caring for Australians with Renal Impairment (CARI) guidelines in his project to ensure evidence-based care was provided to patients. Using the criteria from these guidelines, he collected data for a period of 10 weeks in 2011. The results of the audit showed that 44% of eligible patients with renal impairment were not referred for renal specialist assessment.

MISSION STATEMENT

To increase the percentage of eligible* Chronic Kidney Disease (CKD) patients at Choa Chu Kang Polyclinic referred to renal specialist from 60% to 100% within six months and to ensure that patients referred receive specialist care.

* Eligible patients are defined as:
CKD Stage 3B, GFR<45, age<60 years old
CKD Stage 4 and 5, at any age

With the encouragement of his Heads — Drs Richard Hui and Yehudi Yeo, Dr Santos formed a multidisciplinary team to improve the referral rate. His team comprised a senior family physician, a senior staff nurse/care manager, the CCK laboratory manager, a patient service associate (PSA) from the referral counter, with the heads of CCK as project sponsors.

Upon seeing any issue, I now tend to question why processes are happening the way they are, and look into the root causes of problems before thinking about the solution.

DR FLORENCIO SANTOS III

Resident Physician, Choa Chu Kang Polyclinic, CPIP Batch 28

REVIEWING THE PROCESS

A staff survey was conducted to gain insight into the practices and perception of fellow colleagues on what were the underlying reasons why patients who fit the criteria were not referred to a renal specialist.

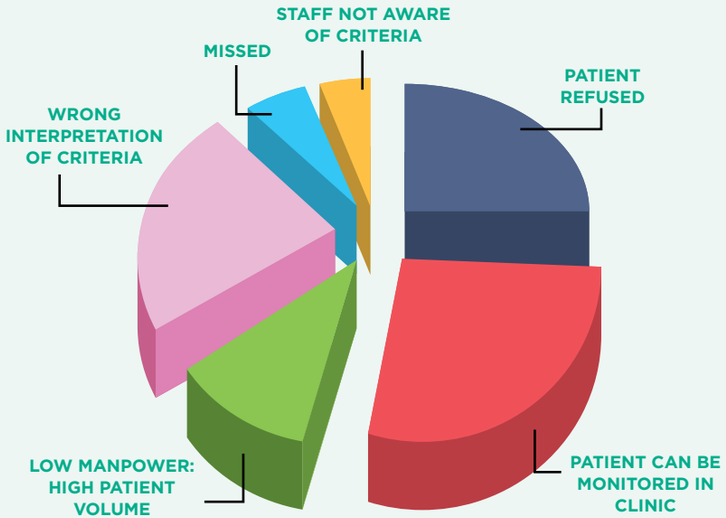


FIGURE 1: REASONS FOR NON-REFERRAL

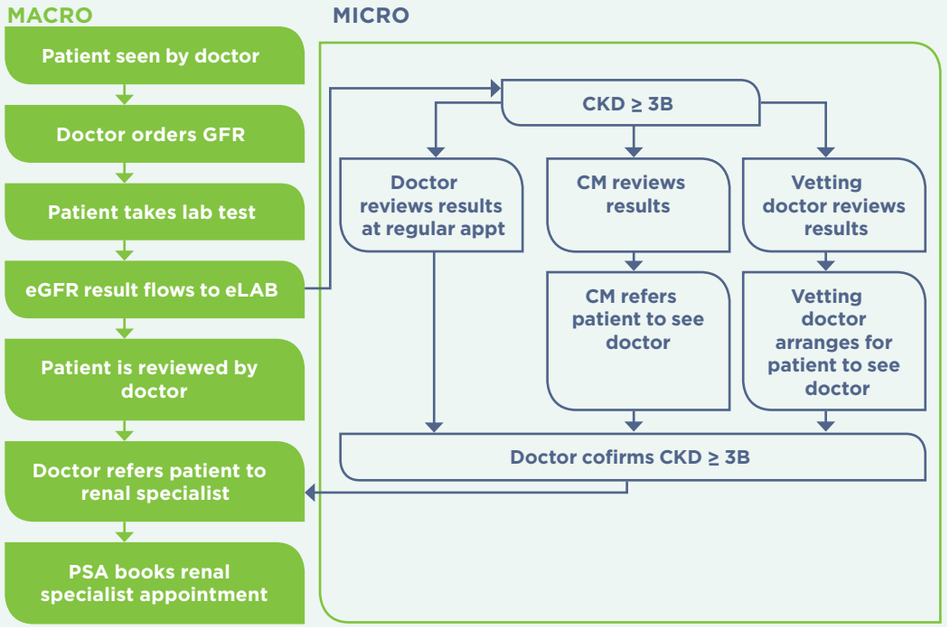


FIGURE 2: A PROCESS FLOW CHART WAS CONSTRUCTED TO EXAMINE CCK POLYCLINIC'S CURRENT PROCESS OF PATIENT REFERRAL.

INTERVENTIONS

1. On a daily basis, approximately 1,500 laboratory results were electronically reviewed by a single vetting doctor, and an abnormal GFR results might be missed. The team worked with the Diagnostics Laboratory to explore if the "Renal Tag" in e-Lab in CCK Polyclinic could be improved to incorporate abnormal GFR results less than 45mmol/l so that the results were flagged out for the doctor to review. Within two months of introducing this intervention, NHGP management caught wind of this idea and supported the Renal Tag change to be rolled out to all other eight NHG Polyclinics.
2. To improve knowledge of CKD guidelines, the team gave a series of briefings to all clinical staff during clinic meetings. The guidelines were also communicated and reinforcement by the Head of CCK Polyclinic to all doctors. Additionally, the team provided internal consultation via Skype/phone calls and personal reminders to doctors who were found to have missed referring eligible patients.
3. Abnormal GFR was incorporated into NHGP Guidelines for Reviewing Abnormal Results which required the vetting doctors to highlight and document the abnormal GFR finding in the "Important Notes Section" of the electronic medical record and allowed for follow-up to ensure the appropriate referral is done.

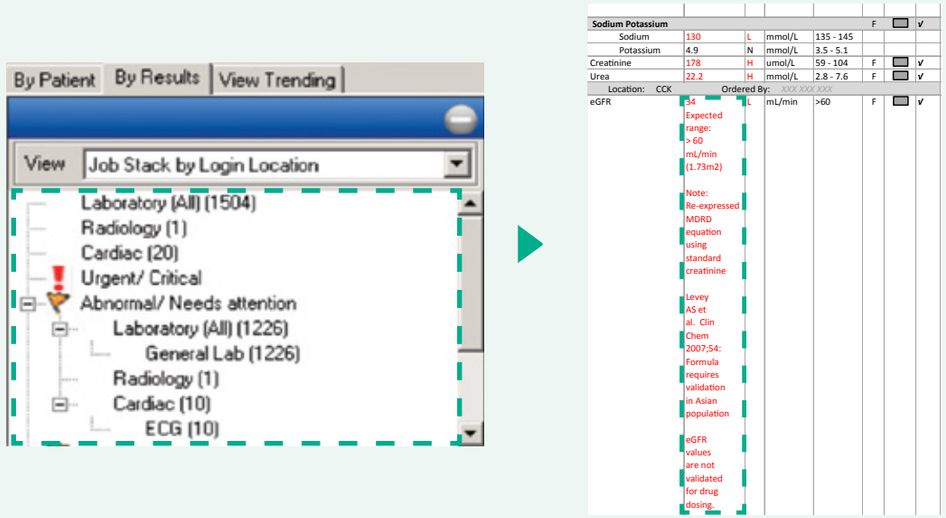


FIGURE 3: RENAL TAG IN THE SYSTEM FOR ABNORMAL GFR < 45 MMOL/L

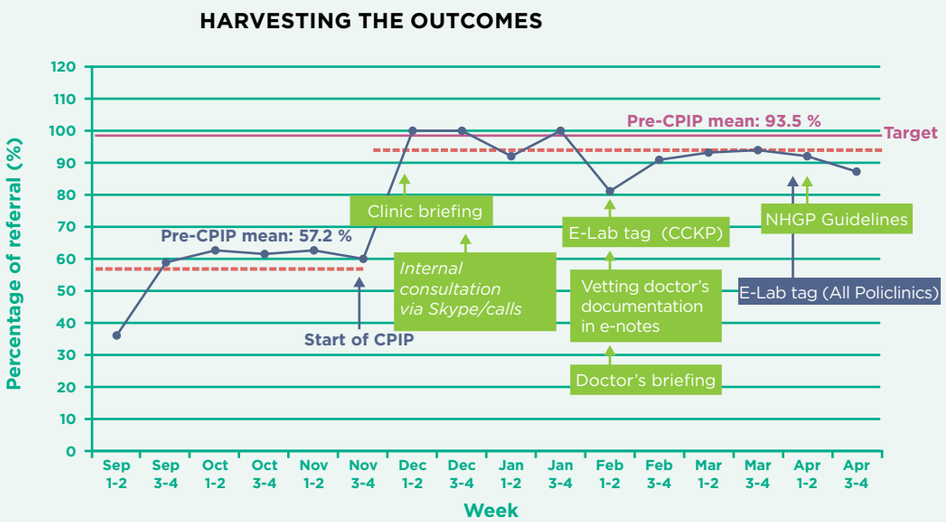


FIGURE 4: REFERRAL TO RENAL SPECIALIST

As a result of the team's efforts, 93.5% of patients with abnormal GRF were referred to a renal specialist, from a baseline of 57.2% (Figure 4). Dr Santos and his team also tracked the status of patient outcomes and whether the new referrals were actualised at the Renal Clinic. As a result of the improved referral process from CCK Polyclinic, a new Renal collaborative program with National University Hospital was started to upskill polyclinic doctors with better information and updates.

Praising his supportive team, Dr Santos highlighted the laboratory staff's assistance in data collection and implementation of the red Renal Tag intervention. Many of the laboratory staff expressed satisfaction in achieving a greater contribution to patient care. The Heads of CCK Polyclinic also supported and shared his idea of the Renal Tag with NHGP senior management and garnered support for this to be implemented across all nine NHG Polyclinics.

Training and refresher lectures on referral procedures and providing feedback on over-referrals were ways to sustain the change. The system for laboratory alerts was a simple but extremely helpful change as a marker due to the sheer volume of laboratory results. Dr Santos continues to contribute as a team member or advisor to other NHGP CPIP teams. Most recently, he has been looking at ways to incorporate closed loop communications in the event of urgent cases and critical laboratory results.

> If patients are referred late, they're treated late, especially with referral dates being hard to come by. Our strongest resistors were generally patients who have already seen a renal specialist or are generally stabilised. Therefore, communicating with them about their health is important — using phrases like "improve kidney life" and "avoid dialysis" helps the patient understand their situation better.

DR FLORENCIO SANTOS III

Resident Physician, Choa Chu Kang Polyclinic, CPIP Batch 28

A DECEPTIVELY SIMPLE ISSUE

Progressive foot problems can affect up to 90% of patients inflicted with Rheumatoid Arthritis (RA). For people with inflammatory arthritis, the involvement of the feet, even to a mild degree, is a significant marker for future impaired mobility, functional incapacity and negative psychosocial impact. Early podiatry intervention is recommended to improve long-term outcomes; reducing pain, maintaining function and preventing deformities, and all patients with RA and foot problems.

FIGURE 1: KATE CARTER AND HER TEAM

> CPIP is a good tool to build relationship and so many research projects and ideas were spurred after the project was done. One of the key elements I picked up was that small, simple steps can help to give you the information you need to test things quickly. People are usually happy to help if you engage and take that first step.
>
> MS KATE FRANCES CARTER
> *Senior Podiatrist, National University Hospital, CPIP Batch 37*

BACKGROUND

Kate Carter, a Senior Podiatrist in the National University Hospital (NUH), discovered that their Podiatry Clinic sees less than 8% of their total number of RA patients. Kate said, "The criteria for potential patients, appropriate for referral to podiatry, were those with current or previous foot problems such as foot pain, swelling and deformity. After observing the processes across clinics, our team found that non-adherence to international guideline recommendations, coupled with patient resistance, made the issue worrying".

Kate formed a team within the NUH Rehabilitation Department and Department of Medicine. With her team members that included doctors, research nurses, podiatrists and physiotherapists, they decided to tackle the problem.

MISSION STATEMENT

To increase referrals of patients with Rheumatoid Arthritis to podiatry from 8% to 32% at the One-Stop Arthritis Clinic at the National University Hospital within six months.

REVIEWING THE PROCESS

The team went through their workflow and gathered feedback from staff and patients. They found a few gaps in their system. Firstly, they found that there were no formal guidelines for clinicians and no formal workflow in referring patients with RA to podiatry. Secondly, the team found that there was a lack of patient awareness to the potential severity and progression of their foot problems. On further investigation, the team discovered there were patient's concerns about costs for the podiatry consultations.

INTERVENTIONS

To tackle the lack of patient awareness, Kate and her team raised awareness of foot-related complications at the One-Stop Arthritis Clinic through various mediums. Educational leaflets and posters were made available in the waiting areas. Podiatry fact sheets and foot-care checklists, an article on the importance of foot care in Lianhe Zaobao newspaper, and a video about a patient's experience playing in the waiting area were some of the comprehensive steps to promote patient awareness on the issues requiring podiatry services in the clinic.

FIGURE 2: CLINIC POSTER AND MEDIA CREATED TO SPREAD AWARENESS OF THE ONE-STOP ARTHRITIS CLINIC

Patients at the One-Stop Arthritis Clinic were given adequate time to discuss their treatment plan with the medical staff, making their care plans individualised. Kate and her team also addressed the cost concerns for her patients. A bundled payment package deal was set up to reduce the total cost for patients. The package included assessment, health education and treatment, as indicated, by the full multi-disciplinary team (MDT) and it also helped to increase patient involvement in their care plan.

A formal workflow was established to screen and identify potential RA patients who were eligible to be referred to a podiatrist (for same day walk-ins/referrals) streamlining the health screening process for both staff and patient. This also included:

1. An additional question about foot pain being inserted in the patient questionnaire at the self-screening stations (tapping into an existing project studying patient reported outcomes).
2. A referral pathway to podiatry with a new screening form at the Patient Service Assistant (PSA) stations making it easy for the doctor to indicate suitable patients for same day referral. A doctor can also use the screening form to indicate that the patient needs to see a podiatrist on the next clinic visit.
3. PSA work stations and designated podiatry, physiotherapy, and occupational therapy work rooms were re-located together to support the new, formalised workflow. Members of the MDT were previously floating between clinics, but designated consult rooms improved the efficiency and coordination of the patient flow between rooms. With this change it was easier for them to improve micro-processes within the flow chart.

As there were no formal guidelines for the management of foot health for RA patients, Kate and her team set out to develop the guideline and subsequently disseminated to the multi-disciplinary team in NUH and to other podiatry teams across Singapore. Kate was subsequently invited to join the Ministry of Health's national workgroup to produce RA clinical practice guidelines, which is still ongoing as of this book's publication.

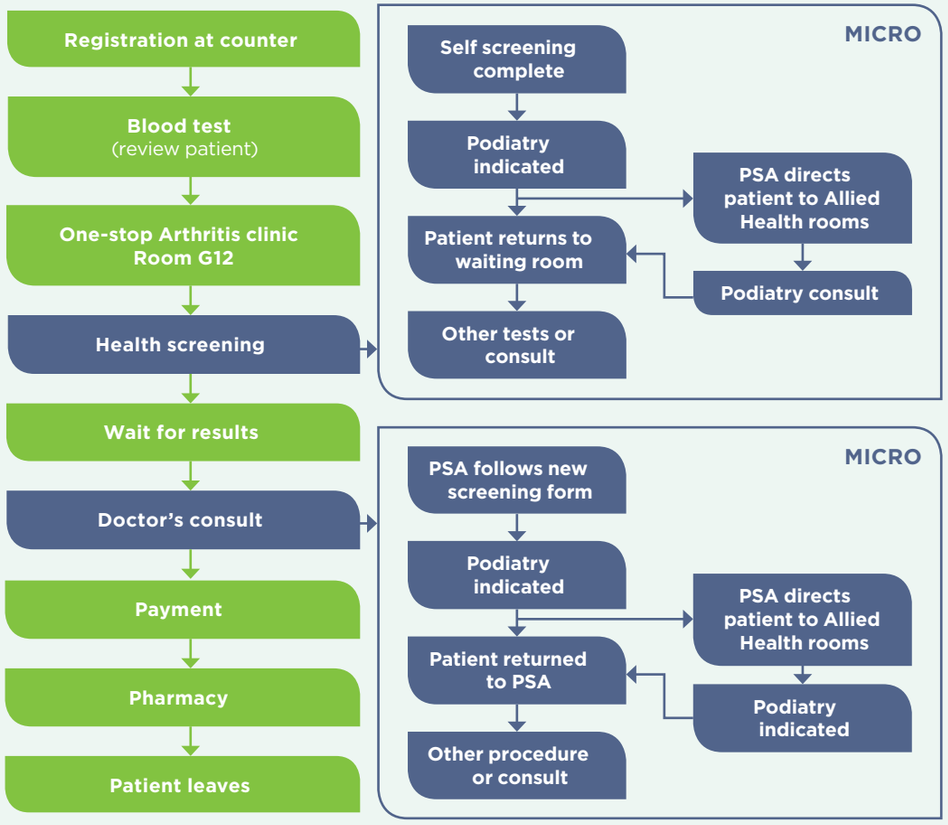


FIGURE 3: FLOW CHART DEPICTING THE IMPROVED PROCESS

HARVESTING THE OUTCOMES

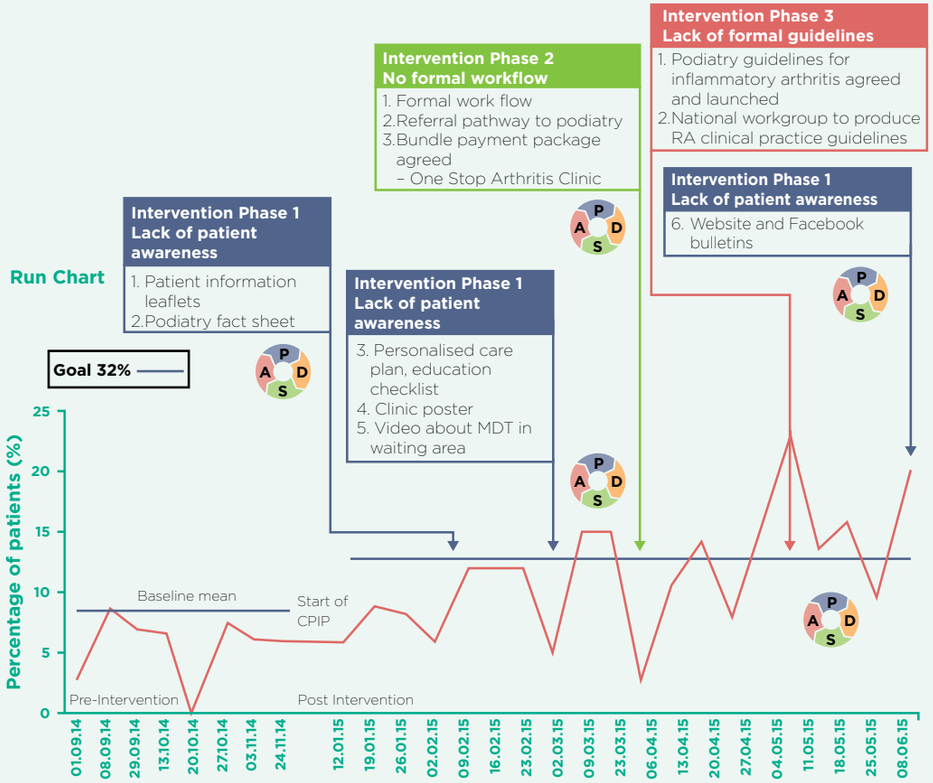


FIGURE 4: OVERALL INCREASE IN RA PATIENTS SEEING THE PODIATRIST FOR APPROPRIATE CARE

Although the team did not reach their target within the first six months, they persevered. With the launch of the payment package, they finally managed to hit their target of 32% referrals. Reflecting upon her experience, Kate realised that resistance from patients arose from lack of knowledge and awareness. With their interventions, patients now have a better awareness and can be involved in their own care.

> We had to break down our working silos and work together to give our patients a more well-rounded care package. I was apprehensive about approaching patients to ask for their feedback, but after taking the first step, we were pleasantly rewarded with the comment that our patients feel cared for.

MS KATE FRANCES CARTER

Senior Podiatrist, National University Hospital, CPIP Batch 37

Kate has the opportunity to present this project's poster at the BMJ Forum in 2016. On top of that, she continues to support research initiatives sprouting from this current project.

LESSONS FROM OUR PROJECT OWNERS

PATIENT-CENTRED CARE

KEEP CALM AND CARRY ON

Healthcare systems and healthcare providers around the world face constant challenges to be patient-centric in their care delivery. Dr Tey Hong Liang's group of patients were pre-school children undergoing cryotherapy. He observed that his young patients exhibited high anxiety during the treatment in National Skin Centre (NSC). The anxiety faced by these children often lead to their refusal of treatment and also resulted in frustrated parents and care providers.

> You'd have kids who delay treatment by saying "Wait! Wait!" to no end. It is the fear of experiencing pain, rather than the actual discomfort itself, that scares them, and a vicious cycle builds up during a treatment course which requires repeated visit. If we were to take away the apprehension and reduce their anxiety, they would go through the procedure with the experience that 'it is not really that painful after-all'.
>
> DR TEY HONG LIANG
> *Consultant, National Skin Centre, CPIP Batch 26*

In 2011, Dr Tey and Irene Lim, then Manager, QRM, NHG set out to manage anxiety with this group of paediatric patients.

MISSION STATEMENT

To reduce the percentage of children two to six years of age having high anxiety prior to performing cryotherapy for viral warts in a general dermatology clinic from 89% to 50% over three months.

BACKGROUND

Cryotherapy is a treatment for viral warts and it involves the administration of liquid nitrogen to freeze the tissue. While discomfort and some pain is common during this treatment in all patients, children can get particularly distressed by the procedure and can refuse to undergo the procedure. The problem is compounded, particularly when the treatment regime may be at weekly or fortnightly intervals. Parents and caregivers are also negatively affected and may face a wasted trip if the child refuses treatment. Children and parents who are in the adjacent room waiting for their turn are also adversely influenced. Staff faced delays and longer time for completing procedures when children have to be coaxed for a long time.

REVIEWING THE PROCESS

Dr Tey and his team evaluated the children's anxiety level, using a modified Yale Preoperative Anxiety Scale (mYPAS). The scoring matrix comprises of 22 items in five categories (activity, vocalisations, emotional expressivity, state of arousal and use of parent) where a score of more than 30 or above is defined as high anxiety. Their baseline measurements revealed that the mean pre-procedure anxiety was 56. 89% of children between two to six years had a score of 30 or above, signifying high anxiety. The average time taken for each treatment was 16.3 minutes, with 33% of the children require coaxing and 22% requiring forceful restraining by their caregivers.

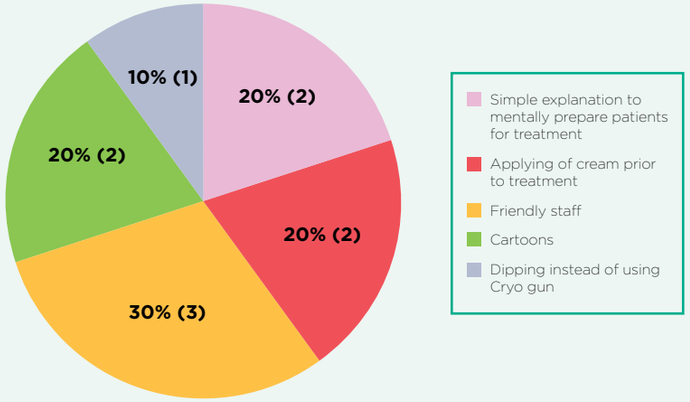


FIGURE 1: SUGGESTIONS FROM CAREGIVERS

INTERVENTIONS

After their investigations, the team identified root causes leading to the problem of high anxiety levels in the patients. These were attributed to non-paediatric trained staff lacking knowledge and skills in handling paediatric patients and their caregivers, the children's fear of unknown, inappropriate parenting skills during treatment, and the equipment used being not child-friendly. The team decided to test the following ideas to address these causes:

- Assign paediatric-trained nurses who have experience in performing the cryotherapy procedure.
- Use of DVD player to play children's programmes during the procedure.
- Decorating the cryotherapy spray with cartoon stickers.

Dr Tey and his team planned to shift the children's focus away from the perceived pain using the concept of distraction by playing children's TV programmes or movies during the treatment. However, they had to overcome some constraints. "Depending on the location of the wart, the child will have to be placed in different positions for treatment. Such variability in positioning meant that they may not be able to see the television screen well," Dr Tey said. "In addition, we didn't have the resources to install a television and video player in every consultation room." The team's solution was to bring in a portable video player, which allowed for flexibility in accordance to the patient's position during treatment. The intervention was found to be effective and with further engagement of the patients' caregivers to learn of the child's preference for the type of video programme, the success rate was higher.

FIGURE 2: CHILD PATIENT WATCHING CARTOONS ON DVD

FIGURE 3: PASTING OF CARTOON STICKERS ON THE CRYOTHERAPY SPRAY

> Our nurses can effectively engage the children with the intervention. Now, we are engaging parents to install their children's favourite videos in their own mobile devices before they come for treatment.
>
> DR TEY HONG LIANG
> *Consultant, National Skin Centre, CPIP Batch 26*

HARVESTING THE OUTCOMES

During their six-month long project, the percentage of children with high anxiety scores reduced from 89% to 29%. The average time taken for each cryotherapy treatment decreased from 16.3 to 12.8 minutes, i.e. an average reduction of 3.5 minutes (21% reduction) per treatment. Concurrently, the number of children who required coaxing to go for their treatment fell from 33% to 19%. The benefit was further observed with the proportion of children receiving forceful restraint by their caregivers during treatment being reduced from 22% to 8%. Overall, the treatment process was observed to be less traumatic and less anxiety-inducing for the patients, parents and providers.

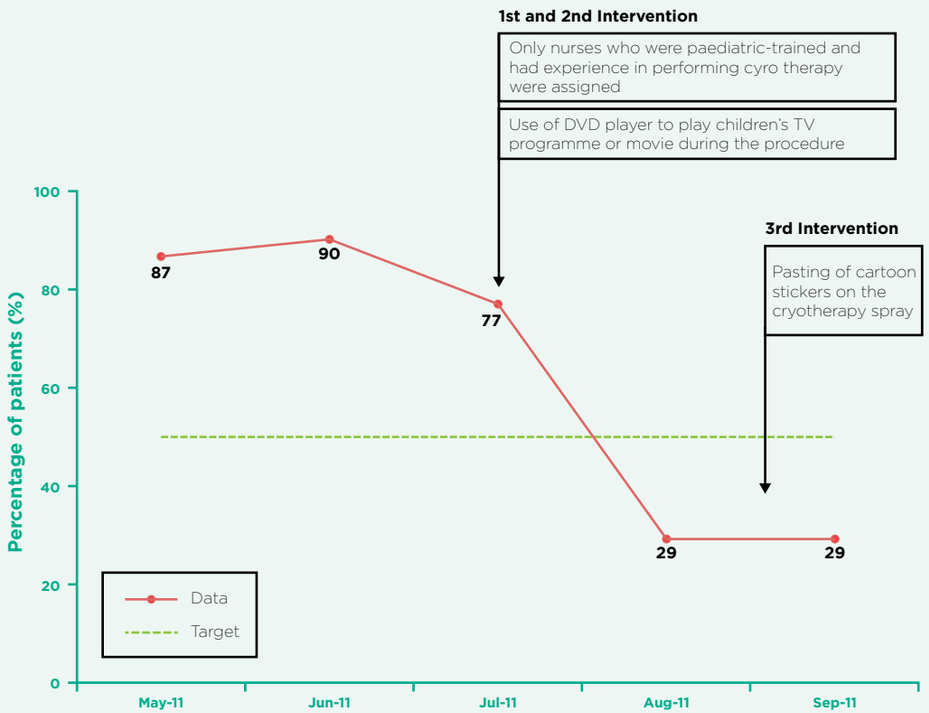


FIGURE 4: PERCENTAGE OF PATIENTS WITH HIGH ANXIETY SCORE

Dr Tey's team was able to achieve the improvement in their work processes with the assistance of the nurses and patients' caregivers. Subsequent to the interventions, they also found that cryotherapy can be administered to children of younger ages.

With engagement of parents to make use of their mobile devices, cryotherapy treatments are not restricted to rooms with a TV. Showing children their preferred videos proved to be a very useful approach in improving the treatment process in children.

Dr Tey and his team's article on how pre-cryotherapy anxiety level in children was reduced, was published in JAMA Dermatology in 2012. This project caught the attention of the media and has been featured on international channels, including REUTERS. "Simple solutions can make a real difference." said Dr Tey, who has since gone forth to help facilitate other improvement projects in NSC.

KEEP ME DRY

IMH's patients sometimes have different care needs which require staff to be vigilant and innovative in order to address their patient's needs. Nurse Clinician Yong Kit Kit looked for a solution to reduce the number of wetting episodes in ambulatory patients, thus alleviating their discomfort. The use of adult diapers in psycho-geriatric wards is a common practice with many of the elderly patients having urinary incontinence. However, prolonged use of diapers on aged skin can cause skin breakdown and infections, discomfort and a state of over-reliance.

> I was very happy to have completed the project. We had good feedback from the caregivers, and our patients have learnt to take more initiative. General morale has become better and our patients are happier.

MS YONG KIT KIT
Nurse Clinician, Institute of Mental Health, CPIP Batch 25

BACKGROUND

Nurse Clinician Yong Kit Kit felt it was possible to have elderly patients who are ambulant reduce their use of diapers as well as their number of wetting episodes. Patient's safety and comfort would be improved as their toileting needs are met (as body is dry and free from urine odour, skin breakdown and infection). In addition, less wetting episodes might mean less work for nurses in changing patient's trousers, and impacting on costs of care.

MISSION STATEMENT

To reduce the number of wetting episodes in ambulatory patients with urinary incontinence in a long stay psycho-geriatric ward (Ward 66B) in the Institute of Mental Health by 50% in 6 months.

REVIEWING THE PROCESS

Kit Kit gathered a team of nurses to review the process. The team tracked 10 ambulant patients and found there was an average of 79.1 wetting episodes per patient per week.

DAY \ PATIENT	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸 /	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 /	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸 /
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7	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸 /	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 /	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 / /	𝍸 𝍸 𝍸 𝍸 /
TOTAL	84	77	84	70	77	84	84	70	84	77

FIGURE 1: USE OF TALLY SHEET TO CONDUCT REAL-TIME OBSERVATIONS OF WETTING EPISODES A DAY FOR INDIVIDUAL PATIENTS

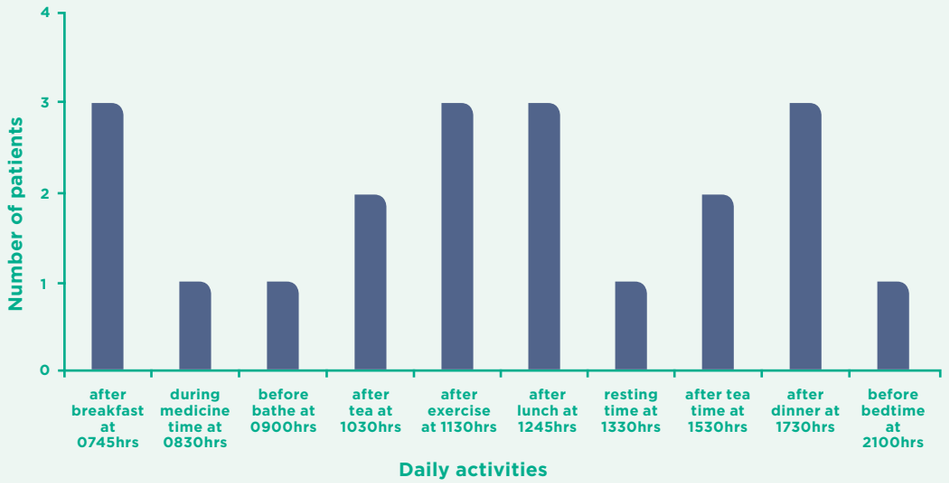


FIGURE 2: TRACKING NUMBER OF PATIENTS WITH WETTING EPISODES DURING DAILY ACTIVITIES

INTERVENTIONS

The main issues for these wetting episodes stemmed from (1) the lack of a robust process for scheduled toileting, (2) means of communication with patients, and (3) knowledge by staff.

The team first started by ensuring ambulant patients were not using diapers. They made sure that the wet trousers were changed promptly during any episode of incontinence. They implemented a standardised two hourly regime to pro-actively bring their patients to the toilet for their toileting needs. These interventions resulted in fewer wetting episodes for their patients. However, it was also apparent that a smaller group of patients continued to face challenges. Further analysis lead to the team implementing prompted voiding and use of visual cues. For patients who were unable to communicate toilet needs, they were prompted to go toilet in between the daily activities at shorter intervals (1.5 hour toileting schedule).

All new staff to the ward were educated on the MOH Nursing Clinical Practice Guidelines 1/2003 on 'Nursing Management of Patients with Urinary Incontinence'. The importance of prompted voiding, and use of the visual cues was emphasised during training, especially when communicating with patients who had problems expressing their needs. The staff were also briefed on the patient benefits, cost and time savings resulting from the regular toileting process for patients with urinary incontinence. By giving staff ownership of the issue, the nurses became more enabled, empowered and cooperative in carrying out their duties, interacting well with the patients to gather feedback about various future needs.

FIGURE 3: STAFF SHOWING VISUAL CUE TO PATIENT AND VISUAL CUE SIGN TO PROMPT NON-COMMUNICATIVE PATIENTS

HARVESTING THE OUTCOMES

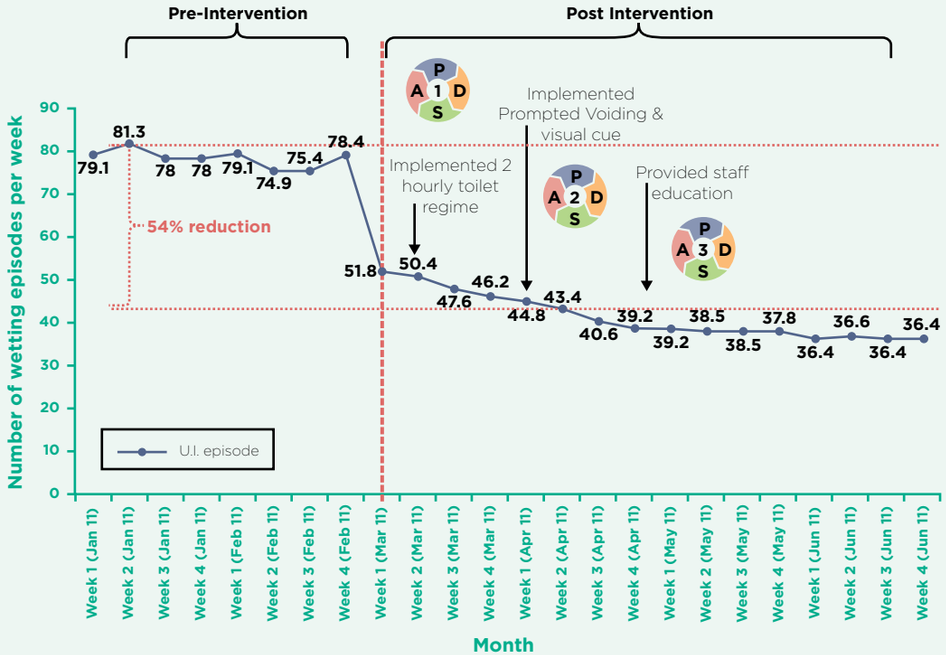


FIGURE 4: TOTAL NUMBER OF WETTING EPISODES IN AMBULATORY INCONTINENCE PATIENTS PER WEEK

The wetting episodes encountered in Ward 66BA decreased significantly with the team's interventions. Knowledge learnt by the improvement team was shared with all the other psycho-geriatric wards. The team was extremely pleased that their interventions have been adopted to benefit similar patients in IMH. Kit Kit presented her project to staff and senior management in IMH, and shared her team's work at the NHG and IMH Quality Days 2012 and 2011 respectively.

"My facilitator recommended this project for submission to the International Forum on Quality and Safety in Healthcare in London, 2013," she said, "We were delighted that our poster was accepted, and we were given the opportunity to present in London."

BALANCING ACT

Diabetes Mellitus (DM) is becoming a vital public health problem in Singapore, with a prevalence of 11.3% in 2010. Studies by Turchin et al. (2009) and Wexler (2007), stated that hypoglycaemia will increase the length of hospital stay by one to two days, and cause an increased one year mortality rate proportionate to the number of days of hypoglycaemia.

BACKGROUND

As an Advanced Practice Nurse in TTSH's Endocrine Department, Lian Xia encountered patients who experienced hypoglycaemia on a daily basis. There were on average 13 episodes of inpatient hypoglycaemia occurring per day which have the potential to cause serious harm to patients. Lian Xia used CPIP to search for a way to tackle the problem of inpatients developing hypoglycaemia in TTSH.

An audit was conducted in 49 wards in the hospital. Out of the 112 diabetic patients with hypoglycaemia, the majority of them experienced one to two episodes of hypoglycaemia during their hospitalisation. Reduced oral intake or "Nil-By-Mouth (NBM)" was found to be a major preceding cause of hypoglycaemia in these patients. She surfaced her concerns to endocrinologist Associate Professor Michelle Jong and they decided to form a multidisciplinary team to tackle this problem. The team comprised of ward nurses, orthopaedic surgeons, endocrinologist, pharmacist, dietitian and nurse educator.

MISSION STATEMENT

To reduce incidence of first episode hypoglycaemia in patients treated with oral hypoglycaemic agents/insulin admitted to Orthopaedic Ward 12D by 50% (baseline 10% to 5%) over six months, in Tan Tock Seng Hospital (TTSH).

REVIEWING THE PROCESS

Lian Xia's team explored steps in the processes involved in patient's medication and food intake, narrowing down to the following points: inappropriate dinner time (too early), insulin injection and meal time mismatch, no food was supplied to patients admitted after 1830 hrs, inappropriate NBM management, and a lack of knowledge in diabetes management.

CAUSE/PROBLEM	INTERVENTION	IMPLEMENT DATE
Inappropriate dinner time (too early)	1. Delay dinner time from 1730 hrs to 1830 hrs	6/4/2015
Insulin and meal time mismatch	2a. Insulin labelling 2b. Readjust nursing practice	20/4/2015 22/6/2015
No food supply after 1830 hrs	3. Provide food for late admission	11/5/2015
No Snack for bedtime CBG<6mmol/L	4. Bedtime Snacks	27/5/2015
Inappropriate NBM management	5. Initiate NBM protocol	12/6/2015
Lack of knowledge	6. Education (a) Educate the patient on signs and symptoms of hypoglycaemia (b) Educate nurses on insulin action	 24/5/2015 16/6/2015

First, the team tested if they could delay dinner time by an hour from 1730 hrs to 1830 hrs. The timing for lunch was also adjusted to 1200 hrs. By adjusting and having shorter hours between dinner and the next morning breakfast, the hope was to reduce the nocturnal hypoglycaemia. As the food was transported by automated guided vehicles (AGVs), the team not only had to engage kitchen and nursing staff, but also the AGV engineers to work out the desired delivery times to conduct the proposed test change. Feedback was positive. Patients said that it felt more "normal" to eat lunch and dinner at a later time, rather than 1130 hrs and 1730 hrs respectively. Feedback from nurses made the team realised that they had to also address work schedules and shift timings of health attendants at the kitchen who were tasked to receive food trolleys or clear food trays.

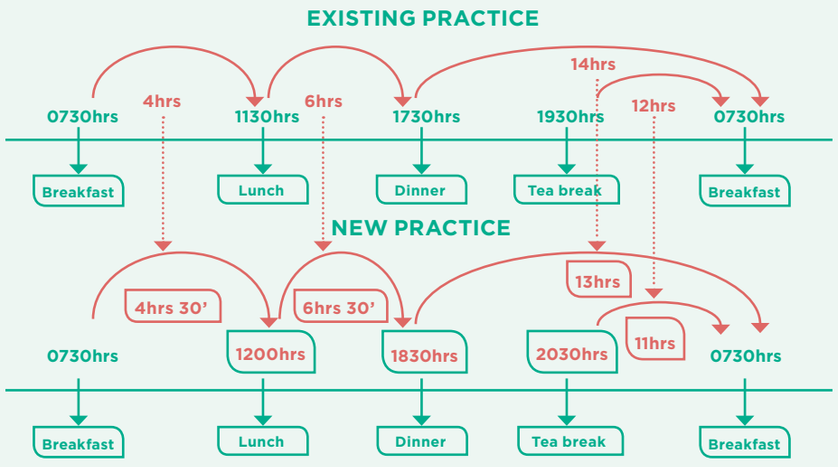


FIGURE 1: ADJUSTED MEAL TIME

Next, the team worked closely with the kitchen staff and changed the meal ordering process for diabetic patients on insulin. This was to address problems with diabetic patients receiving meals more than 30 minutes after they had their insulin injections. Using information from the e-ordering system, kitchen staff pasted an insulin sticker on the appropriate patient food tray. Nurses in the ward ensured that these trays are served to patients on insulin therapy first. This allowed matching of insulin injection time and meal time to within 30 minutes. Through these interventions, kitchen staff felt involved in improving the care of diabetic patients.

The team explored more change ideas. They started to provide well-planned meals which could be reheated for late admission. Over a study period of two weeks, 57 patients were admitted to Ward 12D after 1830 hrs, 33% of patients had history of DM. "It used to be just cup noodles, which the patients loved," Lian Xia said, "But it will affect their DM control. So having food like sandwich or bee hoon soup will provide healthier options." On top of adjusting meal times, bedtime snacks were provided for patients when their 2200 hrs Capillary Blood Glucose was found to be <6mmol/L.

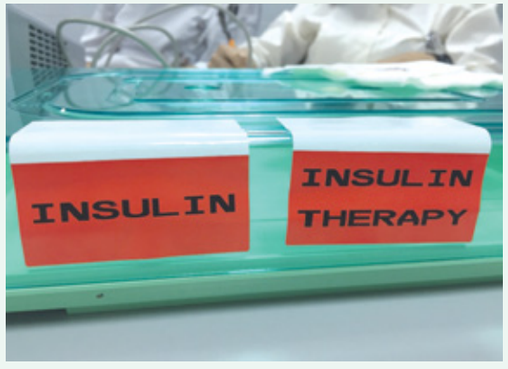


FIGURE 2: LABELLED FOOD TRAYS FOR DIABETIC PATIENTS ON INSULIN FOR EASY IDENTIFICATION

To resolve issues of inappropriate NBM management, the team tapped on an ongoing DM improvement project with a protocol designed to reduce the likelihood of hypoglycaemia for DM patients who are scheduled for surgery in the Orthopaedic Department.

The team went on to address those patients who had poor oral intake. They created a training programme for new staff as well as a compulsory e-Learning module for management of diabetic patients. New medical officers and nurses were also educated on the different types of insulin and how to order and administer insulin safely. Patients and caregivers were educated on how to identify signs and symptoms of hypoglycaemia and what steps to take to prevent and manage hypoglycaemia.

HARVESTING THE OUTCOMES

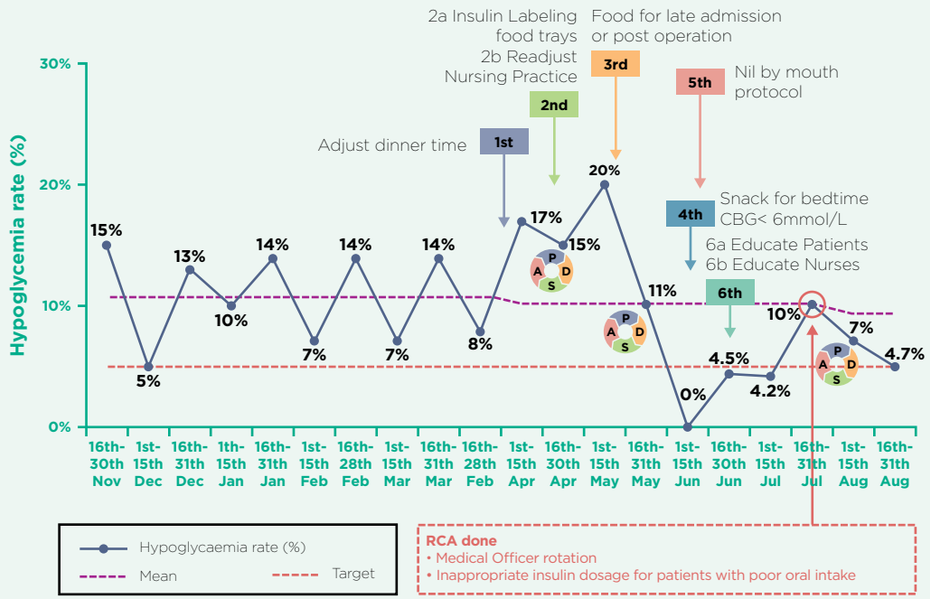


FIGURE 3: HYPOGLYCAEMIA RATE IN PATIENTS TREATED WITH OHGAS AND INSULIN IN WARD 12D

The team had changed several processes associated with food delivery and medication management in Ward 12D. Their project addressed the risk of morbidity and mortality due to hypoglycaemia. The reduction of one episode of hypoglycaemia potentially reduces hospital stay by one day. It has been estimated that preventing each hypoglycaemia episode, saves the patient $75.60 per day and potentially reduces costs of $1275 per day to our hospital system.

Lian Xia's project was presented during the International Forum for Safety and Quality in Healthcare in Sweden 2015. Once overwhelmed by the prospect of quality improvement, she feels that improvement efforts now have a well-defined process and structure. She remarked that CPIP has helped her to look at issues on a larger scale and looks forward to guiding her juniors.

CPIP has definitely changed the way I look at things.

To manage the patient with diabetes in the ward, we should not only look at the single value of the glucose level but also need to pay attention to patient's oral intake and medical condition as well as whether any steroid medication has been used. Recently, one of my patient experienced hypoglycaemia. After I had done the root cause analysis, I realised that the patient consumed soya milk half an hour before blood glucose was checked. The Nurse gave her eight units of insulin due to a spike of high blood glucose level. Three hours later, patient developed hypoglycaemia mainly due to the high dose of insulin given.

If we look at issues on a larger perspective, we can prevent such errors. It's the simple improvements and checks which can make a difference.

MS LIAN XIA

Advanced Practice Nurse, Tan Tock Seng Hospital, CPIP Batch 37

NOT YOUR FOOD!

Within the psycho-geriatric wards of Institute of Mental Health (IMH), food grabbing incidents present stressful problems for both staff and patients. A patient who grabs food is someone who can grab food from anyone, at any time, at any place without regard for safety and may risk choking.

BACKGROUND

Senior Nurse Clinician Therese Galistan shared that is sometimes almost impossible to stop a food grabbing patient, as they are extremely swift in action. Some patients have insight, but have problems restraining their impulses to grab. Patients who are prevented from grabbing tend to be more restless and agitated as their needs are not met.

> We could either fight fire forever, or study the situation to find a better way to do things.
>
> MS THERESE GALISTAN
>
> *Senior Nurse Clinician, Institute of Mental Health, CPIP Batch 15*

This patient-centred project aimed to prevent the potential effects of choking and death caused by food grabbing incidents. Therese chose to start her work in Ward 62 A and B, where the intellectually disabled patient population had the highest incidences of food grabbing. To understand the extent of the problem, a three week baseline study was done which revealed as many as 15 food grabbing incidents during that time period.

MISSION STATEMENT

To reduce food grabbing incidents in female General Psychiatry Wards 62A and 62B by 80% in six months.

REVIEWING THE PROCESS

The team had to understand the opportunities for patients to grab food and think out of the box to approach the problem. There was limited evidence in the published literature on managing patients who grab food.

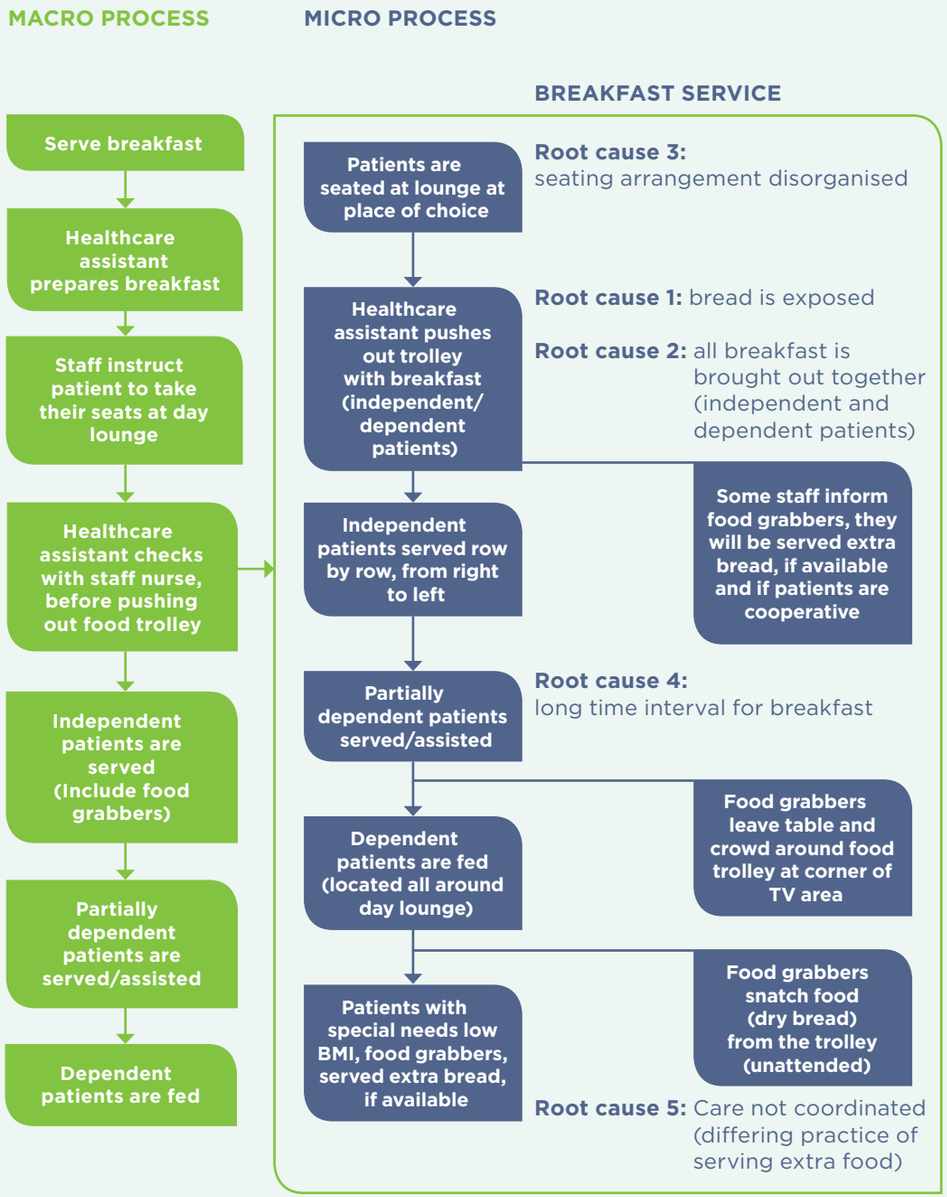


FIGURE 1: IDENTIFYING WHERE THE OPPORTUNITIES AND ROOT CAUSES LIE WITHIN THE PROCESS FLOW LEADING TO HIGH FOOD GRABBING INCIDENCES

INTERVENTIONS

"The main issue starts when patients see the food trolley coming in," Therese explained. "Some of them are afraid that there's not enough food, so they will rush and grab. Some patients, when we asked them to return the food, they panic and stuff all the food into their mouths." Therese and her team organised their changes into prevention of food grabbing and mitigating harm from choking as food grabbing cannot be totally prevented.

(1) Visibility of food was restricted by placing the food on the trolley in locked containers. Food was pre-cut into smaller bite-sized pieces to reduce the risk of choking.

(2) Night beverages and 0700 hrs drinks were introduced forpatients who experienced hunger pangs.

(3) Patients who were particularly distressed when it came to meal times were segregated to keep them calmer. There was constant reassurance to the patients that there was enough food to go around.

(4) Serving of breakfast was separated into two phases. Independent patients who did not need assistance were served in the 1st Phase. This could be done quickly and the food trolley was immediately pushed back into the pantry after serving to reduce the opportunity for food grabbing. In the 2nd phase, dependent patients, who needed a longer time for feeding, were served. Staff could observe and monitor patients more closely.

(5) Reorganised seating arrangement. Patients were separated into independent, partially dependent, dependent, and patients who grab. With a more organised seating arrangement, food serving, feeding of patients and plate clearing processes were more orderly.

(6) Staff used images and pictures to create awareness about the danger of food-grabbing and choking.

(7) Eating spoons were down-sized from a soup spoon to a smaller dessert spoon to slow down the eating time and to increase patient's feelings of satiation

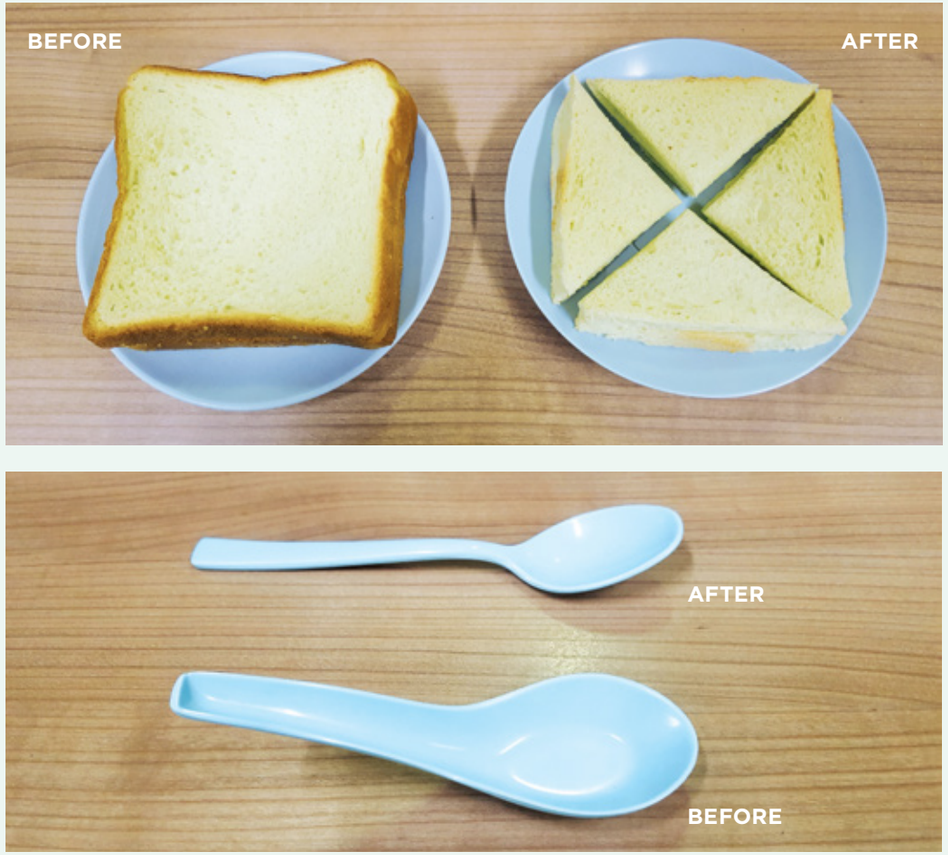


FIGURE 2: FOOD CUT UP TO SMALLER PIECES BEFORE SERVING AND SMALLER DESSERT SPOON USED

It is very satisfying to know that many things could be done and the staff had a morale boost while we were implementing these interventions. I was more surprised when one of our patients managed to understand and realised the consequences of food-grabbing very quickly after our educational session. She said things like, 'The doctor will need to save you,' when we showed images of patients choking after food grabbing.

MS THERESE GALISTAN

Senior Nurse Clinician, Institute of Mental Health, CPIP Batch 15

HARVESTING OUTCOMES

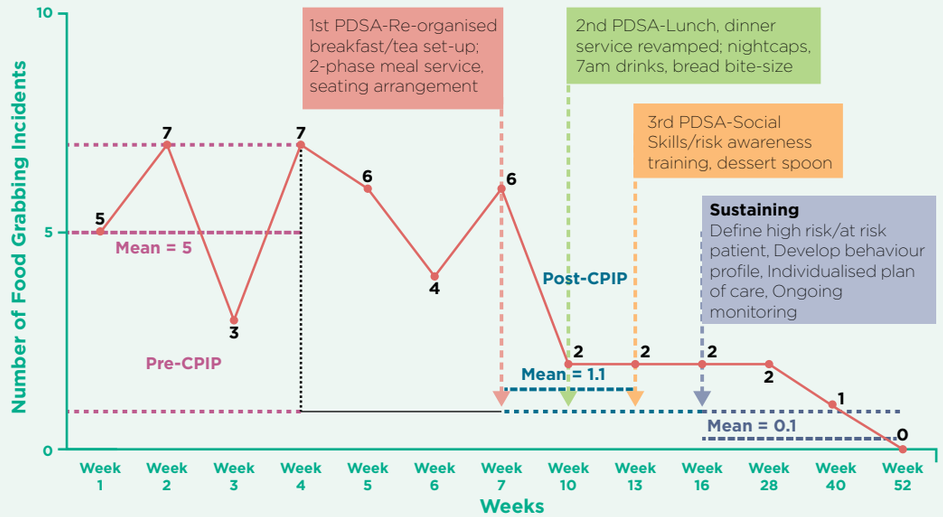


FIGURE 3: INCIDENCE OF FOOD GRABBING

The team managed to reduce the incidences of food grabbing after introducing a number of changes in the breakfast service process from a mean of five incidences a week to a mean of 1.1. In 2008, their team participated in the NHG CQI Quality Week presentation, showcasing their sustained good outcomes for the project. To date, the team reports that there have not been any episodes of choking arising from food grabbing during breakfast service.

A team of advanced practice nurses and ward nurses are engaged in ongoing study and research on food grabbing. IMH has also created a taskforce to address choking incidents for the entire institution in 2015.

I would like to acknowledge many people, particularly the IMH CPIP/Quality Management team, and Department of Nursing Administration. They gave us so much support, encouragement, and reassurances. They guided us throughout the whole project, right up to our presentation at the 6th NHG CPIP Convention and Graduation Ceremony in 2008. Boosting the morale and staff satisfaction and hearing their positive comments made this project very worthwhile. That was very gratifying, impressive, and encouraging.

MS THERESE GALISTAN
Senior Nurse Clinician, Institute of Mental Health, CPIP Batch 15

Learning about the patient's unique responses and capacity to understand their situation came as an eye opener for Therese and her team. She also felt that not only has CPIP influenced the way they approached problems, but also taught them that they had the power and ability to make changes in their daily lives.

LESSONS FROM OUR PROJECT OWNERS

EFFICIENT CARE

CHANGING HANDS, BETTER FLOW

BACKGROUND

Senior Nursing Officer Zauyah Sanif faced a constant challenge as the Nurse-in-charge of the Day Surgery Ward. For a Day Surgery (DS) facility to be efficient and effective, there had to be a smooth through-put of patients to cater for morning, lunch-time and afternoon surgical cases.

Zauyah's issue was simple, Day Surgery patients who have recovered after surgery and anaesthesia should be discharged promptly without unnecessary delays, increasing satisfaction among patients and family, allowing better turnaround times for the DS ward beds and improving workflow for doctors and nurses. There is better time management, prioritisation of cases and increased moral of staff within Day Surgery.

MISSION STATEMENT

90% of general anaesthesia (GA) patients' will be discharged from Day Surgery Ward at Tan Tock Seng Hospital (TTSH) within 2.5 hours after surgery, in six months.

> We initially started looking at solutions to this problem more than two years before entering CPIP. I was later encouraged to do this through CPIP after raising this issue to our Heads at that point — Adjunct Associate Professor Tai Hwei Yee, Dr Loke Yee Heng, Dr Chin Ngek Min and Dr Kwan Kim Meng. From there, the processes and the improvements came a little easier.
>
> **MS ZAUYAH SANIF**
> *Senior Nursing Officer, Tan Tock Seng Hospital (2004), National University Hospital (Current), CPIP Batch 4*

When she was a Nursing Officer at the TTSH Operating Theatre's Post-Anaesthesia Care Unit (PACU), Zauyah had already lead a successful change to have PACU nurses discharge post-anaesthesia patients to the ward instead of having to wait for the anaesthetist to review. Determined to solve the problem, she had to seek endorsement from the Director of Nursing to change work practices and professional accountability for Registered Nurses to activate the decision to discharge patient home instead of the doctor. With the Director of Nursing's strong recommendation, Zauyah became the first non-physician participant in the CPIP.

REVIEWING THE PROCESS

"When I moved to Day Surgery," she said, "The systems and the processes were somewhat different, although the issues remain identical when waiting for the doctors to review patients before home. This time the doctors are either stuck in surgery or in the general wards, which makes it more challenging. " However, in DS Ward, there were additional risks and challenges, as patients were discharged home where they had to be able to self-manage after surgery and anaesthesia.

"I had patients who were okay and well recovered after surgery, taking up bed space and unable to go because the doctors were performing other duties in multiple locations and unable to come to review the post-operative patients," Zauyah recalled. "And we couldn't admit late morning and afternoon list patients because there were no more beds."

The patients and families themselves verbalised unhappiness of waiting, when they truly felt well enough to go, and the reviewing doctors took less than five minutes to review, asking questions that they strongly felt the nurse could also do equally well.

INTERVENTIONS

There was an internationally validated and simple discharge tool which was used to safely discharge patients after surgery and anaesthesia. Day Surgery ward nurses expressed that they were confident to use the Aldrete Scoring Tool to perform the discharge review process.

At the start of the project, there was naturally a high amount of apprehension, from some of the nurses and the doctors about inappropriate discharges and patients requiring readmissions later. Zauyah, and the Anaesthetist-in-charge of the ward found similar, successful cases of nurse-led discharges in hospitals in other parts of the world to convince the nurses. She held numerous discussions to hear feedback and to train and reassure nurses with data that the new process was safe.

Over time, the nurses gained confidence and even raised issues that resulted in further modifications to the process, like making sure the anaesthesia doctors indicated by signing off that the patient could be discharged by nurses.

We found a measurement model from one of the successful research papers in Canada. When we modified the measurements and tightened the threshold for patient discharge in our DS Ward, the nurses also started to see that it was evidence-based and this new process held water.

MS ZAUYAH SANIF

Senior Nursing Officer, Tan Tock Seng Hospital (2004), National University Hospital (Current), CPIP Batch 4

- Training Registered Nurses to assess and discharge patients using Post-Anaesthesia Discharge Scoring. System (PADSS) which was based on the Aldrete Scoring Tool.
- Developed protocol and guidelines for Registered Nurses to acquire competency in PADSS.
- Revised Nursing Record Checklist to ensure:
  - All documentation must be completed before the patient arrives at the DS Ward.
  - Upon admission, should patient require a medical certificate (MC), insert an "MC WANTED" tag on the patient case sheet to remind the pre-operative team doctor to fill in the MC before sending the patient to DS Ward.
- Communicating the above interventions to all level of staff.
- Providing patient's relatives with an estimated discharge time during admission.
- Informing patients of next appointment dates through telephone calls, text messages, or letters so that delays due to waiting for appointments are minimised.
- Informing doctor to review patient when there is presence of significant events such as bleeding, vomiting, etc and to follow up any orders closely.

Zauyah recalled "We communicated to all doctors that Day Surgery nurses would discharge the patients as per PADSS discharge protocol unless there is a post-operative orders that the surgeon would like to review before discharge. In such exceptions, the patients would be kept till the surgeon reviews and discharges their patients."

HARVESTING THE OUTCOMES

Following implementation of the CPI Project, more than 90% of the patients were discharged within 2.5 hours after surgery. This was a significant improvement from less than 30% in November 2003, and the rate has been sustained. This process is now part of the routine post-operative care of patients, not only for Day Surgery Ward, but also in other areas of the hospital where procedures are performed.

Another benefit was the streamlining of the various forms that were used by nursing and medical staff to discharge patients. During the re-design of the process for nurse-lead discharge, the multiple forms were reviewed and consolidated into a single form.

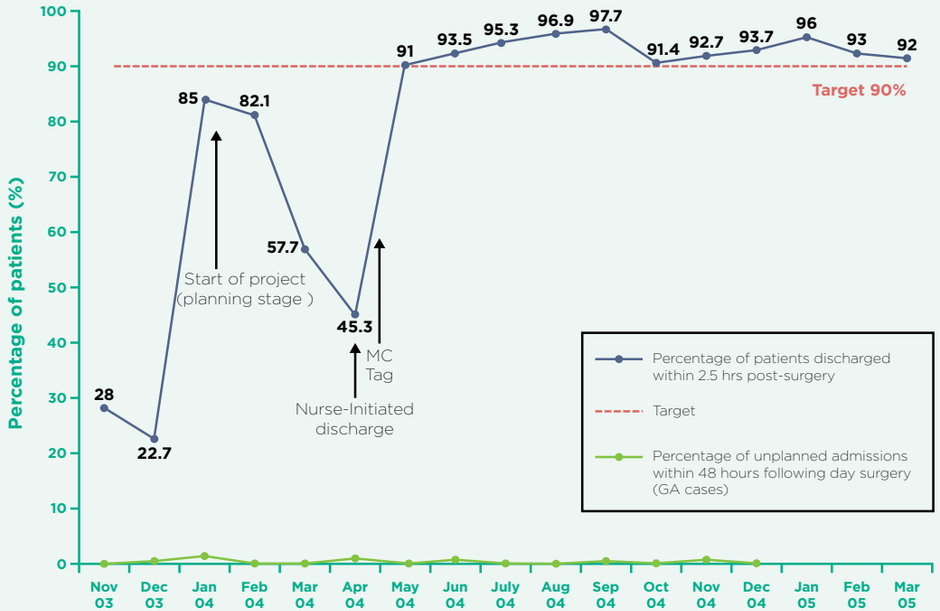


FIGURE 2: PERCENTAGE OF PATIENT DISCHARGED WITHIN 2.5 HRS AFTER END OF SURGERY

As her interventions were implemented, Zauyah and her nurses received good patient feedback about a more efficient discharge and having to wait less before discharge. Unplanned readmissions were measured, and to everyone's surprise, results were better when compared to the previous process. This definitely gave the nurses more confidence to continue.

I am very grateful for the support by the senior management and the doctors who communicated with us during this project. The nurses were a great help as well — the moment the results showed a positive impact, it gave us confidence and a sense of autonomy with our work.

We were faced with many obstacles but at the end of the day, what do you want to do for your patients? It was a managed risk made for the benefit of the patients, and this has saved them worry and time.

MS ZAUYAH SANIF

Senior Nursing Officer, Tan Tock Seng Hospital (2004), National University Hospital (Current), CPIP Batch 4

A BALLOON IN TIME SAVES LIVES

The 2004 American Heart Association (AHA) guidelines stated that suitable patients with ST-segment elevated Acute Myocardial Infarct (STEMI) should have their Primary Percutaneous Coronary Interventions (PCI), performed within 90 minutes upon presentation at the Emergency Department (ED). Performing PCI in a timely manner saves myocardium and ensures best outcomes for patients.

BACKGROUND

In 2007, Professor Tan Huay Cheem noted that NUH was having a median Door-To-Balloon (DTB) time of 110 minutes for STEMI patients, with only 37% of patients achieving PCI in less than 90 minutes. He started to question the efficiency of their processes.

Professor Tan gathered a team of fellow interventional cardiologists, registrats, nursing officers, radiographers, medical technologists and administrative managers. He reached out to the head of ED, Associate Professor Shirley Ooi to examine the inter-departments related processes, aiming to reduce the DTB time.

MISSION STATEMENT

Reduction of Door-To-Balloon Time for Patients with ST-Segment Elevation Myocardial Infarction (STEMI) Undergoing PCI, in National University Hospital (NUH).

REVIEWING THE PROCESS

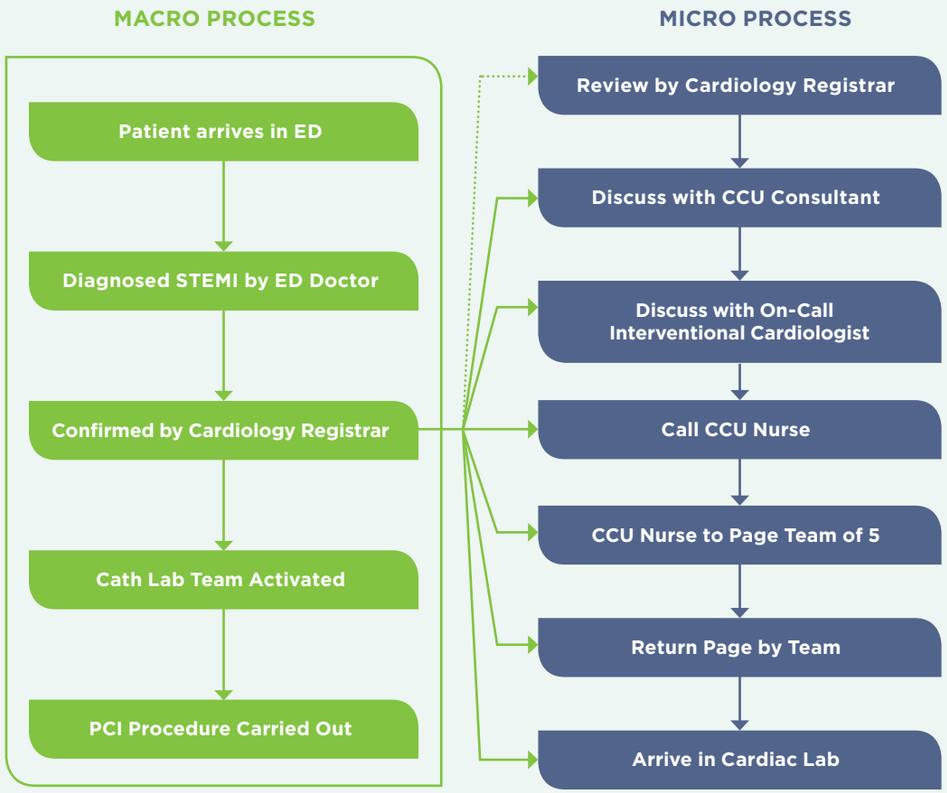


FIGURE 1: WORK FLOW CHART INITIALLY MAPPED OUT AT THE START OF THE PROJECT

INTERVENTIONS

During the analysis of the process steps, Professor Tan and his team realised that there were some steps which were performed in a sequential manner. They also realised that the activation process could be shortened by making a single, but significant change in the staff's role designated to activate the entire PCI process. In total, Professor Tan made four changes.

WORKFLOW FOR PRIMARY PCI ACTIVATION

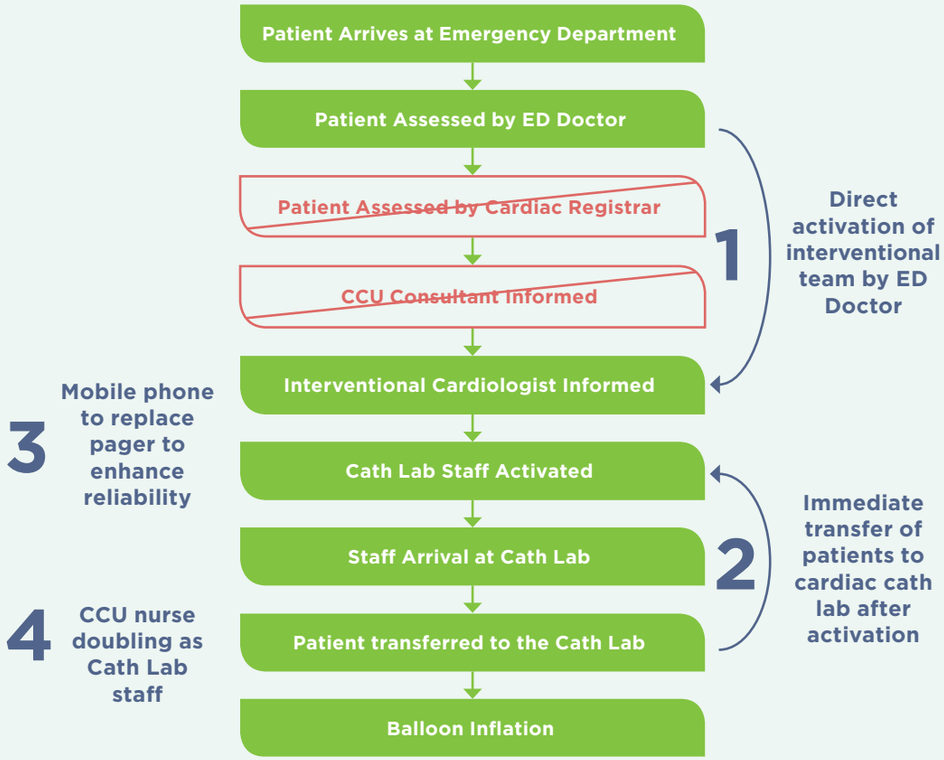


FIGURE 2: REVISED WORKFLOW – MAKING IT EASY TO DO THE RIGHT THINGS RELIABLY

1. Direct activation of the interventional cardiologist on duty by the ED doctor, by passing the duty Coronary Care Unit (CCU) consultant. Algorithms on criteria and exclusions for PCI were delineated between the two departments.
2. Patients who had consented for PCI were moved from ED to the Cardiac Catheterisation Lab immediately upon activation of the emergency PCI process.
3. CCU nurses on duty were cross trained to help to prepare the sterile sets, equipment and trolleys required for the PCI procedure, especially after office hours.
4. The pagers carried by the on-call staff at the Cath Lab were replaced with mobile phones.

HARVESTING OF OUTCOMES

With the simple but significant changes made in the workflow process, Professor Tan saw the DTB time of less than 90 minutes improve from 37% to 73% within six months. The average median DTB time decreased from 110 minutes to 68 minutes.

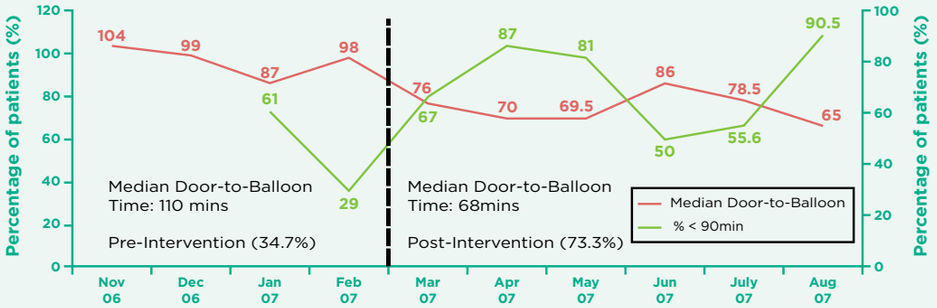


FIGURE 3: MEDIAN DOOR-TO-BALLOON TIME FOR STEMI PATIENT AND PERCENTAGE OF STEMI PATIENT RECEIVING PCI WITHIN 90 MINUTES

"Our patients have given us good feedback. In 2014, NUH was the best performing public hospital in terms of DTB timing," Professor Tan said, "And STEMI mortality is now down to 2% for patients who underwent PPCI without cardiogenic shock, which is comparable to international standard."

Professor Tan's project was not only featured in the Straits Times in Dec 2007, but also won accolades from both NHG Best CPIP awards in 2007, Ministry of Health's Best Clinical Improvement Project in 2008 (3rd Prize) and the National Medical Team Excellence Award in 2010. The results of the improvement were published in The Journal of Interventional Cardiology. The median DTB in NUH continued to improve and is currently 49 minutes.

ACUTE MYOCARDIAL INFARCTION

Shortening of Median Door-to-Balloon Time in Primary Percutaneous Coronary Intervention in Singapore by Simple and Inexpensive Operational Measures: Clinical Practice Improvement Program

CHI-HANG LEE, M.B.B.S., F.A.C.C.,[1,2] SHIRLEY B.S. OOI, M.B.B.S., F.R.C.S.ED.,[3] EDGAR L. TAY, M.B.B.S.,[2] ADRIAN F. LOW, M.B.B.S.,[1,2] SWEE-GUAN TEO, M.B.B.S.,[2] CINDY LAU, B.SC.,[1] BEE-CHOO TAI, PH.D.,[4] IRENE LIM, R.N.,[2] SUSAN LAM, R.N.,[2] ING-HAAN LIM, M.B.B.S.,[5] PING CHAI, M.B.B.S.,[2] and HUAY-CHEEM TAN, M.B.B.S., F.A.C.C.[2]

From the [1]Department of Medicine, Yong Loo Lin School of Medicine, National University of Singapore, Singapore; [2]Cardiac Department, National University Hospital, Singapore; [3]Emergency Medicine Department, National University Hospital, Singapore; [4]Department of Community, Occupational and Family Medicine, National University of Singapore, Singapore; and [5]Department of Cardiology, Tan Tock Seng Hospital, Singapore

FIGURE 4: PUBLISHING IN JOURNAL OF INTERVENTIONAL CARDIOLOGY 2008

Like a tree that continues to grow and proliferate after bearing fruit, Professor Tan was further involved in developing the Western STEMI network with Jurong General/Ng Teng Fong Hospital and NUH combining to provide a common service for patients in the Western part of Singapore.

Many of the hospital care delivery issues can be solved if we know how to use the right and proven methodology, such as being offered in the CPIP course. There is no project that is too small to be looked into. What we need is often a clinician who can be a driver or leader in championing the initiatives; educating and motivating team members on the goals and needs for the changes, as well as developing strong cross-discipline collaboration.

PROFESSOR TAN HUAY CHEEM

Director, National University Heart Centre, Singapore, CPIP Batch 14

OILING THE GEARS FOR SMOOTH RUNNING OF THE MACHINE

Tan Tock Seng Hospital (TTSH) had introduced the Closed-Loop Medication Management System (CLMMS) to reduce medication-related errors through the use of bar-code scanning with Personal Digital Assistants (PDAs).

I am naturally inquisitive, but this inquisitiveness may not be a systematic way of looking at problems. The CPIP is a first step to the change process."

We had to look at the whole end-to end process and all the processes must work well..., especially in a mature organisation such as ours, we've got to be brave about driving change.

DR ROLAND BOEY

Senior Consultant, Tan Tock Seng Hospital, CPIP Batch 25

BACKGROUND

The PDA was used within the hospital's Closed Loop Medication Management System (CLMMS) to scan and verify correct medication and patient (see Figure 1). Previous data had shown that the error rate with the PDA when compared with existing system could potentially reduce the rate of wrong drug administration from 3.2% to 0% and reduce identification of wrong patient from 5.75% to 2.8%. The need to ensure wide-spread adoption of the new process using the PDA was critical to improve medication safety

Dr Roland Boey started a project to improve the usage of PDAs by ward nurses during administration of medication as this would reduce mediation errors. A survey conducted showed that PDAs were only used for 33% of medication administrations. This was of concern as data from incident reports showed about 50 medication errors every month, of which approximately 30% could have been prevented with the use of the new process of bar-code scanning with the PDAs.

During an observational study, it was noted that nurses using the PDA device during medication administration took double the time as compared to nurses using the conventional method of administering medication. This was a major hurdle that needed to be conquered if the adoption of the PDA was to be successful.

MISSION STATEMENT

To achieve 100% Personal Digital Assistance (PDA) device usage in Bar-coded Medication Administration of Closed Loop Medication Management System by the end of six months at Level 8 Wards, Tan Tock Seng Hospital (TTSH).

FIGURE 1: USING PDA DEVICE TO SCAN THE DRUGS AND PATIENT'S NAME.

REVIEWING THE PROCESS

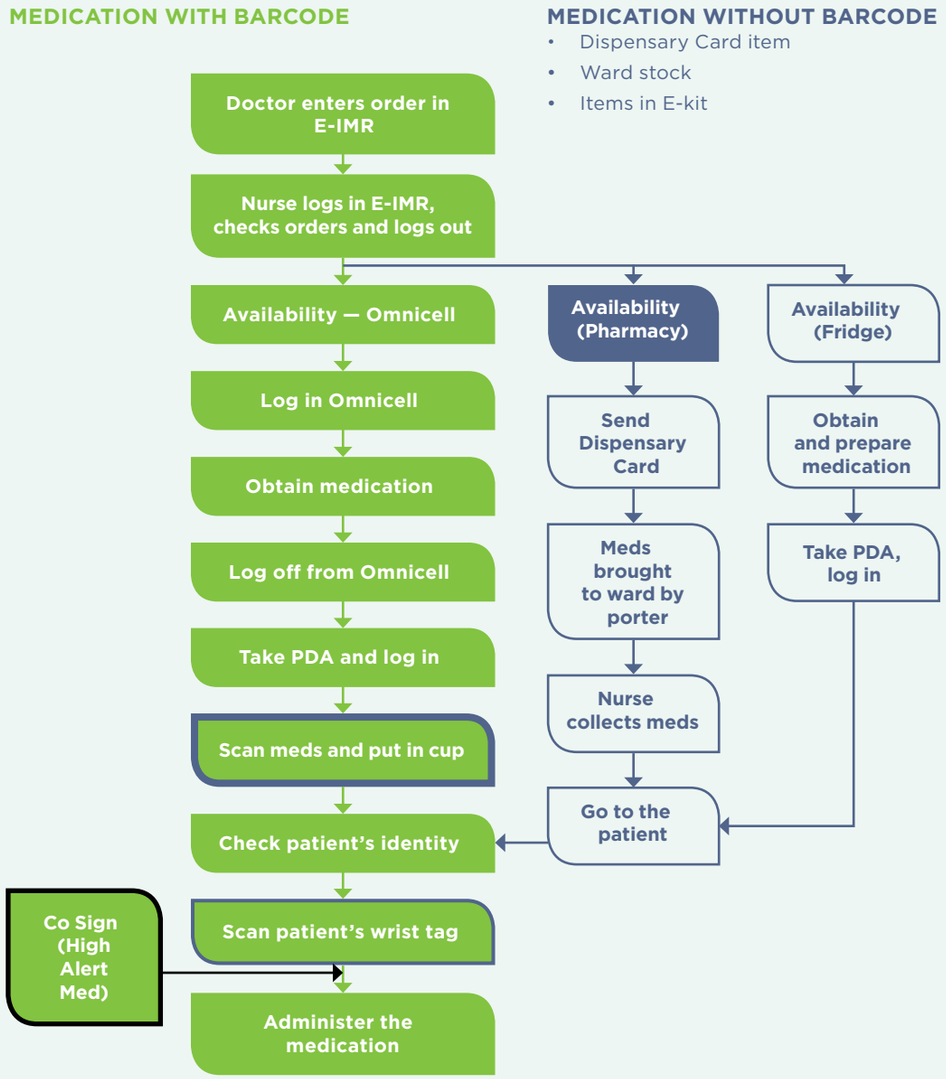


FIGURE 2: MEDICATION ADMINISTRATION PROCESS WITH PDA

After analysing the process steps and following the nurses during their medication administration rounds, the team was able to identify a number of problems with the network and the processes that lead to nurses taking a long time to complete their tasks.

INTERVENTIONS

CAUSE/PROBLEM	INTERVENTIONS
Poor network connectivity	Improve **connectivity of network** • N Wireless terminal upgrades (faster network speed) • Work with ITD OPS to resolve signal dropouts and poor connectivity in some cubicles (due to compatibility of wireless networks and PDA)
Staff attitudes and perceptions	Explain to the nurses the drug administration process with usage of PDA and its impact on preventing medication errors. **Encourage all the nurses to use PDA** in the administration of medication
Slow process for PRN drugs documentation	**Introduce barcode** for "Reasons for not administering medication" to reduce time taken to manually key in reasons **Absent from ward** / **MO's instruction** / **Given in ED** / **Fasting** / **Taken/Given at home** **Not available** / **Given in OT / Endo** / **Refused** / **Withheld** / **Asymptomatic**
Longer Processing time	Review process of administering **PRN medication**. **Revamp, standardise the process** of PDA usage in collaboration with ITD team to reduce the processing time, making it user friendly.

FIGURE 3: ROOT CAUSES AND INTERVENTIONS

HARVESTING OF OUTCOMES

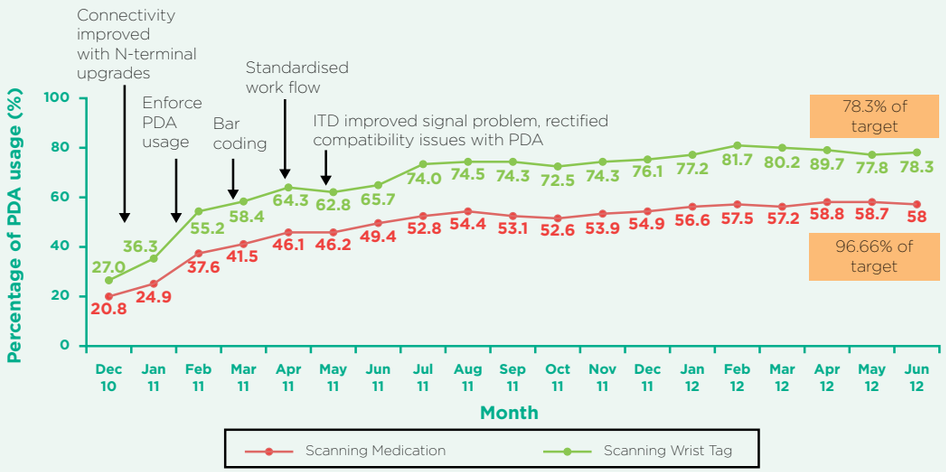
(1) Percentage of scanned medications improved from 20.8% to 49.4% (bar-coded medications comprised 60% of total medications in ward stock).

(2) Scanning the patient's identity on the wrist tag improved from 27% to 65.7%.

(3) Medication error rate due to wrong drug, dose and timing reduced from 3.2% to 2.8%.

(4) Medication error associated with wrong patient identity reduced from 5.7% to 4.3%.

(5) PDA processing time had been shortened from 4.58 to 2.12 minutes (in serving average 6-8 medications per patient).



Scanning bar coded medication aim at 60% (of # total bar-coded medication)
Scanning wrist tag - aim at 100%

 # Total number of bar coded medication is 60% of total med served

FIGURE 4: USAGE OF PDA IN BAR-CODED MEDICATION ADMINISTRATION

PDA usage on bar-coded medication reached to 96.66% of target and patient identity checking 78.3%, as of June 2012. Understanding staff challenges on the ground and changing culture and mindset were crucial for sustainability of this project. TTSH senior management supported the findings and implemented the team's recommendations hospital-wide.

The lessons on adoption of PDAs and CLMMS were shared with MOH's National Medication Safety Taskforce in July 2012 and other hospitals who were implementing similar systems. In addition, Dr Boey presented this project at the BMJ's International Forum for Quality and Safety in Healthcare 2012 in Paris, where there was great interest amongst the audience in the insights gained through the project.

LESSONS FROM OUR PROJECT OWNERS

EFFECTIVE CARE

INTENSIVE CARE, INTENSIVE MOBILISATION

Patients in Intensive Care Units (ICU) who face prolonged bed rest and reduced mobility often experience persistent weakness and alterations in function that can decrease quality of life. The current evidence shows that increasing the duration and frequency of physical and occupational therapies can result in improved functional independence and better quality of life after the patient is discharged from ICU. Early mobilisation can significantly reduce patients' total duration of mechanical ventilation, and potentially reduces the length of stay by two days in the ICU.

BACKGROUND

Principal Physiotherapist Balachandran Jayachandran, from Tan Tock Seng Hospital (TTSH), went on a study trip to Baltimore in 2011 with Dr Jonathan Tan, Director of Surgical ICU (SICU), and Sr Zawiyah the Nurse Manager in charge of SICU. The experience there opened his eyes. They watched as patients in John Hopkins's SICU were mobilised to sit out of bed and ambulate mere hours after admission.

"The traditional impression of ICU patients is of them lying in bed to recuperate. But for each day they lie in bed, they lose about 1–2% of their muscles. This can eventually lead to loss of independent functional mobility. That's when we realised we were being very conservative and needed to change." Bala said.

To help convince colleagues working in the ICU, Bala presented evidence demonstrating that early mobilisation was possible for SICU patients and that these activities did not result in any adverse events or serious medical consequences. A video he obtained from his visit to Baltimore showing SICU patients being mobilised shortly after their procedures was also shown to his colleagues in SICU.

A baseline eight week study in SICU showed that 27.9% of eligible patients were actually given early mobilisation. The core team members were comprised of staff with expertise in different areas.

MISSION STATEMENT

To achieve 75% of optimal mobilisation (≥ 3/5 milestones)* from the current 27.87% of all eligible^ SICU patients in six months.

MOBILISATION MILESTONE*

1. Sit over edge of bed
2. Sit to stand
3. Sit out of bed
4. March on spot
5. Ambulation

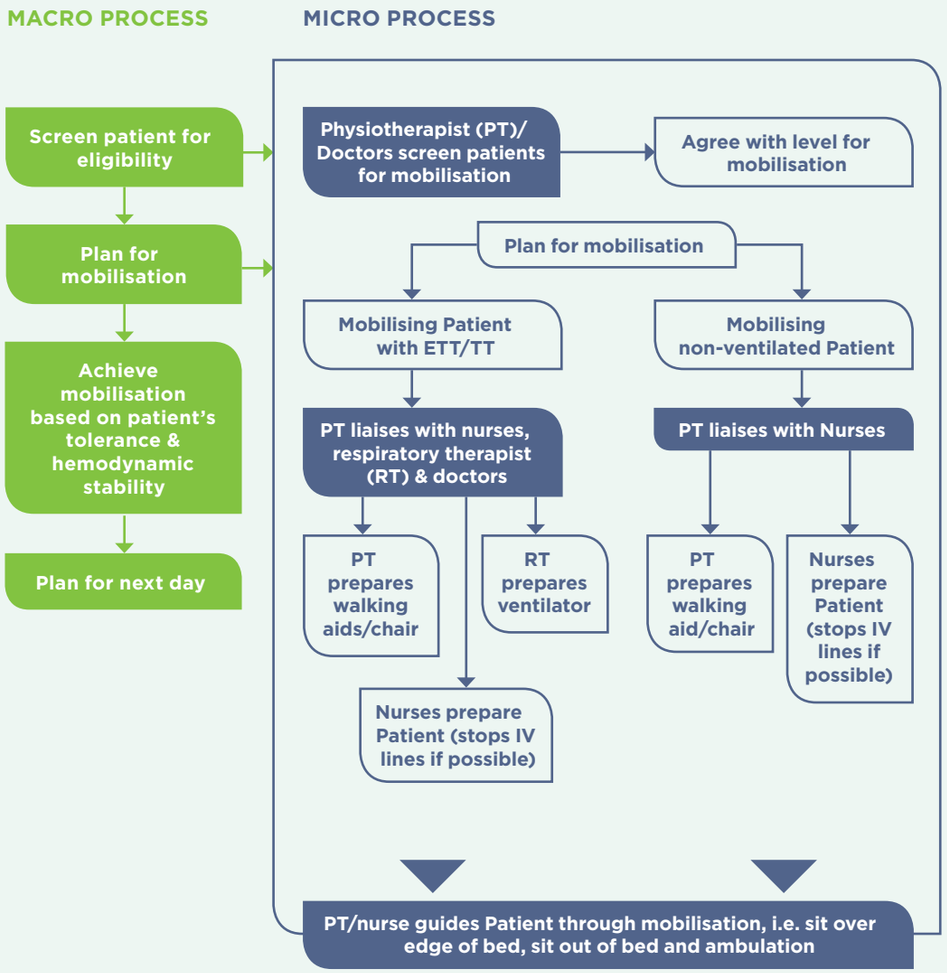
ELIGIBLE PATIENTS^

1. Premorbid — Ambulation independent
2. ICU stay ≥ 3 days
3. CNS (RASS +1 to –1; Muscle power ≥ 4/5)
4. CVS (no vasopressors; no new arrhythmia or cardiac ischemia in the past 12 hours)
5. Respiratory system
   a. Ventilated PEEP < 8; FIO2 ≤ 50%
   b. Non-ventilated FiO2 ≤ 50% RR ≤ 24
6. No surgical contraindications
7. Pain score ≤ 5/10

Two mentors were appointed to guide the team — Adjunct Associate Professor Tan Hui Ling (Chairperson of ICU committee) and Associate Professor Thomas Lew (Chairman, Medical Board).

REVIEWING THE PROCESS

The team examined the process of how patients were currently mobilised; starting with the process of screening to identify eligible patients, to plan mobilisation including how the plan was coordinated and carried out by members of the SICU team. Brainstorming was done to identify causes that would prevent patients from being mobilised. The team was able to establish some of the key issues leading to why eligible SICU patients were not optimally mobilised: (1) No common platform for communication, (2) No mobilisation guidelines in the institution and (3) No coordinated schedule for mobilisation between teams.



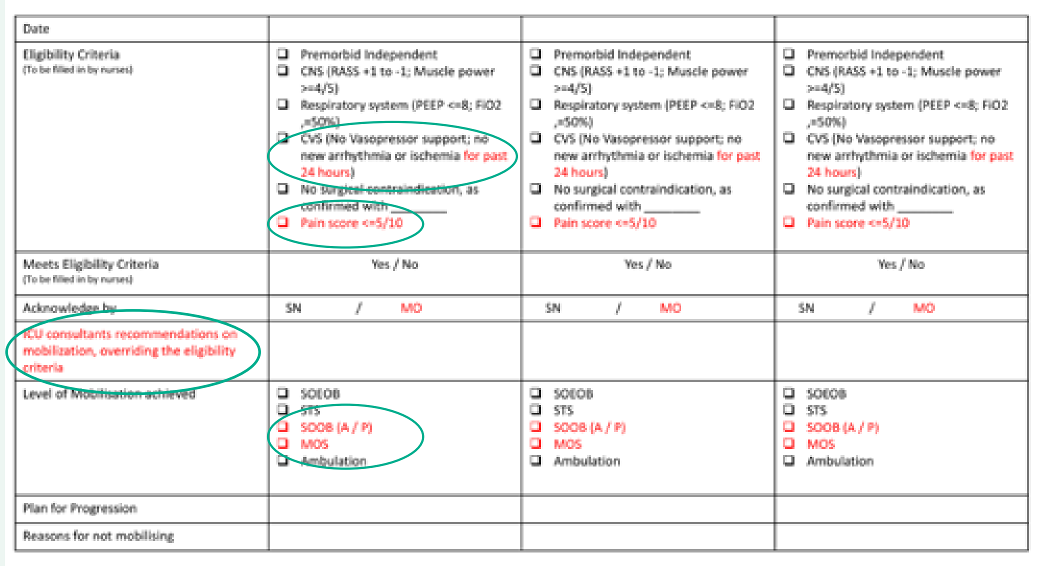
Legend: ETT — Endo Tracheal Tube: TT — Tracheostomy Tube

FIGURE 1: MACRO AND MICRO FLOW CHARTS OF THE PROCESSES INVOLVED IN MOBILISING SICU PATIENTS.

INTERVENTIONS

To streamline communication and coordination among the different staff involved, Bala's team put an Early Mobilisation chart, allowing nurses to screen eligibility, which the ICU and surgical doctors must acknowledge. Upon approval, the nurses and physiotherapists can start to plan goals and commence to mobilise eligible patients. The early mobilisation chart was tested and feedback was obtained from staff to refine the chart (see Figure 2). Prototyping of the chart allowed the team to make improvements. The changes included explanations of the eligibility criteria, providing space for consultants to document and change the sequence of mobilisation after discussion with staff.

In addition, a communication board (see Figure 3) served as a visual aid for both nursing and physiotherapy staff to organise timeslots for their respective activities and avoid clashes in schedules. At the same time, staff were able to spot possible time slots to plan mobilisation activities for their individual patients. "The conversation between us and the nurses was kept open" Bala said, "They had to buy into the idea that this was an important change. Now, with the physiotherapist's guidance they can independently initiate the mobilisation with our patients and we are proud of what the nursing team could accomplish professionally."



Date			
Eligibility Criteria (To be filled in by nurses)	☐ Premorbid Independent ☐ CNS (RASS +1 to -1; Muscle power >=4/5) ☐ Respiratory system (PEEP <=8; FiO2 ,=50%) ☐ CVS (No Vasopressor support; no new arrhythmia or ischemia for past 24 hours) ☐ No surgical contraindication, as confirmed with ________ ☐ Pain score <=5/10	☐ Premorbid Independent ☐ CNS (RASS +1 to -1; Muscle power >=4/5) ☐ Respiratory system (PEEP <=8; FiO2 ,=50%) ☐ CVS (No Vasopressor support; no new arrhythmia or ischemia for past 24 hours) ☐ No surgical contraindication, as confirmed with ________ ☐ Pain score <=5/10	☐ Premorbid Independent ☐ CNS (RASS +1 to -1; Muscle power >=4/5) ☐ Respiratory system (PEEP <=8; FiO2 ,=50%) ☐ CVS (No Vasopressor support; no new arrhythmia or ischemia for past 24 hours) ☐ No surgical contraindication, as confirmed with ________ ☐ Pain score <=5/10
Meets Eligibility Criteria (To be filled in by nurses)	Yes / No	Yes / No	Yes / No
Acknowledge by	SN / MO	SN / MO	SN / MO
ICU consultants recommendations on mobilization, overriding the eligibility criteria			
Level of Mobilisation achieved	☐ SOEOB ☐ STS ☐ SOOB (A / P) ☐ MOS ☐ Ambulation	☐ SOEOB ☐ STS ☐ SOOB (A / P) ☐ MOS ☐ Ambulation	☐ SOEOB ☐ STS ☐ SOOB (A / P) ☐ MOS ☐ Ambulation
Plan for Progression			
Reasons for not mobilising			

FIGURE 2: EARLY MOBILISATION CHART SHOWING CHANGES AFTER PROTOTYPING

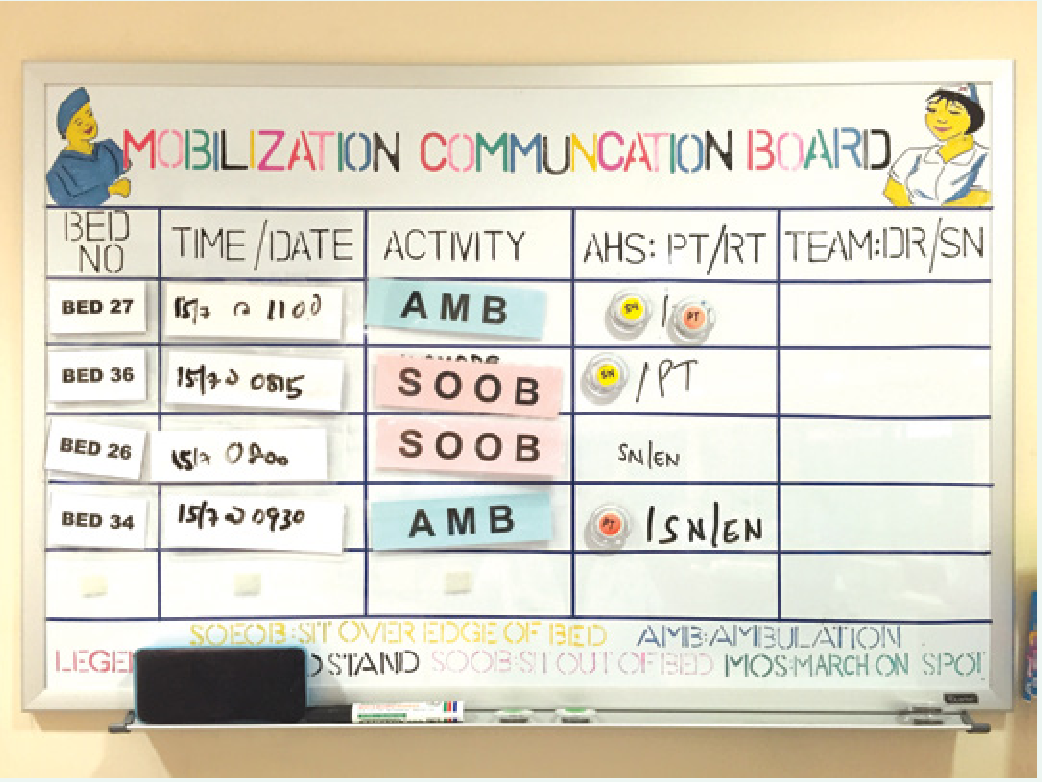


FIGURE 3: COMMUNICATION BOARD AS A VISUAL AID BETWEEN NURSING AND PHYSIOTHERAPHY STAFF

HARVESTING THE OUTCOMES

The results show that SICU managed to achieve a mean rate of mobilising 85% of eligible patients. Two patients were noted to have transient desaturation while being mobilised. Patients had a reduced average length of ICU stay of 2.1 days and overall hospital stay of 4.5 days. The project on early mobilisation for SICU patients made headlines in The Straits Times, Tamil Murasu, and Berita Harian. He has presented the team's work on early mobilisation at various local rehabilitation centres and physiotherapy conference, as well as a poster presentation at BMJ's International Forum on Quality and Safety, in London, 2015. In addition, his project secured the gold award at the Asian Hospital Management Awards (AHMA) in 2014.

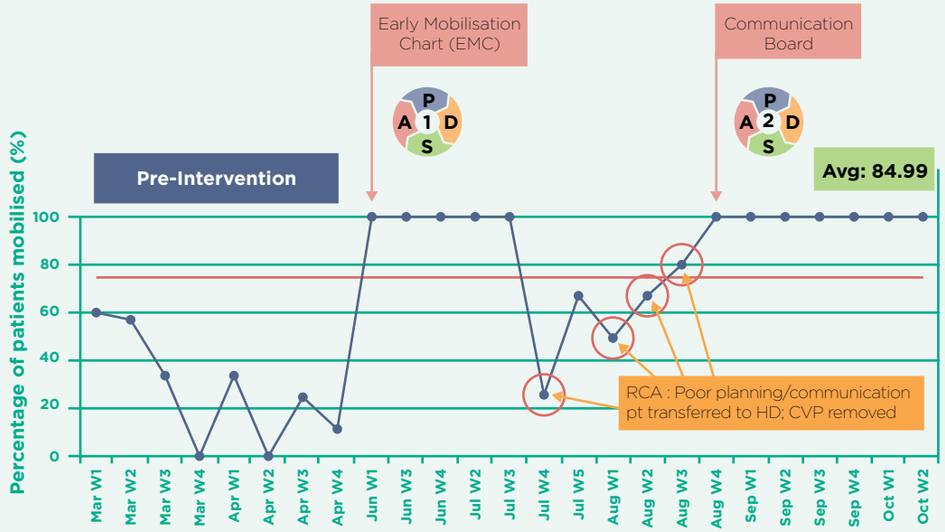
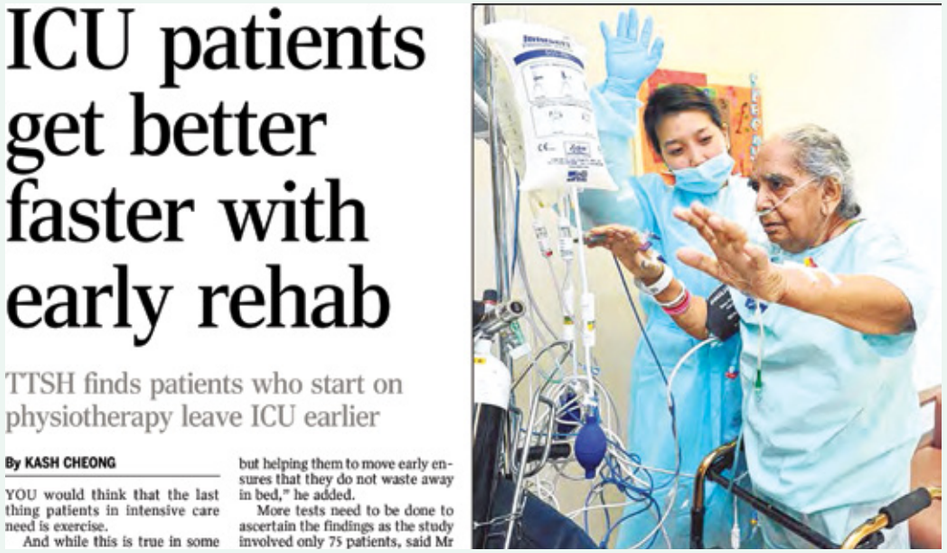


FIGURE 3: ICU PATIENTS WITH EARLY MOBILISATION



ICU patients get better faster with early rehab

TTSH finds patients who start on physiotherapy leave ICU earlier

By KASH CHEONG

YOU would think that the last thing patients in intensive care need is exercise.

And while this is true in some

but helping them to move early ensures that they do not waste away in bed," he added.

More tests need to be done to ascertain the findings as the study involved only 75 patients, said Mr

FIGURE 4: EARLY MOBILISATION PROJECT FEATURED ON SINGAPORE MEDIA.

I was very stressed during my initial stage of the project, but seeing the 2nd order change which really improved our patient care was rewarding. CPIP's methodology sticks and we can now look at our issues in a more insightful and deeper manner before throwing out our solutions.

Empowering the appropriate staff, the ground staff in our case, was the key to our success. CPIP made the steps incredibly clear — it applies across the board.

MR JAYACHANDRAN BALACHANDRAN

Principal Physiotherapist, Tan Tock Seng Hospital, CPIP Batch 32

WATCH THE SUGAR

According to Institute for Safe Medication Practices (ISMP) In 2014, insulin, subcutaneous and intravenous continues to be on the High-Alert Medications (HAM) list in acute care settings. HAM are drugs that bear a heightened risk of causing significant patient harm when they are used in error. Such medications require special safeguards to reduce the risk of errors.

BACKGROUND

Dr Julie George, Senior Consultant in the Department of General Medicine in TTSH, noticed there were adverse events caused by hypoglycaemia [Capillary Blood Glucose (CBG) of <4.0mmol/L] following intravenous bolus insulin therapy for the treatment of hyperkalaemia. She decided to audit how hyperkalaemia was managed in patients at the General Medicine Department in the months of November 2010 and Jan 2011.

Dr George discovered that appropriate treatment was present in 70–90% of patients, but only 13% of patients had CBG monitoring. In the small cohort of 23 cases in the audit, she found one patient had hypoglycaemia. A team of eight comprising house officers, medical officer, nurses, pharmacist and consultant was formed in November 2010.

MISSION STATEMENT

To have all General Medical hyperkalaemia patients treated and monitored appropriately* within 4–6 hours of laboratory result notification to Doctor on Level 5 and 9 Wards at Tan Tock Seng Hospital (TTSH) within six months.

* Appropriate treatment and monitoring defined as per protocol (started within one hour and completed within six hours)

REVIEWING THE PROCESS

The care process carried out by the junior medical staff and nursing staff was critical in explaining what actually took place.

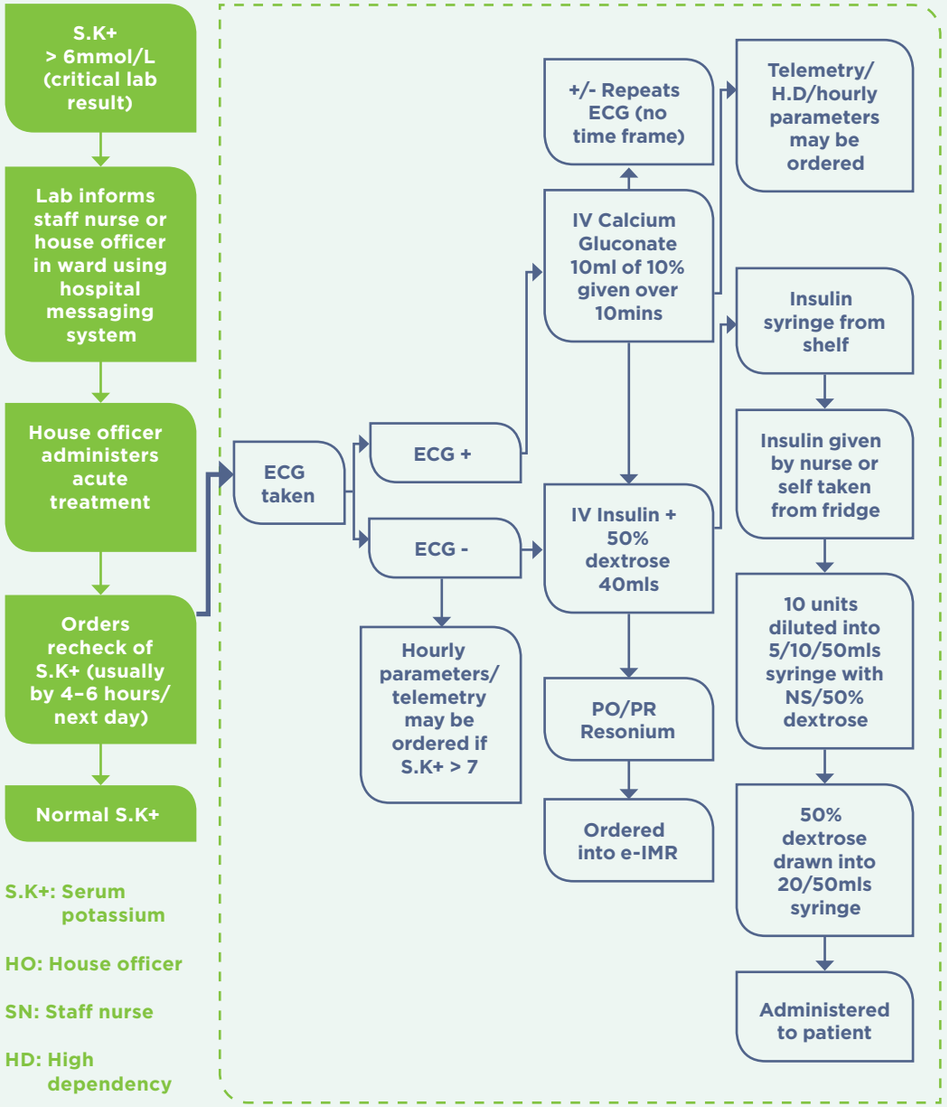


FIGURE 1: MAPPING OUT THE PROCESS JOURNEY OF A JUNIOR HOUSE OFFICER/MEDICAL OFFICER

The diagnostic journey revealed that key issues leading to inadequate treatment and monitoring of patients with hyperkalaemia were (1) lack of a common protocol for management of hyperkalaemia, (2) lack of practical reinforcement, (3) issues with continuity of care between doctors and nurses and (4) the junior doctors' lack of knowledge of insulin syringes. One of the consequences of this was the increased risks of hypoglycaemia when patients were treated with IV insulin.

INTERVENTIONS

"We learnt that in many cases overseas," Dr George said, "Nurses are usually the party who administer the insulin. As there is no standardised training on hyperkalaemia treatment internationally, we had to come up with a plan to address the situation."

The team started by defining a protocol for management of hyperkalaemia. This was then communicated to the junior doctors. Addressing feedback from junior staff about the time taken to gather all necessary medical equipment, consumables and drugs, a "Hyperkalaemia Pack" was designed with all needed items bundled together. The new protocol was also placed with the Hyperkalaemia Kit for easy reference during a crisis (see Figure 2). Nurses were enlisted to remind doctors to use the protocol and correct insulin syringes. A stamp was created to facilitate documentation of all necessary information for continuity of care — such as the critical serum potassium result, standard monitoring requirements and timing of repeat blood tests.

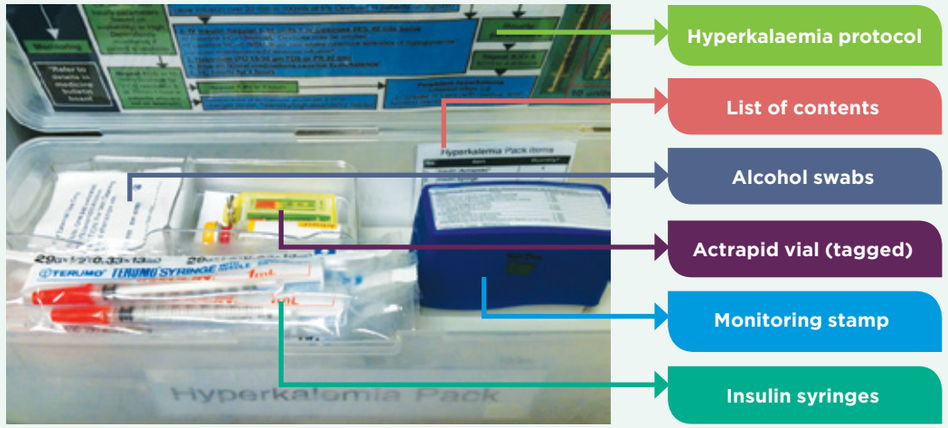


FIGURE 2: HYPERKALAEMIA PACK PLACED IN THE WARDS WITH ALL NEEDED ITEMS BUNDLED TOGETHER FOR DOCTOR'S EASY RETRIEVAL

NEW PROTOCOL FOR TREATMENT AND MANAGEMENT OF HYPERKALAEMIA

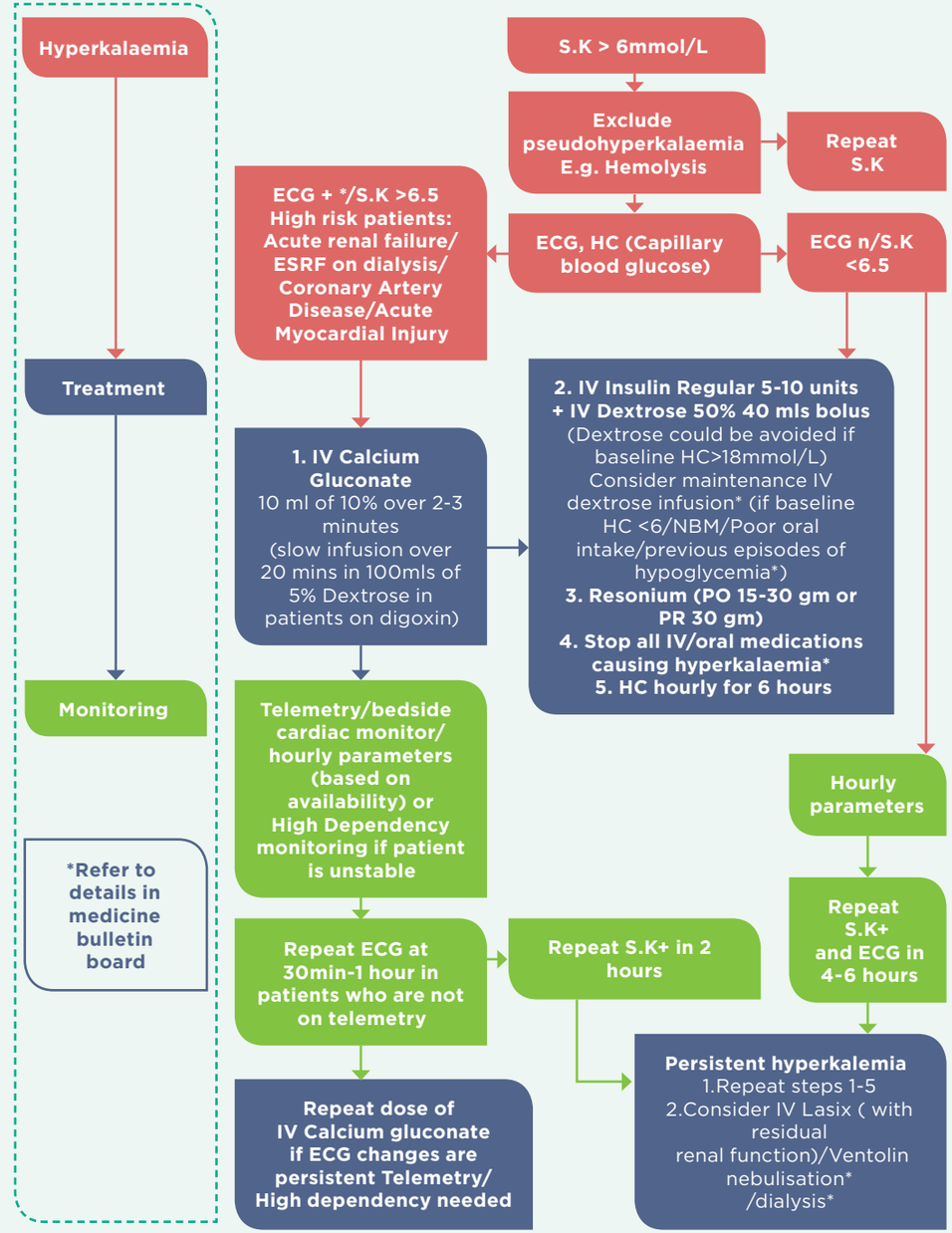


FIGURE 3: PROTOCOL PLACED ON THE TOP COVER OF HYPERKALAEMIA PACK AS EASY REFERENCE

A few PDSA cycles had to be done to trial how to store medications that needed different storage conditions (refrigerated and non-refrigerated drugs) and to ensure that the monitoring stamp met all required documentation needs. The team also tested different ways of alerting doctors that insulin syringes and not normal syringes had to be used. Ultimately, the team decided that placing a tag on the insulin vial with a pictorial reminder was the best solution (see Figure 3).

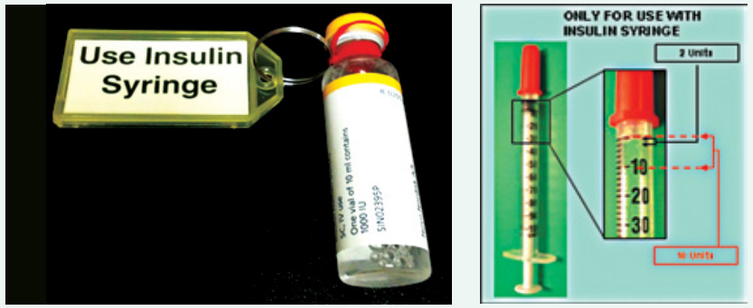


FIGURE 3: TAGGED INSULIN VIAL AND REVERSE SIDE OF TAG SHOWING A PICTURE OF INSULIN SYRINGE

> Three months after implementing the kit and placing it in Ward 9, it went missing! Imagine my surprise when I found out staff from another ward found it useful and wanted to use it.
>
> DR JULIE GEORGE
>
> *Senior Consultant, Tan Tock Seng Hospital, Singapore, CPIP Batch 24*

HARVESTING THE OUTCOMES

Project measures were the compliance to acute treatment and monitoring of patients presenting with hyperkalaemia as well as the incidence of hypoglycaemia following IV Insulin bolus use.

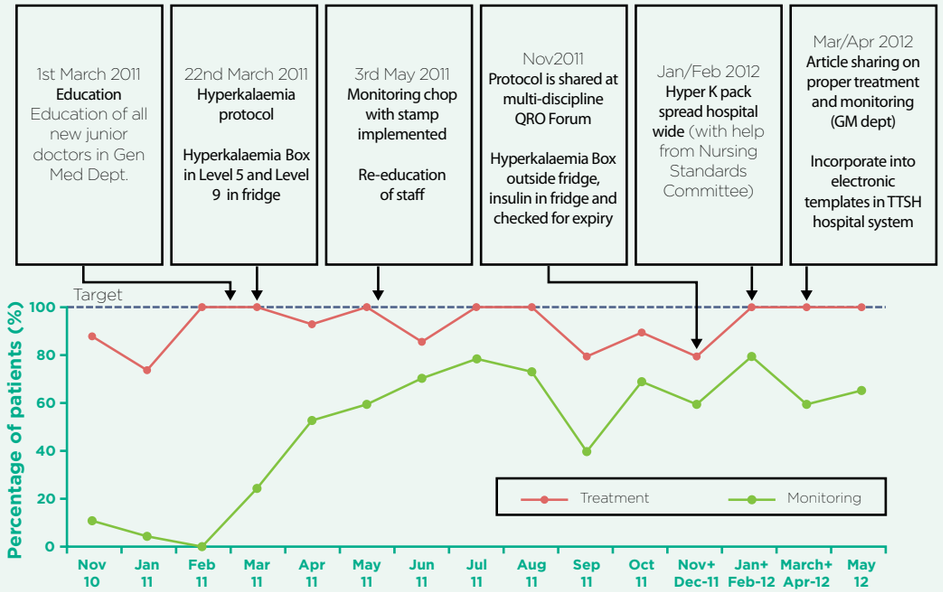


FIGURE 4: APPROPRIATE TREATMENT AND MONITORING OF HYPERKALAEMIA PATIENTS

Compliance to the acute treatment of hyperkalaemia reached 80 – 100% and appropriate monitoring reached 60 – 70% over a 12 month period. The incidence of hypoglycaemia was 25% initially which subsequently reduced to between 0% – 20% over second six months. The team planned to continue random audits to ensure compliance to protocols. To sustain results and to spread these practices to the entire hospital, the following were implemented:

1. Online E-learning module: Acute Kidney Injury and management of Hyperkalemia for all junior doctors joining TTSH.
2. Use of the Hyperkalaemia Kit was spread to the entire hospital.
3. Inpatient electronic medication record (eIMR) template to standardise the acute treatment of hyperkalaemia.
4. Inpatient Clinical Computerised Order Entry (CCOE) template to standardise monitoring and other elements of the hyperkalaemia management protocol.

Dr George also mentioned that through this project, she was able to tap into various channels — management, education, forums and conferences — to spread awareness of hyperkalaemia. She cited teamwork and buy-in from supportive parties, as well as the encouragement of Adjunct Associate Professor Tai Hwei Yee and Bernard Wong from the CPIP faculty as contributing to the project's success.

By thinking through the actual process with junior doctors and nurses, the team was able to come up with simple and inexpensive, yet effective solutions to the clinical problem. The team discovered the importance of building depth of knowledge through repeated testing of each intervention in PDSA cycles. This helped them to identify the most effective solutions. Agreeing to a common protocol was necessary for standardisation and allowed the incorporation of the care process into the EMR system. The entire team is really proud of their interventions, which can now be seen in all wards in TTSH and in other hospitals in Singapore.

LESSONS FROM OUR PROJECT OWNERS

SAFE CARE

A HANDY GUIDE SAVES THE DAY

As a rule, hospitals and healthcare professionals profess and aim to provide the safest care possible. However the design of our systems to cope with the growing complexity and ever changing context of healthcare, is increasingly risky and leads to patients being inadvertently hurt as a consequence of medical care. Recent studies of medication related errors examined risk and latent error in medical systems and uncovered that most of the technologies and prescriptions were not designed with human limitations in mind. Any step in the prescribing process can generate errors, many of them preventable. Errors found in prescribing medications are common in general practice and hospitals, however there have been few reports on psychiatric populations.

BACKGROUND

In year 2013, from a total of 74,840 prescriptions orders in outpatient Clinic B, there was an average mean of 7.5 errors per 1000 prescriptions, requiring interventions by pharmacy staff. Principal Pharmacist Wong Kwai Fong and Dr Prabha Rukmalee Wijesinghe were concerned with the number of prescription errors in IMH's Clinic B, and started an improvement project.

MISSION STATEMENT

To reduce the prescription errors in outpatient Clinic B by 70% within six months at the Institute of Mental Health (IMH).

REVIEWING THE PROCESS

The improvement team formed comprised of pharmacists, both junior and senior doctors in the Community Psychiatry Department, a pharmacy technician, and staff nurse. By examining the medication errors and the workflow, the team understood that the problem was located upstream at the prescribing stage (see Figure 1).

A short e-survey conducted amongst the prescribers identified difficulties with ordering and amending orders in iPharm (an existing computerised prescription ordering system). Out of 38 respondents, 60.5% reported having difficulties in ordering STEP orders (titrating doses), and 52% experienced difficulties in amending dosage instructions (e.g. for creams, ointments, eye/ear drops, oral solutions, inhalers, transdermal preparations).

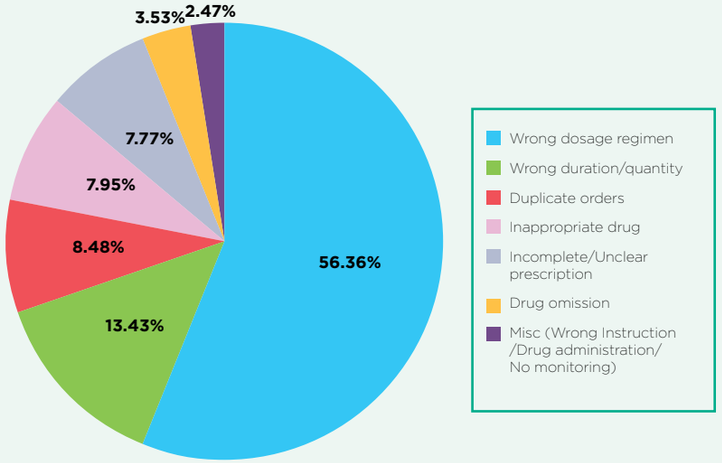


FIGURE 1: BREAKDOWN OF TYPES OF MEDICATION ERRORS

Combining both available data and the team's fundamental knowledge, their diagnostic journey led the team to agree that the top causes were attributed to:

(i) Difficulties prescribers encountered in identifying active medications in iPharm.

(ii) Difficulties with prescribing of STEP doses.

(iii) Printed prescriptions were not verified by doctor.

(iv) Lack of standard training in iPharm.

INTERVENTIONS

Kwai Fong and Dr Prabha lead the team to begin interventions to help the prescribers overcome difficulties with iPharm system. A key resource developed for doctors was the iPharm handy guide, which was eventually placed in every consult room. The iPharm handy guide provided dosage short-cuts and step-by-step screen shots of each type of order process. Additionally, the handy guide included step-by-step detailed instructions on how to document different types of prescriptions e.g. an oral medication with partial dispense, multiple dosing, prn and STEP (titrating) orders; depot injections and even sample

drugs and "free text" items. Common iPharm dosage shortcuts were also included for easy reference. The issue of identification of active medications in iPharm was not addressed as the team felt solutions would be costly and incur a long implementation timeline.

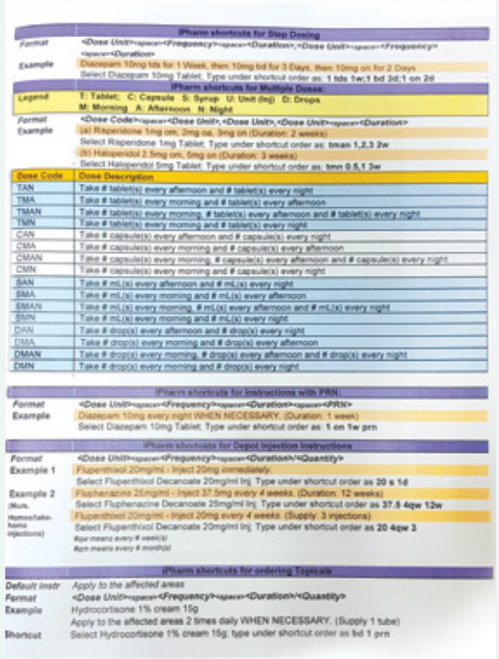


FIGURE 2: IPHARM HANDY GUIDE – DOSAGE SHORT CUTS FOR PRESCRIBERS

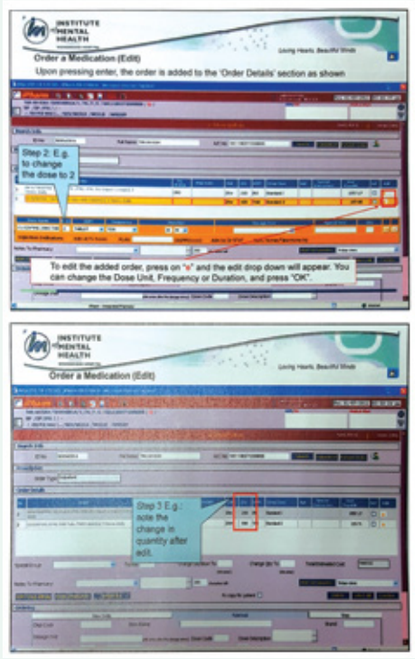


FIGURE 3: STEP-BY-STEP SCREEN SHOTS OF EACH TYPE OF ORDER PROCESS

Next, the team tackled the training for new doctors on iPharm by providing one-on-one hands-on doctors training in iPharm. The content of the training was modified to focus on navigating specific areas in iPharm and referencing the handy guide. New doctors were given access to the User-Acceptance Training (UAT) module to practice at their convenience. Feedback from doctors was incorporated into the standardised training content.

The doctors understood what we wanted to do and why the problem was upstream, especially when the process doesn't belong to us," Kwai Fong said, "Despite that, the difficulty was still getting them together in a physical space.

MS WONG KWAI FONG

Principal Pharmacist, Institute of Mental Health, CPIP Batch 34

HARVESTING THE OUTCOMES

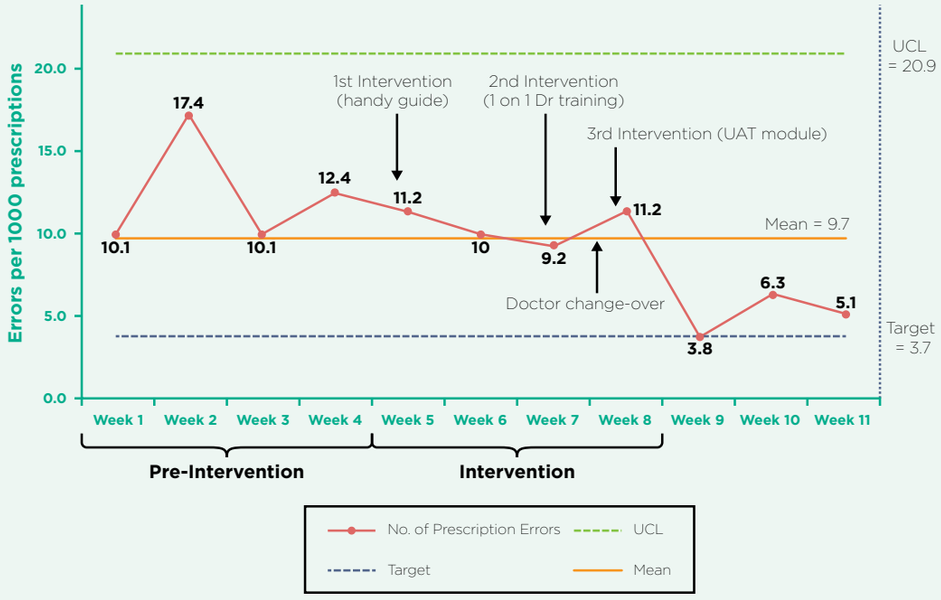


FIGURE 4: ERRORS PER 1000 PRESCRIPTIONS (JUNE – AUGUST 2014)

As the team introduced their interventions, they saw a gradual reduction in prescription errors. This gave encouragement to the team that they were on the right track. At the end of the project, Kwai Fong and Dr Prabha felt that while the work was tough, it was a fulfilling project, especially when they were able to identify gaps and find the appropriate solutions. The feedback gained from the prescribers served as a good base for the design of future e-prescribing platforms.

The team continues to track prescription errors. They are expanding the training for pharmacy technicians to be more fluent with iPharm system. At the same time, new pharmacists in Clinic B received the same training as the doctors, to familiarise themselves with the system.

"CPIP is a very useful methodology," Kwai Fong commented, "It sharpens your thoughts and steers you to identify the root of the problem." She has also mentioned that measurement tools brought about from the workshop were extremely useful in maintaining consistency and tracking the progress in their project.

"Be committed to doing a piece of work well — don't cut corners and go towards the results you want instead of the results presented to you," Kwai Fong mentioned, "Being consistent and doing things yourself will bring you to the end goal. The most important factor is to be able to see things through the eyes of your patients, who are our primary subjects. The work you put in now will make the rest of your work easier in the long run."

> It was a tough journey but it came up to something very rewarding in the end. During the project journey, we were questioning, "Why are we doing this?" but at the end of the day, it was something we could take home. It was a tool which benefitted us and that we could use.

MS WONG KWAI FONG
Principal Pharmacist, Institute of Mental Health, CPIP Batch 34

PICKING FOR ACCURACY

A study of primary care pharmacies in England and Wales quoted an incidence of 22 near misses and four actual dispensing errors for every 10,000 prescription items dispensed to patients in the community pharmacy. A wide range of errors occur with dispensing incidents were caused either by misreading the prescription (90, 24.5%), similar drug names (62, 16.8%), selecting the previous drug or dose from the patient's medication record on the pharmacy computer (42, 11.4%) or similar packaging (28, 7.6%).

BACKGROUND

A local review conducted across nine polyclinics in National Health Group (NHG) showed an incidence of 0.2 actual dispensing errors per 10,000 items. The following contributed to dispensing errors (1) Picking (and Packing) errors; (2) Data entry errors; and (3) Prescribing errors. Picking errors made up 47% of the dispensing errors. Main causes of picking errors were wrong strength (13%), wrong drug (11%), and wrong formulation (4%). Ng Mok Shiang and Wang Hui Hui, both Deputy Directors at NHG Pharmacy, knew that picking error was largely preventable, and were keen to further reduce the error rate.

Mok Shiang and Hui Hui formed an improvement team consisting of the clinic pharmacy manager, pharmacists, pharmacy technicians, pharmacy assistant and health attendant.

MISSION STATEMENT

Reduction of medication picking errors (involving wrong drug and wrong strength) at Clementi Polyclinic Pharmacy by 50% in six months.

REVIEWING THE PROCESS

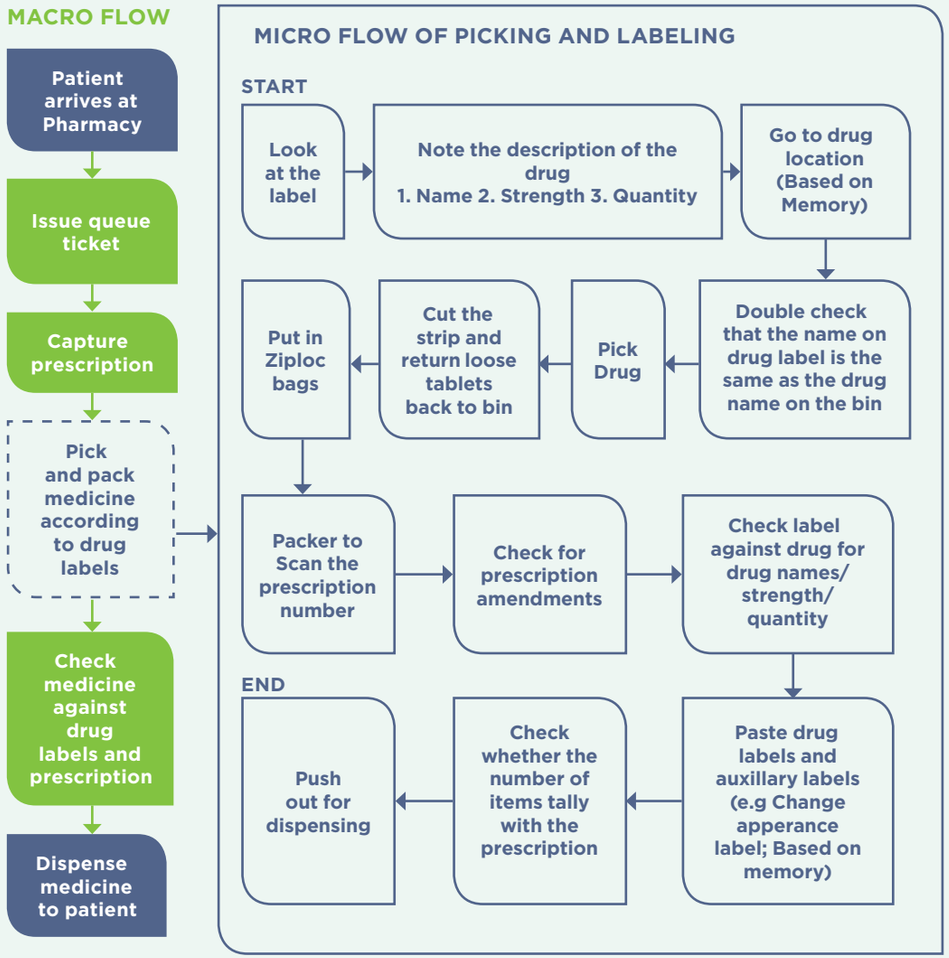


FIGURE 1: FLOWCHART OF THE PROCESS OF PICKING MEDICATIONS

The team introduced a tally sheet at different pick and pack locations for staff to contribute in data collection. The process was simple — as staff could just indicate with a mark if they encountered a near miss involving either a wrong strength or wrong drug. The team was able to pin-point problematic steps in the process and was able to identify the root causes leading to picking errors.

INTERVENTIONS

CAUSES	TEST IDEA
1a. Interruptions New staff: enquiries and checking their work	Improve training efficiency and reduce unnecessary queries
1b: Interruptions Attending to reworks sent back by the dispensers	Introducing "Rework" pegs: Basket requiring reworks will be tagged with the "rework" peg. Picker/packer will first finish the basket at-hand before attending to the reworks
2. Work roster issues	Ensure optimal allocation of manpower to picking/packing sections 1. Balance resources between picker and dispenser 2. Plug gaps in roster especially during shift handover
3. Irregular quantities of cut/loose tablets may be unidentifiable/ identified wrongly or returned to the wrong bin	Quantities of drugs to be rounded off to the nearest 10s or the smallest available packaging size
4. Look-alike-sound-alike drugs/ drugs with multiple strengths 5. Complicated drug names especially combination drugs	Introduce Bin location and Pick-to-Bin: Bin number is allocated to each drug. Bin-location is printed on drug label: Picker refers to the bin number when picking instead of relying on memory. Simplify reading of label: Picker to read bin location (four character) instead of name/strength (60 character)

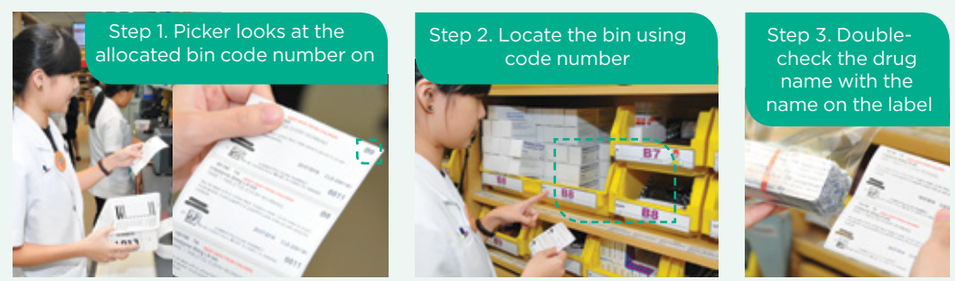


FIGURE 3: PICK TO BIN PROCESS AND BIN LABELS AFTER THE CHANGE.

FIGURE 4: IMPROVE BIN LABEL TO HELP FOCUS ATTENTION ON BIN CODE RATHER THAN DRUG DESCRIPTION

The team worked systematically to address each root cause identified. With each test idea, the team performed pilots to refine and further refine each intervention. Multiple PDSAs were carried out to optimise process of "Picking to Bin Code". DIY laminated zone markers were placed on the floor for easier identification of the different zones. However, wear and tear caused these floor markers to be slippery and a fall risk. The team experimented further and finally, commercially printed, waterproof and slip-resistant zone markers were implemented. Similarly, the bin labels for code numbers had undergone multiple revisions, with inputs from staff before the final design was confirmed.

FIGURE 5: COMMERCIALLY PRINTED ZONE MARKERS ON THE FLOOR TO HELP EASIER IDENTIFICATION OF DIFFERENT BIN ZONES

HARVESTING THE OUTCOMES

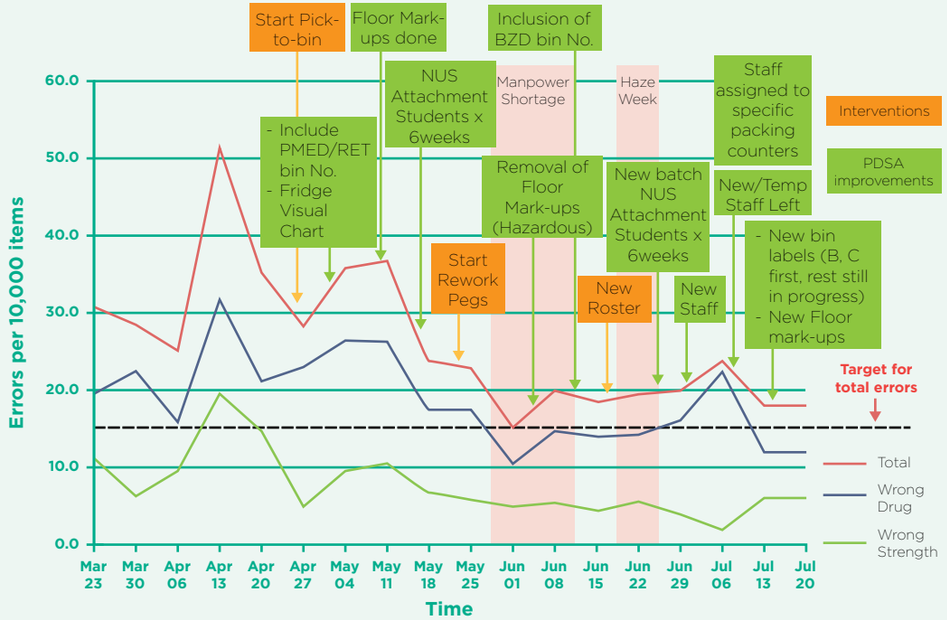


FIGURE 6: RUN CHART OF MEDICATION PICKING ERRORS IN CLEMENTI POLYCLINIC

After implementing the above interventions, total picking errors reduced by approximately 33%. The team leaders went on to implement the changes across all nine NHG polyclinics between October 2013 and June 2014. Each polyclinic had different physical layouts, and this required different considerations for separating Look-alike-sound-alike drugs. The team received a Merit Award in the annual NHG Improvement Best Project Awards in 2014. "We also have the CPIP Facilitators to thank — Mr Bernard Wong, Ms Katherine Lim, and Adjunct Associate Professor Tai Hwei Yee in particular — as they have ensured that the energy for our project was ongoing and did not lose steam," Mok Shiang mentioned.

This project continues to serve as a teaching model for future improvement projects in NHG Pharmacy, and was the foundation of the Medication Safety Workgroup within all polyclinics. The workgroup seeks to constantly improve and sustain the system, and has identified a champion within each clinic to ensure the work is sustained and continually improved. The workgroup seeks to constantly improve and sustain the system, with each clinic branch having a champion or a voice. International recognition came when the project was selected for presentation at BMJ's International Forum for Quality and Safety, Paris in 2014.

CPIP has also taught us to think deeper about the issues and problems. One has to be open to new perspectives — we had a solution first, but had we not gone for CPIP, we wouldn't have found a solution as elegant as the one we came up with later.

These new systems will open more steps, but also more opportunities for learning and development. Support, teamwork, and cooperation towards a clear goal will aid in the success of the projects we do.

MS NG MOK SHIANG

Deputy Director, NHG Pharmacy, Singapore, CPIP Batch 31

STOP, LOOK, LISTEN

The World Health Organisation (WHO) High 5s patient safety collaboration project was launched in 2006. Singapore was a signatory to the collaboration. One of the goals was to facilitate implementation and evaluation of a Correct Site Surgery process to eliminate the possibility of an incorrect surgery (wrong procedure, wrong patient, wrong site (including wrong side or wrong organ) or wrong implant).

BACKGROUND

Adjunct Associate Professor Chong Yew Lam, Head of Urology with his team comprising of a Urology registrar, operating theatre services staff (unit nurse manager, nurse manager, and three staff nurses) set about to improve the key components of a thorough pre-operative check.

MISSION STATEMENT

To have 100% compliance with *pre-op check for elective Urology surgery in OT 15, in six months, in Tan Tock Seng Hospital (TTSH).

* Pre-Op Check includes proper conduct of:
(i) Time-out
(ii) Site-marking
(iii) X-ray verification

REVIEWING THE PROCESS

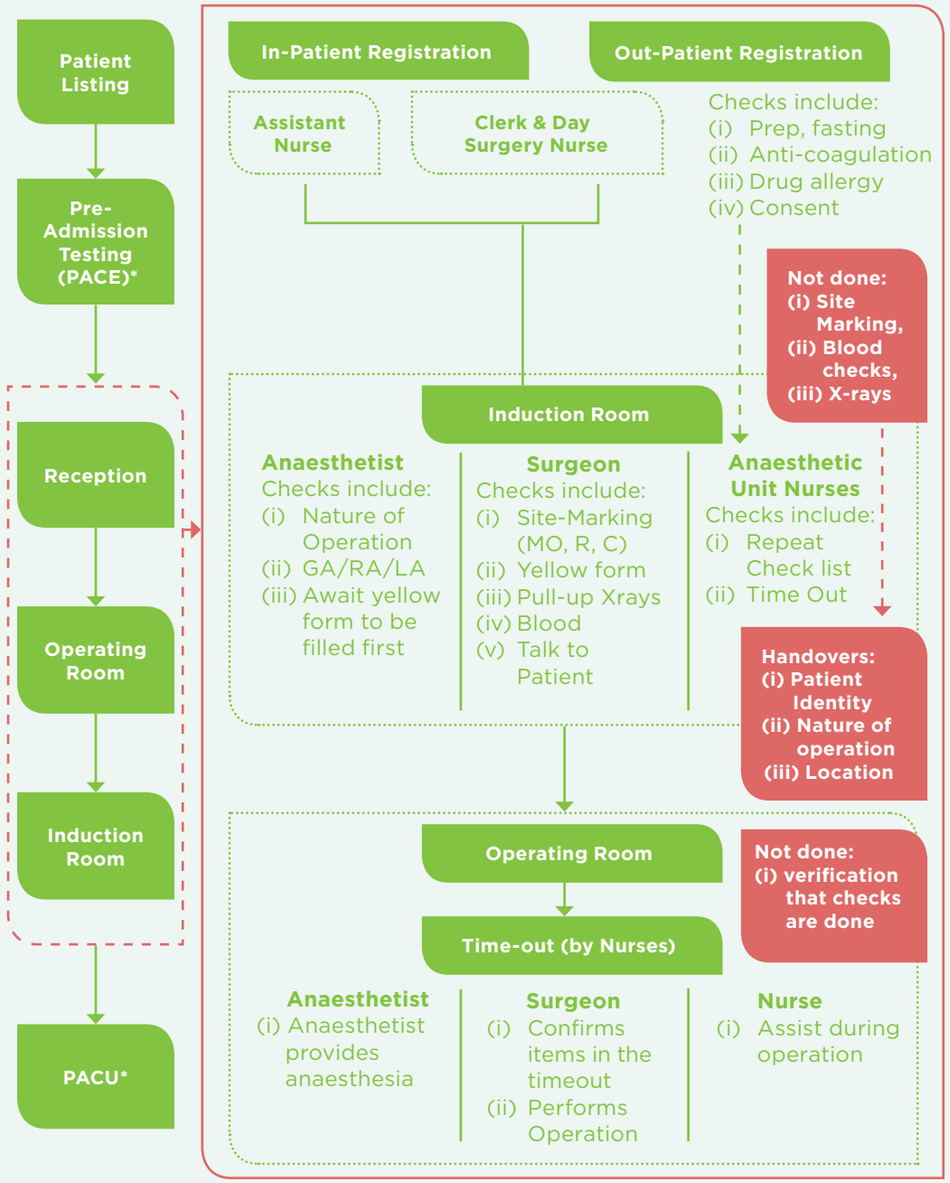


FIGURE 1: PROCESS AT MAJOR OPERATING THEATRE

** PACE - Pre-admission Counselling and Evalution*
** PACU - Post Anaesthesia Care Unit*

The team reviewed the process steps for a patient undergoing a procedure in the Major Operating Theatre (MOT). An observational survey was also conducted on 50 Time-out procedures in General Surgery and Orthopaedics Department , which helped to identify top causes leading to lack of pre-operation checks.

CAUSES	INTERVENTIONS IN TIME-OUT SCRIPT
Surgeon not paying attention	Active engagement of all members of the operative team in Time-out process by verbalising questions that demand a response.
Sign without checking yellow form (perioperative record form)	Active engagement of all members of the operative team in Time-out process by verbalising questions that demand a response.
X-ray verification not in Time-out process	Extended coverage to all the criteria required under WHO HI-5 criteria for pre-operative safety checks.

INTERVENTIONS

A formal script utilising open-ended questions for Time-out was developed. Multiple versions of the script were tested with inputs from staff through direct feedback and surveys. Short-comings and confusing questions in the script were identified and revised. The Time-out form was redesigned to incorporate the same open-ended questions from the new script. The nurse who was reading out the script will check the compliance of each of the Time-out components to complete the documentation. This helped to standardise the process and made it easy for staff to follow.

Observational audits were conducted as the trials of the script and new form were taking place. Individual and combined weekly results for each component were analysed and presented to the team. Nurses were coached by Nursing Officers to use the script effectively.

During user survey, majority of the staff found that the new Time-out script was an improvement over the existing form. Some of the positive comments include the ability to get the team's attention, improved communication among surgeons, anaesthetists and nurses, better anticipation of patients' needs and surgical team members felt that they were empowered to voice out their concerns.

TIME OUT Procedure

Correct patient		☐ Yes	In the presence of :	
Correct procedure		☐ Yes	Surgeon(s)	
Correct operation side / site		☐ Yes		
Implant available	☐ N/A	☐ Yes	Anaesthetist(s)	
Special Equipment Available	☐ N/A	☐ Yes		
Prophylactic Antibiotics Administered	☐ Not required	☐ Yes	Scrub Nurse	

Documented by OT Nurse (Name / Signature) _____ at _____ hr

TIME OUT *(Before skin cleansing)*

Performed & documented by OT Nurse *(Name & Signature)* _____ Time _____

No.	In the presence of: Surgeon: _____, Anaesthetist: _____, Scrub Nurse: _____		Yes	No	*Reconciled	NA
1	Surgeon, Anaesthetist & Nurse to acknowledge	Has (Name & IC of patient) consented for surgery (nature of surgery)?				
		Has patient been **positioned** correctly for surgery?				
		Is the **site marking** (site / side) correct & visible? (If applicable)				
		Are the relevant **preoperative imaging(s)** on display?				
		Are the required **implant** (if applicable) available? Specify: _____				
		Are the required **special equipment(s) / instrument(s)** available? Specify: _____				
		Does this patient have any **allergy**? Specify: _____			Remarks:	
2	Surgeon & Anaesthetist to acknowledge	Is **prophylactic antibiotic** required and has it been administered?				
		Do you anticipate significant **blood loss** & use of blood products?				
		Are there any **surgical** or **anaesthetic issue(s)** to highlight to the team?				
3	Scrub nurse to acknowledge	Has the **sterility** of sterile items been confirmed?				
		Are there **equipment issue(s)** or any **concern(s)**?				

FIGURE 2: OLD FORM (TOP) AND THE NEW FORM (BOTTOM)

Previous Time-out forms only provides listed components of a checklist. The new form was designed as a conversation script.

The nurses conducting the time-outs were nervous at first. With the new script, everything else was systematic and standardised. From there, they were able to curb their own doubts of missing out important questions. Nurses felt that the surgical teams were listening to them with the use of this script, and the surgeons also started to be more compliant with the procedures.

ADJUNCT ASSOCIATE PROFESSOR CHONG YEW LAM

Senior Consultant, Tan Tock Seng Hospital, CPIP Batch 19

HARVESTING THE OUTCOMES

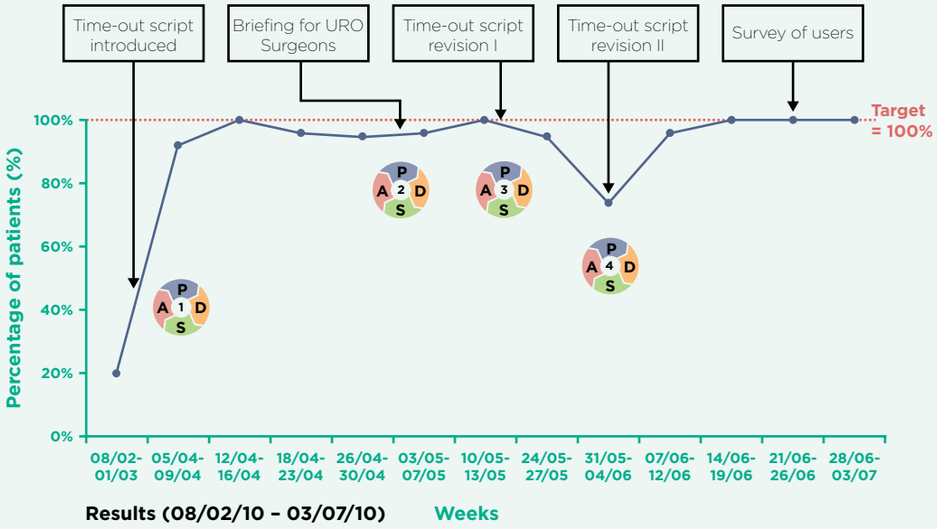


FIGURE 3: RUN CHART OF THE PERCENTAGE OF PATIENT PRE-OPERATIVE CHECK CONDUCTED WITH ALL THREE COMPONENTS (TIME-OUT, SITE-MARKING AND X-RAY VERIFICATION)

Results of patients with all three components (proper Time-out, correct Site-marking and X-ray verification) showed a marked improvement and the team was able to reach 100% compliance. The Time-out script has been adopted by the Hospital Safety Committee and implemented in all other surgical disciplines, including for procedures done outside OT. In December 2011, the same Time-out script and Form was incorporated into the hospital electronic OT reporting system. The team received the 1st prize from the Ministry of Health 8th Healthcare Quality Improvement Competition in 2011 for their improvement project.

FIGURE 4: ADJUNCT ASSOCIATE PROFESSOR CHONG TOGETHER WITH DR SHIRLEY BANG RECEIVING HIS AWARD FROM MOH, SINGAPORE.

While trying to implement new interventions, CPIP serves as a good guide, with methodology and the tools walking alongside each other. So, tools like the Run chart, PDSA (Plan-Do-Study-Act cycle), and root cause analysis don't feel so intimidating.

The same principles of CPIP still applies to key parts of everyone's job, and continues to be used to spontaneously start the discussion and start changes in important problems which are worth solving.

This strong sense of mission for improvement in our culture continues to fuel system-wide changes, and acts as a good staff retention tool.

ADJUNCT ASSOCIATE PROFESSOR CHONG YEW LAM

Senior Consultant, Tan Tock Seng Hospital, CPIP Batch 19

CHANGING A DEEPLY-ROOTED PRACTICE

Wrong-site tooth extraction is both a significant medical error and one of the major reasons for litigation in dentistry. Worldwide wrong-site tooth extractions makes up of 14 percent of all medico-legal claims reported, and is largely preventable. Procedural "Time-Out" is conducted before extractions, root canal treatments and other surgical procedures. During "Time-out", the Dentist and Dental Assistant reconfirm the type of procedure to be done as well as which tooth is involved with the patient.

BACKGROUND

Dr Serene Wu, a Senior Dental Surgeon at Hougang Polyclinic was concerned about how "Time-out" are reliably conducted in her dental clinic, given that it was at the time that a local newspaper reported a case of a wrong tooth extraction done in an established Dental institution in Singapore.

Patients were expressing concerns and doubts — they were afraid we would extract the wrong tooth, or do procedures on the wrong site, and the costs incurred thereafter.

DR SERENE WU

Head, Dental, NHG Polyclinics (Hougang), Singapore , CPIP Batch 32

MISSION STATEMENT

To increase the percentage of correct procedural time out for patients requiring extractions in Hougang Dental Clinic to 100% in six months.

REVIEWING THE PROCESS

The improvement team comprised of Dr Wu, a dental officer (DO), two dental assistants (DAs), and two oral hygiene therapists (OHT). They examined each part of the workflow for tooth extraction experienced by the patient in detail.

The reasons for sub-optimal procedural Time-out were attributed to (i) No Reminders (from computer), (ii) Time pressure due to patient load, (iii) DA do not feel empowered to call for Time-out to be done properly, (iv) Workflow not displayed and (v) Checking of patient's identifier on the computer software not in workflow.

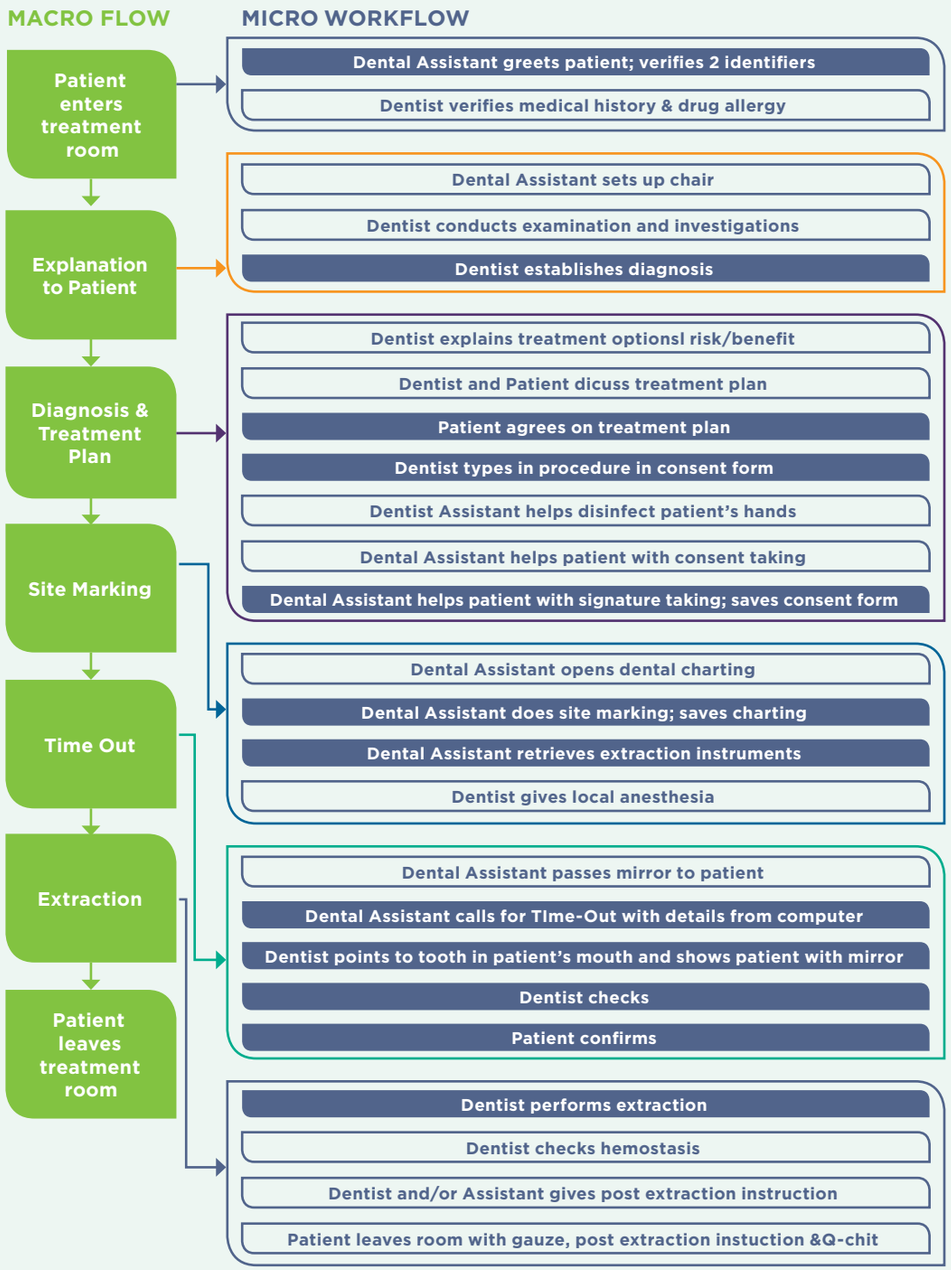


FIGURE 1: PROCESS FOR DENTAL EXTRACTION; BLUE BOXES DEMONSTRATE CRUCIAL CHECKPOINTS IN THE WORKFLOW.

INTERVENTIONS

FIRST INTERVENTION PERIOD	LESSONS LEARNT
1. Reminder signs/posters placed at: a. Sterilisation Room b. Drawers for sterile gauzes needed for extraction c. Computers screens used for documentation 2. Time-out template made available for DAs to conduct Time-out	• Create awareness on procedural Time-out amongst clinicians • Having DAs in the team facilitate feedback on their barriers to conduct Time-out. Template is easy to read from, so DA would not feel embarrassed or uncomfortable
SECOND INTERVENTION PERIOD	**LESSONS LEARNT**
1. Refined workflow for dental extractions displayed in all treatment rooms 2. DAs empowered to do the Time-out 3. Process for whistleblowing on non-compliant DOs 4. DOs educated about their role and expected behaviour during Time-out	• Facilitate correct behaviours by refining processes and systems to eliminate hindrances and difficulties • Set up workflow which are easy to follow for new staff • Education and engagement sessions provided opportunities to clarify new processes, emphasising that it is an essential tool to help prevent wrong tooth extraction
THIRD INTERVENTION PERIOD	**LESSONS LEARNT**
1. Reinforced education and engaged staff on queries. 2. Surveyed clinicians on attitude towards Time-out 3. DO's dialogues with DAs on their surgical practice preferences 4. Engaged all clinicians to perform Time-out audits (on rotational basis)	• Inputs by staff helped team to work on difficult but common scenarios which clinicians are unclear • Survey showed a change of clinicians' attitude towards procedural Time-out - clinicians have recognised and are convinced that it is an essential tool to help them prevent wrong tooth extraction

WORKFLOW FOR DENTAL EXTRACTIONS

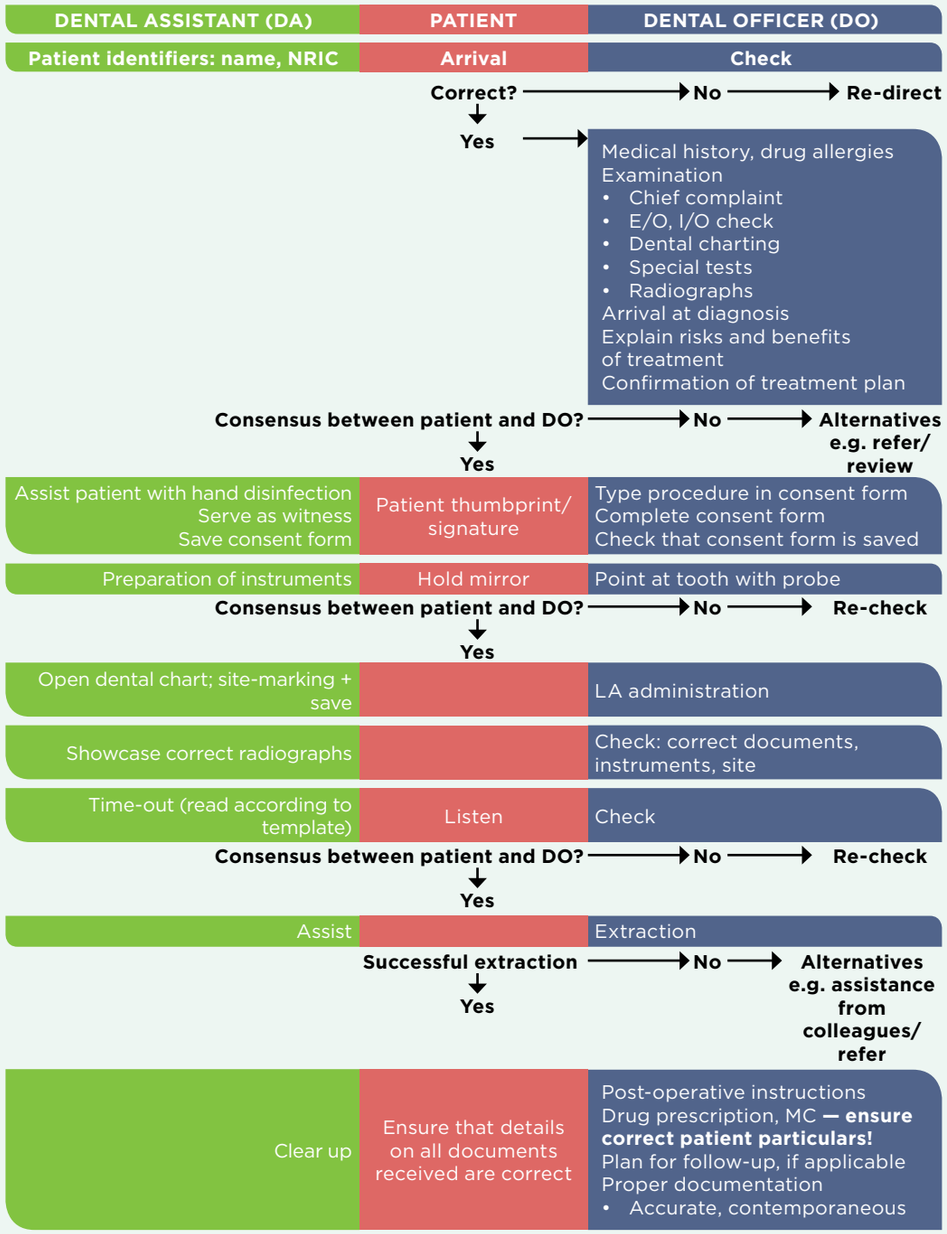


FIGURE 2: WORKFLOW FOR DENTAL EXTRACTION DISPLAYED ON A CABINET WITHIN SIGHT FROM THE DENTIST'S CHAIR

This new workflow for dental extractions has become part of our policy, our dental assistants feel more empowered, with an increased job satisfaction. In addition, dental officers continue to stay with us because they feel more secure with the system in place — they feel safer and more confident that way.

But at the end of it, it's still most satisfying to hear patients say that they are very assured with our new system in place to keep them safe.

DR SERENE WU

Head, Dental, NHG Polyclinics (Hougang), Singapore , CPIP Batch 32

HARVESTING THE OUTCOMES

Dr Wu and her team achieved sustained improvement in conducting correct procedural Time-out in Hougang polyclinic. With this success, Dr Wu's team:

- Spread the interventions to all five dental clinics within NHGP.
- Shared their project with other departments and TTSH Dental Clinic.
- Incorporated the "Procedural Time-out" video in dental orientation for new staff.
- Enhanced the electronic dental record system to integrate workflow.

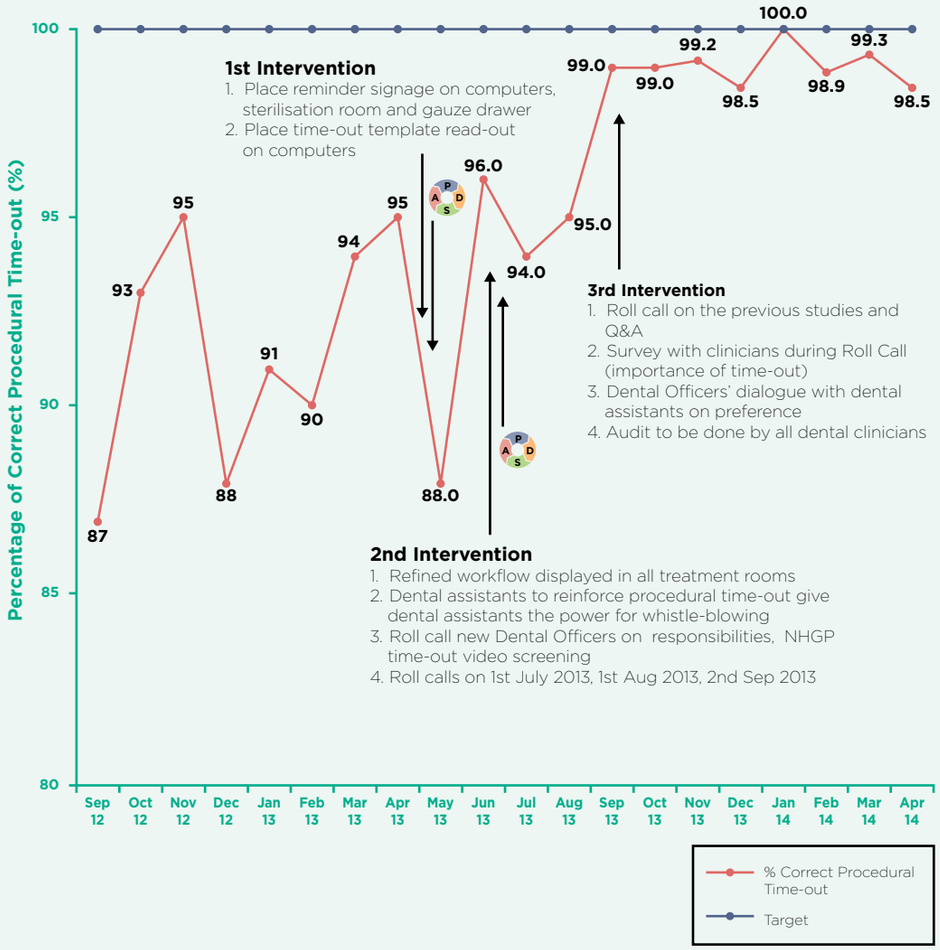


FIGURE 3: RUN CHART OF THE PERCENTAGE OF CORRECT "PROCEDURAL TIME-OUT" DONE BEFORE EXTRACTION

SIR, LOWER YOUR FISTS, PLEASE

"Tertiary mental health patients may commit assaults leading to both injuries and psychological trauma to other patients and staff. Although patients may be unpredictable, there are cases when we can definitely prevent this type of detrimental and unacceptable behaviour," said Adjunct Assistant Professor (Adj Asst Prof) Alex Su, Senior Consultant Psychiatrist in the Institute of Mental Health (IMH).

BACKGROUND

In 2004, a study showed that out of an average of 29 assaults a month in IMH, 20 cases were on patients and nine cases on staff. A retrospective data over a six month period identified that three specific long stay wards contributed to 60% of all assaults, and 5% of recidivists accounted for 53% of incidents. Many of these patients are chronically unwell, with rejection by their families and have past history of aggression and behavioural problems.

In Nov 2004, Adj Asst Prof Su and his team comprising of an assistant director of nursing, three registrars and three nursing officers looked at ways to reduce the assault rates in the three high-risk long stay wards.

MISSION STATEMENT

To effectively identify and reduce the assault rate in three high risk long stay wards of Institute of Mental Health (IMH) by 50% in six months.

REVIEWING THE PROCESS

To get a better picture of the situation, a survey was carried out on both patients and staff.

STAFF SURVEY FINDINGS: (N=196)

61%	staffs have been assaulted before
89%	have witnessed assault while on duty
83%	have patients under their care being assaulted before
89%	have a colleague being assaulted before
59%	accepts assault as part of their work
66%	feels that assaults are preventable
68%	are aware of our workgroup and effort
75%	perceived more assaults in acute wards rather than long-stay wards
60%	felt that it was a staffing problem

PATIENT SURVEY FINDINGS (N-42)

78%	are above 40 years old, 86% Chinese, 48% stayed at least one year; 45% stayed more than five years, 67% were rejected by family
43%	have been assaulted before (compared to 27% in acute wards)
50%	have witnessed another patient being assaulted
60%	have witnessed a staff being assaulted
57%	have assaulted another patient before; 87% felt that they were being provoked; only 13% felt it was due to their mental illness
95%	felt that assault was WRONG
86%	felt that their wards were SAFE
50%	believed that having mental illness will reduce the punishment
88%	felt that their medical treatment was satisfactory

The team examined and reviewed causal factors for assaults and identified the following issues:

(i) Lack of senior doctor's inputs to the management of patients.

(ii) Aggressors continue to remain in the wards.

(iii) Some staffs were high-risk and lacked training to handle situations.

(iv) High risk situations with relapsed patients and behavioural issues.

INTERVENTIONS

"In IMH," Adj Asst Prof Su explained, "We wanted to use verbal de-escalation first, so as to build trust between the patients and the staff." The team took the following steps to:

1. Selected staff from the three high risk wards were formed into an "Assault Reduction Team" and were asked to drive changes on the ground. Meetings were held to discuss strategies and monitor trends.
2. The reporting system was enhanced to collect more relevant and useful information on each assault.
3. Team increased awareness through journal reviews, case discussions, ward and block meetings.
4. High-risk patients (both aggressors and victims) were identified and specific interventions applied to them. e.g. special identifiers on clothing, senior doctor ownership of patients, transfer to acute wards when appropriate.
5. High-risk staff received training, more supervision, and assistance in improving language/communication.
6. Strategies were devised to handle high-risk situations, including increased staffing, having better communication aids and activities and isolation of high-risk patients.

IDENTIFYING HIGH-RISK SITUATIONS

- Keep a distance
- Check for safety
- Know the triggers
- Keep the crisis alarm bell at hand
- Verbal de-escalation first

HARVESTING THE OUTCOMES

The team managed to reduce the rate of assault incidents from a pre-intervention mean of 5.3 to post-intervention of 2.2. Lessons learnt from the team's undertaking was if they can identify high risk wards (accounting for more than 70% of assaults), high risk patients (5% of patients can account for 60% of assaults), high risk staff (e.g. young inexperienced, female, foreign) and high risk situations (inter-personal conflicts, environmental factors), a safer environment for both for staff and patients is possible.

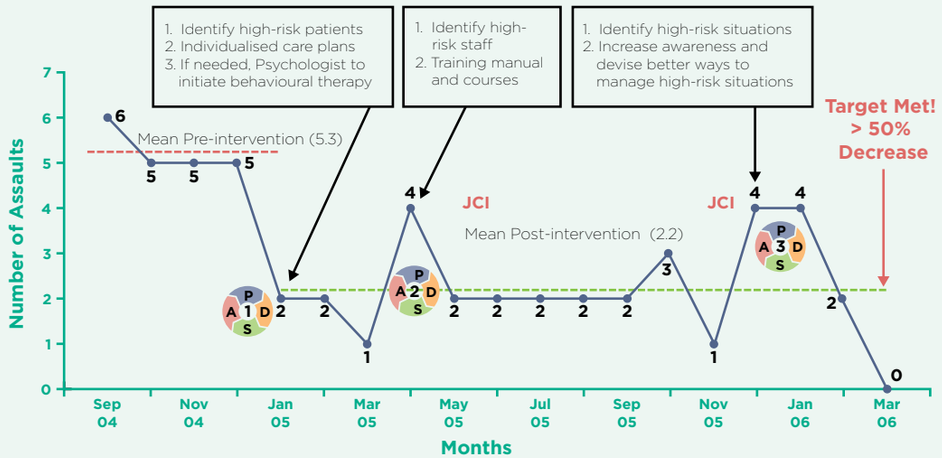


FIGURE 1: NUMBER OF ASSAULTS IN THREE IMH HIGH RISK LONG STAY WARD

Adj Asst Prof Su went on to become the Chair of the IMH CPI Programme. Citing Dr Ross Wilson as one of the most encouraging figures during his journey in CPIP, he shared that significant changes had occurred in IMH, with better multi-disciplinary teams and more patient-centred care.

> All of us are capable of making an improvement that will make a difference to the care of our patients. There are many tools to do so, but it is the spirit that counts. It's a learning journey for every participant, and it's there for everyone who wants to change for the better.

ADJUNCT ASSISTANT PROFESSOR ALEX SU

Vice-Chairman Medical Board (Clinical Quality), Institute of Mental Health, CPIP Batch 8

PART 4.5
CROSS-POLLINATION

GRABBING AN ISSUE BY THE THROAT

Evidence shows that tracheostomy is associated with poor quality of life for patients. Several complications including stoma related events like bleeding, granulation tissue formation, pneumonia, difficulty with vocalisation and feeding. Staff and doctors in the long-term care setting were dependent on the Ear, Nose and Throat (ENT) surgeons from restructured hospitals to plan and initiate weaning of the tracheostomy tube.

> Perhaps the biggest lesson we've all learnt here was to be resilient and believe in the cause we're working for. Our team truly believed in this change, and worked at it for two years to bring about this improvement. At the end of it, seeing it take fruition makes the whole project worth it.
>
> DR KALA KANAGASABAI
> *Director, Ren Ci Hospital, CPIP Batch 31*

BACKGROUND

Ren Ci Community Hospital (RCH) is the largest and only long-term care centre for patients with tracheostomy in Singapore. Dr Kala was concerned with the quality of life of 40 patients with tracheostomy at Ren Ci Community Hospital. Patients with tracheostomies lacked a definite and systematic plan to wean them off their tracheostomy tubes. As a result, these patients were rarely placed on a tracheostomy weaning trial, and only one patient had been successfully weaned off his tracheostomy.

MISSION STATEMENT

"To have a plan for "Trial Off Tracheostomy (TOT)" in all *suitable patients with tracheostomy at the Long-Term Care (LTC) Facility of Ren Ci Community Hospital within 24 months."

*Suitable patients is defined in our inclusion criteria as part of the guideline in discussion with ENT advisor team

REVIEWING THE PROCESS

A survey revealed that although staff and next-of-kin perceptions and attitudes towards TOT were highly positive, staff had low confidence in their ability to perform the process, and were worried about patient safety.

There were concerns about respiratory complications during weaning and the need for resuscitation and transfer to the Emergency Department.

The team comprised of nurse manager, staff nurses and enrolled nurses from both Ren Ci Hospital and Ren Ci Nursing Home in Hougang, physiotherapist and quality executive. They collaborated with a team from Tan Tock Seng Hospital (TTSH) whose members included — ENT surgeon, ENT advanced practice nurse, physiotherapist and speech therapist. Together, both teams came up with solutions to the problem.

INTERVENTIONS

ROOT CAUSES	INTERVENTIONS (PRE-TOT INTERVENTION BUNDLE)	PDSA CYCLES

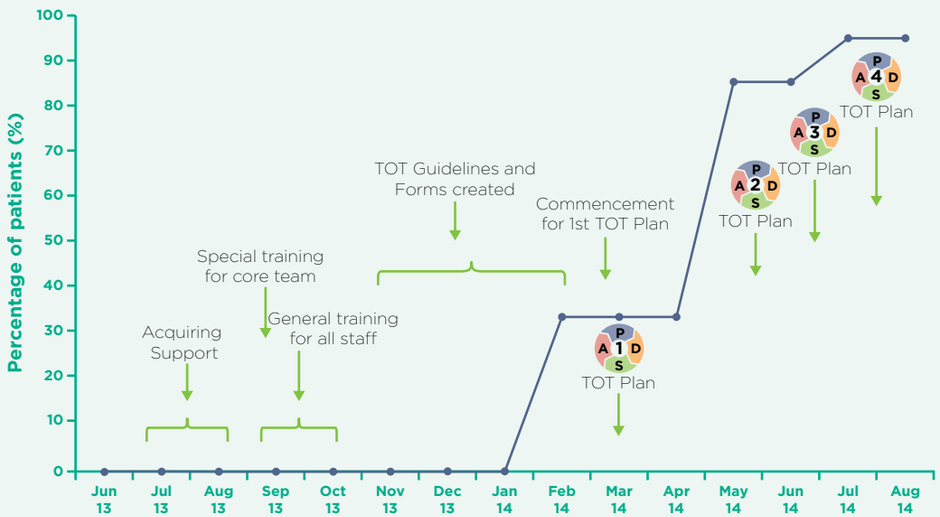
Lack of ENT expertise and support from ENT team.
 	
Insufficient in-house Speech Therapy (ST) service.
 	
No on-site on call doctor after office hours.
	Intervention I (Jul – Aug 2013)
	
	• Formed a collaborative team between RCH and TTSH. A Memorandum Of Understanding between RCH and TTSH was signed. The role of the joint team would be to:
	  • Develop a TOT protocol and work instructions.
	  • Provide training to Ren Ci clinical team and staff Assist in selection of suitable patients for TOT.
	
	• Decision to do de-cannulation phase at Community Hospital rather than Long-Term-Care (LTC) facility in Hougang.
		Several rounds to determine the roles of various individuals on both teams and to select the right people to be on the team. They discovered that:
		
		• Physiotherapy (PT) and Nursing were the key members that contributed to success.
		
		• ST was not required in the initial TOT phase. They are important to assist in vocalisation and feeding review for successful TOT patients.

Lack of specialised/ trained staff for TOT. Lack of staff knowledge on general tracheostomy care/TOT. Staff — perception that it is not possible to do TOT in their patients.	**Intervention II (Sept 2013 – Oct 2013)** • A core team was identified and given specialised training on tracheostomy and TOT. • General training on tracheostomy care and TOT was provided to all staff.	TTSH team conducted an on-site review to help customise content training and development of protocol and work instruction. The curriculum was revised several times to fit the training needs of the staff. Nurses and doctors from Ren Ci received hands-on training at TTSH ENT clinic. TTSH Nursing and Physiotherapy staff gave hands-on training to nurses at Hougang Nursing Home by TTSH Nursing and PT for RNs and ENs.

Lack of formalised guidelines or processes for TOT. Lack of staff knowledge on TOT processes.	**Intervention III (Nov – Jan 2014)** • Developed TOT Guidelines, processes and medical record forms.	TTSH's TOT protocol, nursing work instruction, guidelines were adopted and modified to suit patient's needs and resources in community hospital and nursing homes. Several rounds of revision of guidelines and forms were done, based on staff feedback.
TOT INTERVENTION BUNDLE		**PDSA**
TOT Plan Pre-spigotting Spigotting De-cannulation Post De-cannulation phase	**Intervention IV (March 2014 onwards)** • Patients were assessed for suitability for TOT and placed into four categories: Definite TOT; Potential for TOT; Require ENT review for TOT and Contra-indication for TOT. • Safety checklists and user-friendly monitoring charts using tick boxes were developed. • Emergency management flow chart during spigotting and de-cannulation to ensure patient safety was put up for quick reference.	**PDSA 1** • Exclusion and inclusion criteria were reviewed and refined • Pre-spigotting phase included to ensure patient is ready for Spigotting. • Revision of Emergency Management during de-cannulation **PDSA 2** • Changes made to duration of Spigotting and De-cannulation; Timing and duration of change of inner tube. • Rescue and excessive bleeding management plan. **PDSA 3** • Two weekly patient selection process instead of monthly. • Inclusion of TOT Complication data tracking weekly. • Inclusion of PT therapy records in all phases. • Additional TOT patient Assessment and Selection sheet was included. • Modification to the medical and nursing interventions for TOT patients. **PDSA 4** • Defined PT role in post de-cannulation. • ENT/ST review post de-cannulation. • Pre-spigotting on weekends and public holidays. • Process for aborting TOT plan.

HARVESTING THE OUTCOMES

Preparing the organisation's infrastructure and staff training before putting the first patient on TOT was a major undertaking. However, the team worked systematically to address all issues, including getting approvals for transfer of patients to the community hospital for the trial and de-cannulation. As a result of their hard work, more than 90% of eligible patients had a plan for TOT and 100% of patients who completed the trial successfully were safely and uneventfully weaned off their tracheostomy tubes. Strong leadership and support from senior management, heads of departments, staff and next-of-kin contributed to the success of this project. Dr Kala said, "It's not easy for our nurses to look after and build a relationship with a ward of patients who cannot communicate verbally. But, what is so satisfying is the happiness and feedback from the families to the point where some are actually asking on behalf of their relative — when is it our turn?"



Patients were assessed based on criteria and decision was made whether for TOT or not or pending further monitoring or review by ENT.

FIGURE 1: PERCENTAGE OF ELIGIBLE PATIENTS WITH A PLAN FOR TRIAL OF TRACHEOSTOMY TO BE REMOVED

FOOD, GLORIOUS FOOD

Elderly patients above the age of 50 years may suffer from dysphagia, which is a condition where patients may face difficulties with swallowing. Causes of dysphagia may include physiological age-related changes in swallowing, acute illness or chronic medical condition e.g. Stroke, Parkinson disease and Dementia. Management of these patients require a multidisciplinary approach involving doctors, nurses, speech therapist and dietitian as well as the patient and caregivers. Dietary modifications are a key intervention to ensure patient safety and clinical outcomes. Not following recommended texture modified food may result in cough and choking, aspiration pneumonia, malnutrition and dehydration which, in turn, can result in increased length of hospital stay and increased healthcare cost.

BACKGROUND

Tan-Chwee Say Moi, a Nurse Manager at Ang Mo Kio - Thye Hua Kwan Hospital (AMK-THKH) started looking at diet serving process as well as the ordering process using the Diet Ordering System.

MISSION STATEMENT

To ensure that all Speech Therapist's and Dietitian's recommendations are complied with by the next meal order, within six months in Ward 3, AMK-THKH.

Her team comprising a ward registrar, dietitian, locum speech therapist (ST), ward assistants (WA), staff nurses (SN), with leadership support from their director of medical services and director of nursing services.

The following root causes were established. (1) No formal training for staff, (2) Team staff nurses too busy to key into the computer, (3) Staff nurses misses out or forget to update the bedside chart, and (4) Database system too complicated causing staff to type on wrong line.

INTERVENTIONS

Intervention 1

- Trained all ward assistants (WA) to update the diets in the master diet ordering. The training program included the orientation of new staff to the unit.
- Educated all nurses on various diet texture and fluid consistencies (e.g. blended diet and thickened fluid) for different groups of patients.

Intervention 2

- Clarity around assigned roles and responsibilities amongst staff involved in the diet ordering process. The team reduced the number of staff involved.
- The speech therapist assistant (TA) will write on the diet amendment form located at the central station. The WA will amend the diet for the next meal when updating the master ordering system and indicate this is done by signing.
- Dietitians will update their recommended diets directly into the diet ordering system.
- Team staff nurses were to follow up with timely change of diet for patients.

Intervention 3

- TA will personally update the fluid consistency chart at patient's bedside.
- Dietitian will update own recommended feeds in chart at patient's bedside.

Intervention 4

- Refined master diet ordering system to be more user friendly — the font size and row height increased to reduce data keying errors.

HARVESTING THE OUTCOMES

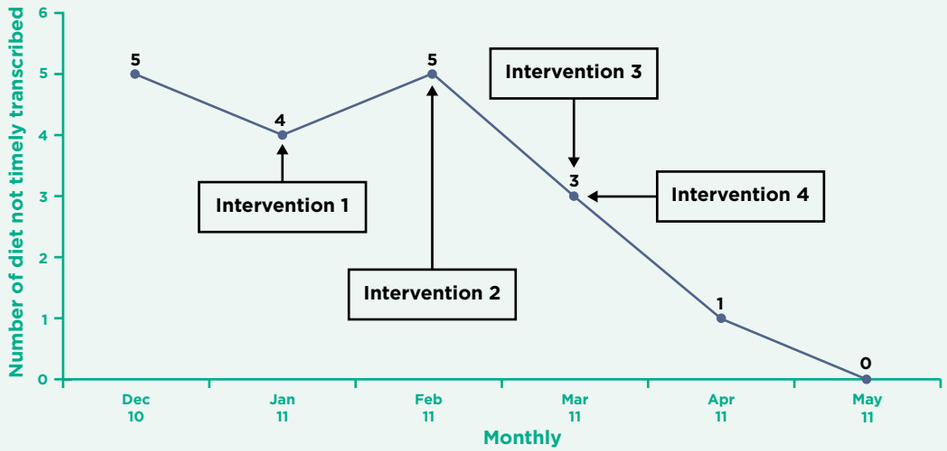


FIGURE 1: RUN CHART OF DIET ORDERS NOT TIMELY TRANSCRIBED TO DIET ORDERING SYSTEM

The team achieved 100% of diets transcribed accurately and in a timely manner into the Diet Ordering System.

"When the speech therapist agreed to our intervention, we found that it became a system that we can follow very well," Mdm Tan said. Direct documenting into the system has also helped the staff to update their consolidated case notes well. This simple change resulted in a much safer process for patients.

With the guidance of their senior management, Mdm Tan also mentioned that CPIP has helped their staff in thinking about improving care and guiding themselves in care improvement.

> CPIP was useful as a quality principle for our staff. Thanks to the support of our facilitators, senior management, and the team, we have been able to set SOPs for our future processes as well.

MDM TAN-CHWEE SAY MOI

Nurse Manager, Ang Mo Kio-Thye Hua Kwan Hospital, CPIP Batch 24

USING TEAMWORK TO GET MOVING AGAIN

Rehabilitation in Activities of Daily Living (ADL) training can speed up a patient's abilities to perform ADL and enhances the possibility of the patient returning to independent living at home. *(Hagsten, Svensson & Gardulf, 2004).*

BACKGROUND

Evidence showed that patients in rehabilitation hospital who receive Occupational Therapy (OT) interventions (rehabilitation in dressing, showering, transfer, functional mobility) are less likely to deteriorate and are more likely to be independent in their ability to perform personal activities of daily living. At Saint Andrews' Community Hospital (SACH), the window of opportunity for such interventions is best completed with the patients within two weeks of admission. A three month audit in 2012 on the occupational therapist's care delivery showed that out of 206 discharged patients, only 8.9% of the patients had OT care delivery completed within two weeks of their stay. The OT plan tended to focus more on rehabilitating patients' physical impairments compared to ADL functionality.

Anna Lee, principal occupational therapist and manager, together with Jasmine Heng, nurse manager in outpatient services, decided to address this gap with an improvement project.

MISSION STATEMENT

To improve the average number of days to complete OT Care Delivery* within two weeks of hospitalisation for patients** with good mental score*** in SACH, within six months

* Occupational Therapist's Care Delivery denotes training the patient in: dressing, showering, transfer, functional mobility
** Patients assistance level: moderate, moderate to minimum assist, minimum assist to standby assist and standby assist.
*** Abbreviated Mental Test Score ≥ 7

FIGURE 1: MS ANNA LEE, MS JASMINE HENG, AND THEIR TEAM

REVIEWING THE PROCESS

Their multidisciplinary team comprising of a doctor (Dr), senior staff nurse (SSN), enrolled nurse (EN), two occupational therapists (OT), patient services assistant (PSA) and a patient, set about reviewing how the care plan for patients was developed and executed during the patient's stay in the community hospital. Root causes contributing to the lack of OT'S care delivery on dressing, showering, transfer, functional mobility within two weeks were established.

INTERVENTIONS

The team undertook interventions for the top five root causes that were identified. They executed a series of small Plan-Do-Study-Act (PDSA) test cycles before implementing for all patients.

ROOT CAUSES	INTERVENTION	PDSA CYCLES
Lack of standardised ADL training for OTs.	Developed structured training slides.	1st PDSA — Training to OTs done. Measured by staff survey. 2nd PDSA — Follow-up training session, OT to gather feedback on actual care in ward, toilet, any concerns. Feedback: Reinforcement of selection criteria.
OT's discretion to do self-care delivery.	Develop guidelines for patient's self-care delivery by Occupational Therapist.	1st PDSA — Piloted in Ward 7. Measured by auditing patient's OT progress notes x 10 patients (80% forms completed). 2nd PDSA — Spread to all rehab wards. Measured by auditing patient's OT progress notes x 13 patients (92% forms filled).
OT concentrates on patients' physical impairments.	(i) Design new documentation for Goal Attainment Score (GAS). (ii) Incorporated GAS in self-care in initial therapy assessment form.	1st PDSA —Pilot initial assessment with GAS therapy form and GAS new form in Ward 8. Measure: Check 10 forms are filled (100% forms filled). 2nd PDSA — Spread to other Wards (5,6,7,10). Revised GAS document from four pages to one page.
Patient perceives rehabilitation is only exercising on equipment to regain functional status.	Slogan on how OT can help you on self-care. Poster on OT-led interventions emphasising on self-care.	1st PDSA — 12 slogans received. 2nd PDSA — OT staff informed to design posters based on slogans. Piloted in Ward 7 and Ward 10. 3rd PDSA —Change poster location to ADL Room. 4th PDSA — Poster at Outpatient Clinic; All positive.
OT does not see the need to do self-care delivery.	Case ward rounds monthly (1200 hrs to 1230 hrs/1600 hrs to 1630 hrs)	1st PDSA — Start with Ward 8 with all OT, staff feedback it was overcrowding and irrelevant. 2nd PDSA — Reduced to one Principal OT and designated Ward OT to conduct individual ward round on every 3rd week of the month. Feedback: Fast and efficient.

HARVESTING OF OUTCOMES

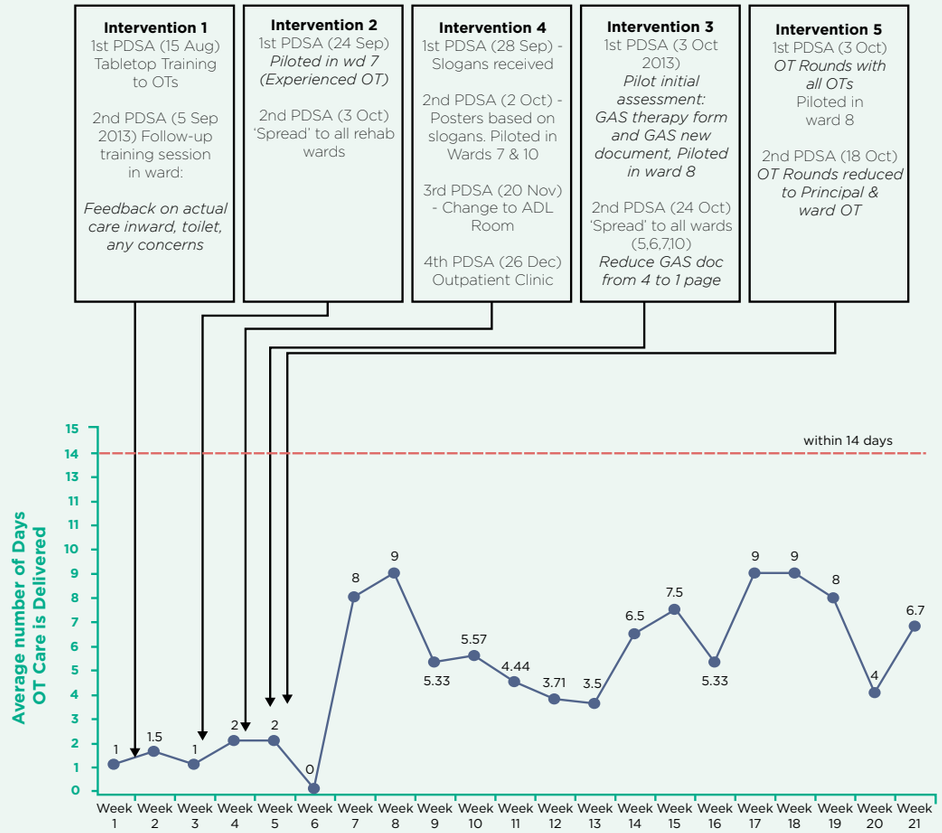


FIGURE 2: AVERAGE NUMBER OF DAYS TO COMPLETE OT CARE DELIVERY

Patients continued to get their OT care delivery done well within two weeks of admission without impacting the OT Department operations.

> You have to experience for yourself the interventions you have put in place and walk in your staff's shoes. These changes have to be simple, doable to be sustained in the long run. If you find it difficult yourself (to complete a four page form) it tells you a lot about the design that has to improve.

MS ANNA LEE

Manager (Occupational Therapy), Saint Andrews' Community Hospital, CPIP Batch 33

> CPIP has taught us that at the end of the day, we march together as a team to care for our patients.

MS JASMINE HENG

Nurse Manager, Saint Andrews' Community Hospital, CPIP Batch 33

NEXT LAP

Like life, CPIP needs to evolve — see what the new thinking is, across all levels as the healthcare landscape changes constantly. We need to re-assess our legacy and inherited processes, and ask, "Shouldn't this change? Is this the best way?" There should be relentless foresightedness and will to achieve a perpetual cycle of improvement.

ASSOCIATE PROFESSOR THOMAS CHEE
Tan Tock Seng Hospital

Think beyond one-to-one clinician-patient interaction in creating value for patients and community. If you have the opportunity to do quality improvement work that positively impacts patients' care, go for it! Always critically examine how your patients may perceive your proposed "improvement", as patient value is frequently in the eye of the beholder.

DR TUNG YEW CHEONG
National Healthcare Group Polyclinic

You have two jobs, CPIP is to help you do your second job well.

Small is beautiful but has its limitation. Our survival will depend on how we go about approaching our problems.

Be curious, be persistent. Adapt unashamedly. Copy if it's good for us. Follow best practices.

PROFESSOR CHEE YAM CHENG
National Healthcare Group

Essential to develop enthusiasm for quality improvement — make it a common goal. Put it early in the medical school curriculum. Demonstrate to young doctors the concept of dealing with clinical process issues using quality improvement tools. Mentorship from clinicians and sponsorship from HOD is key.

DR CHONG YEW LAM
Tan Tock Seng Hospital

I was told — If you go to CPIP, you will change the way you approach a problem.

MR BALACHANDRAN JAYACHANDRAN
Tan Tock Seng Hospital

There is always a need to improve clinical processes, ensure reduction of waste and enhance productivity. CPIP has proven methodologies that can improve clinical issues that seem impossible. Your projects do not have to be large-scale to have an impact on patient care.

PROFESSOR TAN HUAY CHEEM
National University Hospital

CPIP provides the foundation to aid in grasping quality improvement concepts. CPIP concepts have endured over the years. Should we have a national CPIP to look at the nation-wide healthcare improvement and put in place outcome measures so that healthcare outcomes can be measured and constantly be used for improvement? Looking into the future, it is important to develop a culture of improvement for Singapore.

ASSOCIATE PROFESSOR DR LAU TANG CHING
National University Hospital

Remember that the work behind improvement is always almost like caring in healthcare. You don't want to improve FOR me, nor do improvement TO me, but rather WITH me. Have fun always!

MR BERNARD WONG
Group Quality Resource Management

All of us are capable of making an improvement that will make a difference to our patients. There are many tools to do so but it is the spirit that counts.

DR ALEX SU
Institute of Mental Health

Modify CPIP to train beyond clinical processes e.g. can we use CPIP to modify patients' behaviours when they are at home? Are we ready to help and facilitate clinicians to improve processes beyond the hospital and clinical setting, and to help them innovate care?

ADJUNCT ASSOCIATE PROFESSOR CHUA HONG CHOON
Institute of Mental Health

Work on something meaningful and significant, that you can look back in time, and be grateful for the opportunity to have made a permanent improvement to the human condition.

ASSOCIATE PROFESSOR THOMAS LEW
Tan Tock Seng Hospital

MY WISH LIST...
MESSAGES FOR THE FUTURE GENERATIONS

PEOPLE BEHIND THE SCENE

As we look forward to the future of our CPI programme, it would not have been possible without the hard work of the coordinators behind the scenes. Working tirelessly to bring the programme to our participants, CPIP has changed the lives of our coordinators, in their daily work, mindset, and outlook.

Over the years, I have managed and run 10 batches of CPI Workshop. It has been a mindset change for me to see a positive change to many long-standing problems through the use of CPI methodology, which benefits the patients.

MS PAM WONG
CPIP Coordinator, National Healthcare Group

There are always new thoughts and perspectives that I could gain from the in-house clinic sessions as well as the review sessions at NHG.

MS ONG EE LING
CPIP Coordinator, Tan Tock Seng Hospital

Every facilitation meeting that I have participated in, I would always learn something valuable.

MS YONG YEE NING
CPIP Coordinator, Tan Tock Seng Hospital

My journey with CPIP team members, leaders, mentors and facilitators has always been a roller coaster ride — a thrilling experience where new discoveries are made.

(Left)
MS SHERLYN SEAH
CPIP Coordinator, Institute of Mental Health

It has enlightened, encouraged and inspired many, including myself, on a professional and personal level. To those on the improvement journey — "Difficult roads often lead to beautiful destinations." Ganbatte!

(Right)
MS GOH SIEW MUI
CPIP Coordinator, Institute of Mental Health

We should continue to fuel our staff with resources to strive for continuous and sustainable improvement.

MR LEE JUN YUE
CPIP Coordinator, National Skin Centre

From a clueless new comer five years ago, to now being able to help the teams to reach where they want to be, it has been a fruitful experience for me. I would like to thank my institution facilitators, who stay beyond dinner time for discussions and answer my sometimes "stupid" questions. I have learnt a lot from you.

MS RACHEL LI
CPIP Coordinator, National Healthcare Group Polyclinics

We would like to acknowledge our past and present CPIP Coordinators, Faculty, Facilitators, and anyone who have contributed and supported in one way or another through the 15 years of our quality improvement journey.

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CLOSING MESSAGE

NHG has been fortunate that our leadership recognised early on that it was vital that our staff must be supported to deliver the clinical outcomes that are necessary for us to achieve the vision of "Adding Years of Healthy Life". From this intention, the CPIP programme was started as a means to impart improvement knowledge and skills to our professional staff and as a driver for culture change within our organisations. Over the past 15 years, the focus of the programme was to be the catalyst to inculcate an improvement mindset in our participants. CPIP engages clinicians to think about care delivery at a systems level and empowers them with the tools and knowledge to make sometimes difficult and transformational changes for better patient care.

From humble and small beginnings, the CPIP is today, a well-established foundational programme in NHG's pursuit of excellent and patient-centred quality care. It is gratifying to also see that we have participants from all over Singapore, and even from other countries. This ability to bring together participants from diverse institutions adds to the richness of the collective experience. The 19 CPI projects showcased in this publication represent the experiences our participants have gone through while initiating, driving and effecting the change they wanted to see for the betterment of our patients.

Over the years, I am happy to see quality improvement has become an integral part of the ethos within NHG. This will give NHG the ability to face today's challenges: to achieve population health, and to collaborate meaningfully with patients and our partners, and be true agents of change. I would like to extend my heartfelt thanks to the pioneers of this programme, our Board and Senior Management for their unending support. My deepest gratitude goes to the CPIP Faculty and supporting staff who have carefully nurtured this precious seedling. I am confident our patients and staff will continue to enjoy the fruits of their labour for many years to come.

ADJUNCT ASSOCIATE PROFESSOR TAI HWEI YEE
GCQO, National Healthcare Group

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