

# Technology and Medication Safety

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# Medication Safety

- What technology can do
- What technology can't do (yet)
- What we need to do

# Prescribing

## Drug Allergy

## Maximum Dose Alert

## Drug Interaction

Alert Detail - CGH SMM TST Patient 09 - Tramadol HCl Capsule/Tablet

Alert Summary

Ack...	View...	Do...	Alert	Priority	Type	Comment	Scope
✓	✓		Patient Allergy	HIGH	WARNING	!	Chart

Alert: Patient Allergy

Message: **ALLERGY ALERT - tramadol**

[Expand](#) This patient is allergic to tramadol.  
Order/Additive Name: **Tramadol HCl Capsule/Tablet**  
Reaction: Yes to tramadol  
[References](#) ADDITIONAL INFORMATION Rpt By: CPHLM; Route: Oral; Probability: Possible; Onset Date: 00000000; Adverse Reactions: Anaphylaxis; Rpt Date: 201703161306; Source: Patient; Parent Drug; Category: DA

Acknowledgement Comment:

Acknowledge when seen

Unacknowledge << Previous Alert 1 of 1 Next >>

Alert Detail - CGH SMM TST Patient 09 - Amlodipine Tablet

Alert Summary

Ack...	View...	Do...	Alert	Priority	Type	Comment	Scope
✓	✓		Medication Dosage	HIGH	WARNING	!	Chart

Alert: Medication Dosage

Message: **Amlodipine Tablet 20 mg PO OM is OUTSIDE USUAL DOSE RANGE**  
Based on patient age of **65 year(s)** and route of **PO**:  
**Total Daily:**  
Above Usual Dose Range 0-10 mg, Current Order: **20 mg**

[Expand](#)

[References](#)

Acknowledgement Comment:

Acknowledge when seen

Unacknowledge << Previous Alert 1 of 1 Next >>

Alert Detail - CGH SMM TST Patient 09 - Ciprofloxacin Tablet

Alert Summary

Ack...	View...	Do...	Alert	Priority	Type	Comment	Scope
✓	✓		Drug Interaction	HIGH	WARNING	!	Chart

Alert: Drug Interaction

Message: There is an **interaction** with the **Ciprofloxacin Tablet** medication.  
(Max severity is **Major**)

[Expand](#) **Warfarin Sodium [MAREVAN] Tablet** Major Drug Interaction

[References](#) ADDITIONAL INFORMATION  
**Details for Ciprofloxacin Tablet-Warfarin Sodium [MAREVAN] Tablet** Start Date: 17-Aug-2017 08:39 Status: Unapproved Order  
**MONITOR CLOSELY:** Some quinolone antibiotics have been reported to potentiate the hypoprothrombemic effect of warfarin and other coumatins, anticoagulants. The exact mechanism is unknown but may involve

Acknowledgement Comment:

Acknowledge when seen

Unacknowledge << Previous Alert 1 of 1 Next >>

# Review by Pharmacist

## Electronic Medication Intervention Form

**Signature Manager**

Function  
 Sign  
 Approve/Verify

Patient Selection  
All Patients

Date Range  
Start Date: Earliest Available  
Stop Date: Latest Available

Facility Selection  
Ang Mo Kio Community Hospit

Provider Selection  
My Signatures

Item Type Filter  
Orders

Item Status Filter  
Active

Sort Sequence  
Location, Patient, Type, Date

Item To Process  
 Sign/Refuse To Sign  
 Reassign

Get List

Item(s) to Sign 4 Items Returned

Changi General Hospital - CGH Clinic B

ANI - SOC MT NO INCOME <S6074083F> (Changi General Hospital - CGH Clinic B - 08-Jun-2016)

Orders

Date	Requested By	Entered By	Status	Medication	Comments
10-Sep-2016 10:04	CGH Doctor 01 (Doctor)	CGH Pharmacist (Pharmacist)	Discontinued	Co-amoxiclav Tablet	Discontinued - 10-Sep-2016 10:04.
10-Sep-2016 10:05			Ordered	Co-amoxiclav Tablet	<Session:> Standard;*Auto Activate.
10-Sep-2016 09:58			Discontinued	OMEprazole Capsule	Cancelled by Clinician/Ward - 10-Sep-2016 10:08. New order ID is 001BHP508.
10-Sep-2016 10:09			Ordered	OMEprazole Capsule	<Session:> Standard;*Auto Activate. Old Order ID was 001BHP501.

Documents

When Dr logs in EMR, Dr can view document details

1. Sign
2. Refuse
3. Close

Show All Select All Unselect All Details Alerts

Edit Sign Refuse Reassign Close

# Closed Loop Medication Management

**1** Doctor orders medication



*Places medication order in Electronic Medical Record System*

**2** Pharmacist verifies orders



*Verifies orders using Electronic Medical Record System*

**Closed Loop Medication Management (CLMM)**

**5** Nurse administers medication



Identify Patient

*Using wireless/RFID with Electronic Medical Record System to meet 5 rights*

**4** Nurse prepares medication



Automated Medication Cabinet



Automated Medication Cart

*Takes medication from Automated Medication Cabinet (AMC) and prepare medication into Automated Medication Cart*

**3** Robot packs medication



*Verified orders are packed and dispensed to Ward (IPAS / Robot)*

# Closed Loop Medication Management

## Enhancing patient safety – ensuring 5 RIGHTS

- RIGHT patient – Barcode verification
- RIGHT medication – Verification before administration to right patient
- RIGHT dosage- Pre-packed sachets
- RIGHT time – Alerts system
- RIGHT route



# Outpatient Pharmacy Automation System

- Increase safety by reducing picking and packing errors
- Enabling pharmacists to spend more time on higher-value tasks (e.g drug review, counselling)
- Increase productivity by reducing manpower
- Increased workload capacity handling with reduction in waiting time

ASRS overcomes space constraints and reduces time taken for retrieving and packing

# Administration

## Smart Infusion Pumps

- IV bolus dose
- Continuous infusion
- Bolus dose and continuous infusion
  - separate dose limits for each configured as “hard stops”
  - automatically switches to the continuous infusion rate once the bolus dose has been delivered.



# Drug Library

1. Standardise concentration of infusion
2. All drug infusions have soft and hard max limits set
3. Review the need of bolus dosing for each drug
4. Those with bolus enabled function must have separate hard min and max limits set for bolus dose

# Limitations of Technology

- No need
  - medication reconciliation
- Wrong patient
  - 2 patient identifiers
- Wrong Drug
  - Selection error due to Lookalike names

Lamivudine 100mg vs Lamotrigine 100mg (incorporated therapeutic class to differentiate)

# Limitations of Technology

## Administration

- Wrong scheduling of drugs resulting in errors of wrong time administration e.g. change in dialysis regimen
- Bypass drug library in infusion pump
- Programming errors
- No proper independent double check before administration

## What we need to do

- Use our brains
- Have a downtime plan
- Enhance security
- Work together
- Keep improving

Avoid going on auto-pilot

# Working Together - Independently

## Independent Double Check

A procedure in which 2 staff separately\* check the 5 Rights of a selected parenteral high alert medication (HAM) before administering to the patient.

Evidence of compliance to independent double check should be documented via co-signatures.

Classes of selected parenteral HAM

- Anticoagulants *e.g. Heparin*
- Thrombolytic agents *e.g. Alteplase, Streptokinase, Urokinase*
- Concentrated electrolytes/solutions *e.g. MgSO<sub>4</sub>, KH<sub>2</sub>PO<sub>4</sub>, NaCl 3%*
- Hypoglycemic agents *e.g. Insulin*
- Sedating agents *e.g. Midazolam, Diazepam, Ketamine*
- Neuromuscular blocking agents *e.g. Suxamethonium, Atracurium*
- Chemotherapeutic agents *e.g. Cyclophosphamide, Methotrexate*
- Opioids *e.g. Morphine, Fentanyl, Pethidine*
- Vasoactive agents *e.g. Phenylephrine, Dopamine, GTN*



*\*alone and apart from each other, then compare results*

# Working Together – with our patients



While warded, take only medications served by our nurses.

**Do not self-administer your home medications** without informing our nurses or doctors.

住院期间，仅服用护士提供的药物。

在未告知护士或医生的情况下，**切勿自行服用从家中带来的药物。**

Semasa berada di dalam wad, hanya ambil ubat-ubatan yang diberikan oleh jururawat kami.

**Jangan gunakan ubat-ubatan dari rumah** tanpa memberitahu jururawat atau doktor kami.

மருத்துவமனையில் சேர்க்கப்பட்டிருக்கும்போது, எங்கள் செவிலியர் கொடுக்கும் மருந்துப்பொருட்களை மட்டுமே எடுத்துக்கொள்ளவும்.

எங்கள் செவிலியர் அல்லது மருத்துவர்களிடம் தெரிவிக்காமல்

**உங்கள் வீட்டு மருந்துப்பொருட்களை சுயமாக உட்கொள்ள வேண்டாம்.**



# Working Together - Good Catch Initiative

Launched in 2015

Recognised during CGH  
Patient Safety Day

*In pursuit of Quality, Effectiveness, Safety and Teamwork*

DECEMBER 2015

In focus.. Introducing...

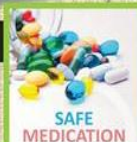
## THE GOOD CATCH INITIATIVE

HAVE YOU SPOTTED A MEDICATION OR PRESCRIPTION THAT SHOULD NOT BE ADMINISTERED TO A PATIENT?

IF SO, YOU ARE ENCOURAGED TO SHARE YOUR EXPERIENCE WITH US SO THAT TOGETHER WE CAN IMPROVE MEDICATION SAFETY PRACTICES FOR OUR PATIENTS.

SHARE YOUR LEARNING EXPERIENCE BY PUTTING IN YOUR DESCRIPTION VIA THE INCIDENT REPORTING SYSTEM.

YOUR EFFORTS IN SHARING WILL HELP PREVENT REAL HARM FROM REACHING PATIENTS.



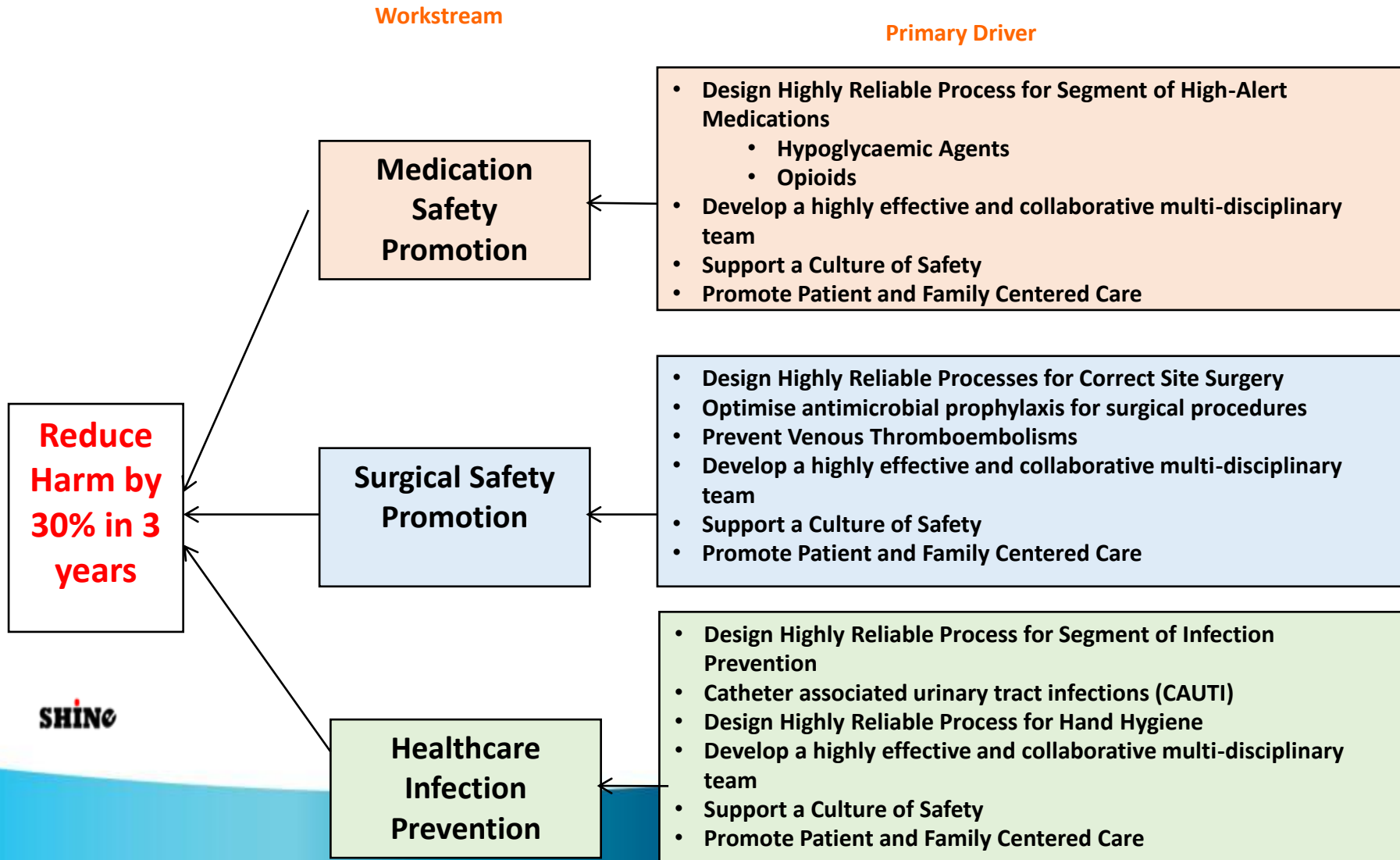


# Keep Improving

- Don't rush to solutions first
- Have a theory for how our intervention matches our problem
  - Each intervention presupposes a certain type of problem
  - What is the theory behind
    - Computer alerts
    - Providing performance reports to departments

# Make Your Theory Explicit

**Driver Diagram:** a tool that organises information and theories about what we are planning to do and how that will effect a change in the outcome.



# Drill Down: Medication Safety Promotion – High Alert Medications (Oral Hypoglycaemics)

Primary Driver	Secondary Driver	Key Change Areas	Change Concepts	Testable Idea (actionable)
Design Highly Reliable Process for Segment of High-Alert Medications	Hypoglycaemic Agents : Oral (OHAG)	Differentiate look-alike-sound-alikes for Oral Hypoglycaemic Agents (OHA) labels	Differentiate: Eliminate look-alikes and sound-alikes (LASA)	<ol style="list-style-type: none"> <li>Use of tall-man lettering for the medication labels during prescribing and picking of oral hypoglycaemic agents</li> <li>Change the labelling for high dosages of hypoglycaemic agents (e.g. Metformin 850mg) to uppercase while maintaining labelling for low dosages (e.g. Metformin 250mg) in lowercase.</li> </ol>
		Adjust the physical environment such that drugs of the same class or look alike are kept apart	Optimize the Work Environment for Safety	1. Store look alike drugs a distance apart
		Standardize training scope / materials for new doctors on Oral Hypoglycaemic Agents (OHA)	Standardise	1. Orientation of new doctors on safe and good prescribing of oral hypoglycaemic agents
		Provide prescribing standard /protocol		Eg, for "Nil by Mouth" cases, system/protocol to ensure no accidental seving of medicine
		Encourage use of electronic decision aids esp for prescribing and monitoring	Automate careful	<ol style="list-style-type: none"> <li>Include warning prompts in the IT clinical support system if 2 sulfonylureas are prescribed.</li> <li>Include common brand names in brackets behind the Drug names of oral hypoglycaemic agents in drop-down list of medications in electronic prescription system and pharmacy system</li> </ol>
		Improve medication labels for patients	Improve communication	1. Larger medication labels for patients, useful especially for elderly
		Counter-checking of drug dosages by pharmacists	Decrease Reliance on Vigilance	1. Counterchecking of dosages with the prescribing doctor if the pharmacist discovers discrepancy with the previous dosage
		Standardize the format of hospital discharge memos	Improve communication	1. Work with the hospitals to clearly list the medications on discharge memos
		Improve patients' knowledge on drugs for self-monitoring and management (include diet advisory and manage dosing during fasting month)	Improve access to information	1. Provide patients with a detailed list of their medicines ie active drug list so they will know when a wrong drug is prescribed.
			Improve communication	2. Patient Information Leaflet (PIL) containing images of drugs are printed on demand for patients
Improve communication	3. Common indications in 4 languages pasted on the medication pack for patients			

# Lessons (I) Learnt

- Do one change at a time
- Multiple PDSAs
- Involve end users in the design, testing, revision, and implementation
- Measure appropriately
- Avoid jumping to (wrong) Conclusions
- Spread “why” and not just “how”

# Medication Safety

- Technology is a strong enabler

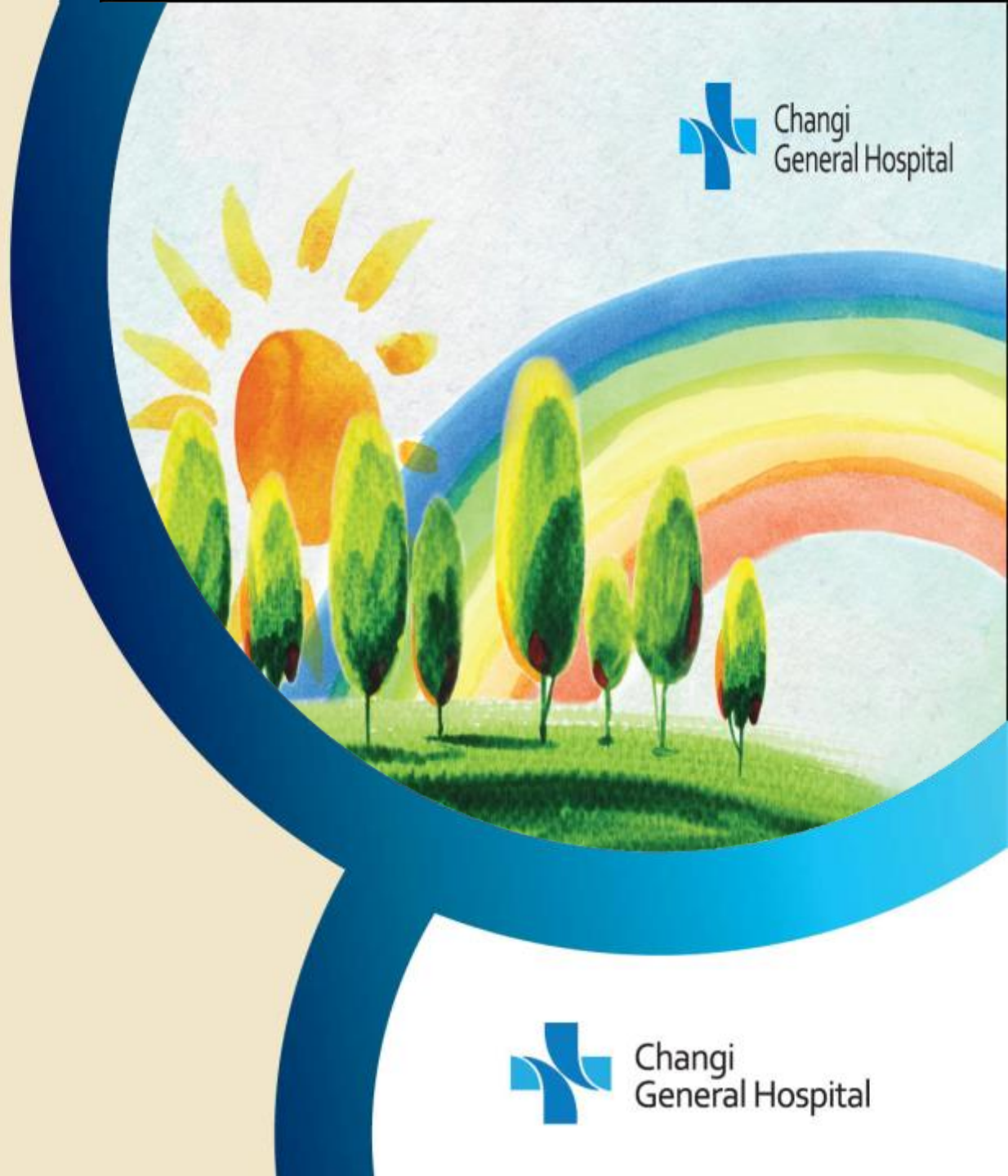
BUT

- It is not a magic bullet

- Technology introduces new risks

BUT

- Complemented by human factors and a safety culture can make care much safer



**Thank You**