Innovation for Sustainable Healthcare

R2R National Forum 2017

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Executive Director
Centre for Healthcare Innovation
Tan Tock Seng Hospital
Singapore Healthcare
Tan Tock Seng Hospital
Innovation for Sustainable Healthcare
Singapore’s Population is Changing...
<table>
<thead>
<tr>
<th></th>
<th>Thailand</th>
<th>Singapore</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Land Area</strong></td>
<td>513,120 km²</td>
<td>719 km²</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>68 million</td>
<td>5.8 million</td>
</tr>
<tr>
<td><strong>Age Demographics</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Life Expectancy (Years)</strong></td>
<td>75 (F: 78, M: 72) (2016 CIA)</td>
<td>85 (F: 88, M: 82) (2016 CIA)</td>
</tr>
<tr>
<td><strong>Top 5 causes of death:</strong></td>
<td>(CDC – 2015)</td>
<td>(MOH - 2015)</td>
</tr>
<tr>
<td>2. Ischaemic heart disease</td>
<td></td>
<td>2. Pneumonia</td>
</tr>
<tr>
<td>3. Stroke</td>
<td></td>
<td>3. Ischemic heart diseases</td>
</tr>
<tr>
<td>5. HIV</td>
<td></td>
<td>5. External causes of morbidity and mortality</td>
</tr>
</tbody>
</table>
Rising Demand for Healthcare

Rapid Increase in Seniors

Number and proportion of elderly in the resident population

Change in Disease Profile

Source: MOH Healthcare Sectoral Manpower Mtg Feb 2015
Changing Context of Singapore Healthcare

**Demand Side**
- Increased Ageing & Chronic Disease Burden

**Supply Side**
- Growth in Bed Demand
- Manpower & Productivity

**Unknown Threats**
- Emerging Infectious Diseases

**System Sub-Optimisation**
- Fragmented Provider-Centric Care
Singapore Healthcare
Tan Tock Seng Hospital
Innovation for Sustainable Healthcare
Three Integrated Clusters

**West Region**
National University Health System and Jurong Health Services

**Central Region**
National Healthcare Group and Alexandra Health System

**East Region**
Singapore Health Services and Eastern Health Alliance

Source: MOH
STRAITS TIMES GRAPHICS
“Yet ever since I began running my business, in my private heart I have always desired to be able to do something for abandoned and suffering people”

Mr Tan Tock Seng
1798 - 1850
Historical Ties with Thailand

King Mongkut
King of Siam

Tan Kim Ching
1st Siamese Consul in Singapore

Anna Leonowe
Governess at the Siamese Court
Our Vision and Mission

Vision
Adding Years of Healthy Life

Mission
Building on our tradition,
Reaching out to the community,
Doing our best to serve, care and heal.
Together, we aim for excellence in cost-effective healthcare, education and research
Established since 1844

One of the largest multi-disciplinary hospitals in Singapore

1,550 Operational Beds
80 ICU & HD Beds

8,000 staff

45 Clinical Disciplines and Allied Health Services

3 Specialty Institutes
16 Specialist Centres
Multi-Generational Inter-Professional Workforce

Jul 2015

Multi Generational Workforce
Higher Proportion of Gen Y
Coming up… 5G Workforce!
TTSH in A Year... Acute Care

57,479 Inpatient Admissions
+0.1% yoy

679,153 Outpatient Attendances
+2.4% yoy

162,701 Emergency Attendances
-0.8% yoy

86,519 Operations
• 30.4% Inpatient
• 69.6% Day Surgeries
+7.8% yoy

462,141 Radiological Investigations
5,117,438 Lab Tests
+6.2% yoy
+4.6% yoy

39,089 Ambulance Cases
+0.1% yoy

502,390 Therapy Attendances
+1.4% yoy

Based on Jan 2015 – Dec 2015
TTSH in A Year… Community-based Care

5,169 Home visits
1,021 ED visits avoided

564 Participants screened under CHEP

5,260 Home Therapy sessions

614 VH patients enrolled (Cumulative as at Dec 2015)
19.6% ED attendances avoided within 6 months of enrolment
46.3% admissions avoided within 6 months of enrolment

57,219 acute bed days saved through use of sub-acute beds

24,319 bed days saved through Buffer Step-down Unit

Based on Jan 2015 – Dec 2015
Singapore Healthcare
Tan Tock Seng Hospital
Innovation for Sustainable Healthcare
SINGAPORE HEALTHCARE: CONTEXT

4 Major Challenges

Ageing Population
Emerging Infectious Diseases
Burden of Chronic Diseases
Financing Future Healthcare

PM, Global Health Leadership Summit,
Singapore, 2013
MOH: Beyond Healthcare 2020

Better Health • Better Care • Better Life

1. Move Beyond Hospital to Community

2. Move Beyond Quality to Value

3. Move Beyond Healthcare to Health
TTSH Value-Driven Healthcare Strategy

Value = \frac{\text{Health Outcomes}}{\text{Costs of Delivering the Outcomes}}

System Cost

1. Improve

2. Transform

3. Value-Driven Care

VOLUME-DRIVEN CARE

System Outcomes
TTSH Value-Driven Healthcare Strategy

**BETTER PEOPLE**

**CLARITY**
We will:
Set clear goals and directions, and work together to achieve them.

**RESPECT**
We will:
Respect one another as professionals and value each other’s contribution.

**EQUITY**
We will:
Have a fair, equitable and creative reward and recognition system that recognizes our varied talents.

**DIALOGUE**
We will:
Dialogue with and give constructive feedback to one another and our supervisors in a safe and dignified environment.

**OPPORTUNITIES**
We will:
Create ongoing opportunities for learning, growth and development to meet one another’s needs.

**QUALITY OF LIFE**
We will:
Build work-life quality and balance, in a safe work environment with adequate resources and even distribution of work.

**BETTER CARE**

1. Cure Me
2. Heal Me
3. Don’t Hurt Me
4. Don’t Make Me Waste my Money
5. Respect Me as a Person
TTSH Value-Driven Healthcare Strategy

BETTER PEOPLE

AON HEWITT BEST EMPLOYER

Retention ↑
89.7% in 2014 to 91.9% in 2015
(6% above MOM Health & Social Services Sector Industry Norm of 85.9%)

EMPLOYEE CLIMATE SURVEY

4-5% improvement in Employee Engagement and Satisfaction from 2013 to 2015

BETTER CARE

JCI ACCREDITATION

MOH PATIENT SATISFACTION

From 68% in 2008 to 86.1% in 2015
I feel that this 'spider web' is really such a good tool because it allows us to voice out our concerns.
Better Care
Better Care: Driving Value for Patients

WHAT PATIENTS VALUE

VALUE MEASUREMENT

VALUE CREATION
3Is in Value Creation

**Inquire**
New Knowledge (Research)

**Innovate**
New Application (Ideas, Device, Methods)

**Improve**
Better Application (Quality)
What is Innovation?

• Today’s Innovation 1.0
  – Projects that pilot or introduce a new application using innovation tools
  - May not Succeed, Cannot Sustain, & Will not Spread

• Let’s try Innovation 2.0 – “Innovation cycle”
  – Meta-Innovation: Improving Innovation itself
  – To Drive Higher Value In Sequence, At Scale and At the Systems Level.
Driving Value Through Innovation
In Sequence, At Scale & At the Systems Level

Meta-Innovation Cycle
Improving Innovation itself to Succeed, Spread & Sustain

1. Care & Process Redesign
2. Automation, IT, Robotic Innovation
3. Job Redesign
   - Up-skilling
   - Substitution
   - Expansion

↓ Waste
↓ Cost
↑ Value

INNOVATE
Care Redesign – Hospital Care

Redesigning Hospital Care for the Future:
*From Organ-Centric Care to Person-Centric Care*

New Integrated Service Lines

Standard Care

Complex Care

Acute Care
Care Redesign
Automation, IT & Robotics (AIR) Innovations

Use of Technology to:
1. Improve Productivity
2. Support Aging Workforce
3. Improve Health Outcomes

Technologies:
- Automation – Lab, Pharmacy, Warehousing
- IT – Next Gen EMR, eHealth
- Devices – Medical Devices, Hospital Equipment
- Robotics – Hospital Operations, Surgery, Rehabilitation, Assistive
- Analytics – Business Intelligence, Watsons
- Smart Hospital – Business Process Mapping, C3 (Command, Control, Communicate)
National Healthcare Innovation & Productivity Medal
Automation, IT, and Robotics Innovation (Best Practice Medal)

AUTOMATION, IT AND ROBOTICS INNOVATION
BEST PRACTICE MEDAL

EAS: Transforming Patient Appointment Scheduling through Redesign and Automation

- Tan Tock Seng Hospital
Job Redesign

Workforce Transformation supports Future Care Model
Integrated Team-Based Job Redesign

1. **Job Upskilling**
   “Do More with a little More”
   Specialisation, higher certification
   E.g. APNs, Specialist Roles
   (Cubicle-based nursing, Nurse-led clinics)

2. **Job Substitution**
   “Do More with Less”
   Substitute with lower grade staff
   E.g. Nurse Clinicians, PSAs
   (Venipuncture / Uroflow)

3. **Job Value Expansion**
   “Do More with the Same”
   Practice at the Top of License
   E.g. Value-added Roles by PSAs
   (Medication Supply Verification)
Innovation Case Study
Ward of the Future (WoF)
Care is getting more complex…

Patients’ expectation on care standard has increased!
Ward of the Future (WOF)

1. Care/Process redesign
   Management of complex care, and strengthen standard care
   - Improve nurses’ availability
   - Inter professional collaboration
   - Patients/NOKs’ engagement
   - Resource management
   - Medication management

2. Automations, ITs and Robotics
   - Technology enables patients for self help, and nurses for accessibility
   - Building capability: Clinical monitoring in smart and remote way
   - Patients/NOKs’ engagement
   - Resource management
   - Closed Loop Medication Management (CLMM)

3. Job Redesign
   Role enhancement and productivity
   - Cubicle based nursing
   - Nurse-led Ward Round of the Future (WRoF)
   - WRNs represent the future role of all wards’ based RNs
   - Resource management
   - Inpatient clinical pharmacists

Increased value
Improved outcomes

Reduced non-clinical, non value adding activities

Re-deployed manpower
Care & Process Redesign

• Management of Complex Care
• Strengthen Standard Care

Improve Nurses’ Availability
- Nursing workstation
- Cubicle based monitoring
- Decentralized cupboard

Inter Professional Collaboration
- Nurse-led ward round of the future (WRoF)

Patients/NoKs Engagement
- Discharge planning/EDD
- Timely update to patients/NOKs on treatment plan

Resource Management
- Bed management
- Acute Care Area (ACA)

Medication Management
- Medication administration to be more reliable and safe

Care & Process Redesign

• Management of Complex Care
• Strengthen Standard Care
## Automations, IT, Robotic Innovations

<table>
<thead>
<tr>
<th>Category</th>
<th>Innovations</th>
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</thead>
</table>
| Improve nurses’ availability & Patients’ self | • 3-in-1 call bell handset  
• Smartsense, MDI, E wound  
• Sotera (upcoming) |
| Help                                          |                                                                            |
| Inter Professional Collaboration              | • NGEMR (upcoming)                                                          |
| Patients/NOKs Engagement                      | • Patient bedside terminal (upcoming)  
• Discharge planning, EDD                                                        |
| Resource Management                           | • RFID Patient Tags  
• AIBMU  
• C3 (upcoming)                                                               |
| Medication Management                         | • CLMM  
• Inpatient pharmacy automation system (IPAS)                                 |
# Job Redesign

- Role enhancement and Productivity
- Nurses beyond Nursing, Nursing Beyond Nurses

<table>
<thead>
<tr>
<th>Improve Nurses’ Availability</th>
<th>Inter Professional Collaboration</th>
<th>Patients/NOKs’ Engagement</th>
<th>Resource Management</th>
<th>Medication Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubicle based nursing role</td>
<td>Ward resource nurse: Discharge planning</td>
<td>Timely update to patients/NOKs: Done by nurses, with reduced need for Dr to update personally</td>
<td>Increased capability of GW Nurses to care for patient in Acute care area (ACA): Release beds &amp; reduce workload from ICUs</td>
<td>Inpatient clinical pharmacist</td>
</tr>
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</table>
Ward of the Future (WoF)

Team-Based Inter-Professional Care
<table>
<thead>
<tr>
<th>Measures</th>
<th>Pre WoF</th>
<th>Post WoF (Year 2015)</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average time to respond to nurse call</td>
<td>53s</td>
<td>39s</td>
<td>↓14s</td>
</tr>
<tr>
<td>Falls (per 1000 patient days)</td>
<td>1.2</td>
<td>0.87</td>
<td>↓0.33</td>
</tr>
<tr>
<td>PSS (Care coordination)</td>
<td>71%</td>
<td>88.8%</td>
<td>↑17.8%</td>
</tr>
<tr>
<td>PSS (Care &amp; concern by nurses)</td>
<td>80.2%</td>
<td>84.6%</td>
<td>↑4.4%</td>
</tr>
<tr>
<td>PSS (Clear explanation of procedures by staff)</td>
<td>74.8%</td>
<td>85.6%</td>
<td>↑10.8%</td>
</tr>
<tr>
<td>% of total time per shift PN spent on direct patient care</td>
<td>10%</td>
<td>34.8%</td>
<td>↑24.8%</td>
</tr>
<tr>
<td>Total distance travelled by staff nurse during a shift</td>
<td>8km</td>
<td>4.1km</td>
<td>↓3.9km</td>
</tr>
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</table>
National Healthcare Innovation & Productivity Medal
(Best Practice Medal for Workforce Transformation)

WORKFORCE TRANSFORMATION
BEST PRACTICE MEDAL

Nursing Workforce Transformation:
Nurses beyond Nursing, Nursing beyond Nurses

Tan Tock Seng Hospital
Innovation Case Study
Transforming Outpatient Pharmacy
Outpatient Pharmacy Automation System (OPAS)

1. Care/Process redesign
   - Re-engineering medication ordering process
   - E.g. Medication verification moved to clinics

2. Automation, IT, Robotics (OPAS)
   - Leveraging on technology such as Rowa and Parata
   - Reduce errors

3. Job Redesign
   - From manual packing and verifications of medications to attending to patient in clinics for MSV (value adding)

Reduce workload

Reduce needless waiting time

1. Improve patients’ satisfactions
2. Savings of 17 headcounts
3. Savings in $$

Redeployment of manpower
First Purpose-Built Centre for Healthcare Innovation Building

CHI Co-Learning Network with 21 international and local partners.
- Thought Leadership
- Workforce Transformation *(Formal & Informal)*
- Training Pedagogies

**Current Status:** Construction Stage
**Expected Completion:** October 2018
CHI Co-Learning Network

1. International Centres of Excellence

2. Healthcare Clusters

3. Academia Partners

4. Strategic Agencies
First R2R Project in TTSH

A Correlation Study Between Perceived Waiting Time and Patient Satisfaction Score at an Outpatient Clinic

Michelle Loo, Ning Xue Wu, Irene Lee, Zha Zhaoling, Meng Fangying
Tan Tock Seng Hospital, Singapore / National Healthcare Group, Singapore
Contact: michelle_loo@ttsh.org.sg

Research Question:
What is the maximum perceived wait time to consult which will result in a patient satisfaction score (PSS) of 4 & 5 with 80% of our patients?

Methodology:
At Clinic 3B] Patient survey + Data from queue system -> multivariate logistic regression

Results
Not more that 20mins
Upcoming R2R Project…

**EMERGENCY DEPARTMENT INTERVENTIONS FOR THE FRAIL ELDERLY (EDIFY)**

**Objective:**
To reduce the number of acute admissions in older persons aged 85 years and above from the Emergency Department

**Next Steps:**
- Establishing a core interdisciplinary team of trainers skilled in R2R methodology
- Rolling out R2R as new tool for improvement and innovation in TTSH

*Project team composition: Doctors, Nurses, Researchers, Operations, Kaizen*
See you in Singapore!
THANK YOU

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