Leveraging Clinical Pathways to Improve Quality of Care and Resource Utilization

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Greetings from the Garden City of Singapore
Singapore ranked world's No. 2 for health-care outcomes: EIU

In a press release issued on Nov 26, the EIU described Singapore as having "a generous healthcare system as well as high life expectancy, low rates of ill-health and low mortality". -- PHOTO. ST FILE
Singapore Island City State

702 Sq. Km
5 Million Population.
GDP on Health 3-4%
### World's Healthiest Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>89.45%</td>
</tr>
<tr>
<td>Italy</td>
<td>89.07%</td>
</tr>
<tr>
<td>Australia</td>
<td>88.33%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>88.29%</td>
</tr>
<tr>
<td>Japan</td>
<td>86.83%</td>
</tr>
<tr>
<td>Israel</td>
<td>85.97%</td>
</tr>
<tr>
<td>Spain</td>
<td>84.36%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>84.09%</td>
</tr>
<tr>
<td>Sweden</td>
<td>83.90%</td>
</tr>
<tr>
<td>Germany</td>
<td>83.58%</td>
</tr>
</tbody>
</table>

Survey and data by Bloomberg

Table showing world's healthiest countries (Channel NewsAsia's Digital Desk)
First hospital in Singapore to receive Joint Commissions International Accreditation in 2004 and JCI Academic Medical Centre Accreditation in 2013.

- **3 Comprehensive National Centres**
- **11 Critical Care Units**
- **29 Operating Theatres**
- **1,272 beds**
- **7,340 staff**
- **900 Medical/Dental**
- **3,522 Nursing**
- **1,132 Allied Health**
- **1,161.5 Ancillary Support**
- **624.5 Administration**

Comprehensive range of services except burns unit & cardiac transplant.
Agenda

1. **Background**

2. **Clinical Pathways and Quality** (Interrelationship)
   - Definition
   - Objectives
   - Advantages

3. **Developing Clinical Pathways**
   - Selection of Topic, Team
   - Exercise

4. **Process**
   - Implementing & Evaluation of Pathways
   - Exercise

5. **Examples:**
   - Stroke & Hypoglycaemia Pathway
   - Surgical Pathways

6. **Conclusion**
Care Needs to be:

- Safe
- Effective and Evidence Based
- Patient-Centered
- Timely
- Efficient
- Equitable

“Care needs to be a collaborative, multidisciplinary process.”

“Carefully designed, evidence-based care processes, supported by automated clinical information and decision support systems, offer the greatest promise of achieving the best outcomes from care for our patients.”
A Persistent Quality Gap

“...on average, Americans receive about half of recommended medical care processes.”

— McGlynn, et al, NEJM, 6/26/03

<table>
<thead>
<tr>
<th>Type of Care</th>
<th># of Indicators</th>
<th>% Recommended Received</th>
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<tbody>
<tr>
<td>Overall care</td>
<td>439</td>
<td>54.9%</td>
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<tr>
<td>Preventive</td>
<td>38</td>
<td>54.9%</td>
</tr>
<tr>
<td>Acute</td>
<td>153</td>
<td>53.5%</td>
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<tr>
<td>Chronic</td>
<td>248</td>
<td>56.1%</td>
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<tr>
<td>Screening</td>
<td>41</td>
<td>52.2%</td>
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<tr>
<td>Diagnosis</td>
<td>178</td>
<td>55.7%</td>
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<tr>
<td>Treatment</td>
<td>173</td>
<td>57.5%</td>
</tr>
<tr>
<td>Follow-up</td>
<td>47</td>
<td>58.5%</td>
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</table>

IOM: “What is perhaps most disturbing is the absence of real progress toward restructuring health care systems to address both quality and cost concerns, or toward applying advances in information technology...”
The Problem

How do you set up a system of care that addresses:

- Prevention
- Patients at risk
- Acute and Episodic Care
- Chronic Conditions
- Catastrophic Situations

A delivery system that will be able to meet the IOM goals stated before:

Safe, effective, patient-centered, timely, efficient, and equitable

And the delivery system needs to be:

- A sustainable business
- Be adaptable to most of the health care system today
- And help produce predictable and lower health care cost increases
Delivery System Capabilities

Build a 21st Century delivery system for long-term solutions to quality and cost concerns (effective and efficient)

- Evidenced Based
- Population Management
- Patient centered
- New models of care
- IT to support connectivity and all the above
- Demonstrate value
Planned Care Model or Chronic Care Model

Which is the most important practice?

- Leadership
- Accountability
- Champions
- Resources
- Financial Incentives
- Provider Feedback
- Program Evaluation
- Patient Action Plans
- Patient Education
- Guideline Training
- Provider Alerts
- AMR
- Defined Care Path
- Risk Stratification
- Registry
- Outreach and Follow-up
- Inreach
- Care Coordination
- Team-Based Care
- Cultural Competence

From Improving Chronic Illness Care
Ed Wagner, MD, Group Health Cooperative of Puget Sound

Source: Dr Warren Taylor. Kaiser Permanente
The Emphasis

Quality patient care → Multidisciplinary teams
Cost containment → Specialty Case Managers
Interdependent and collaborative care between patient and health care providers → Clinical Pathways
From our vision to initiatives

**GOOD**  
- Delays in transfers  
- Coordination between caregivers  
- Readmissions  
- Patient safety  
- Duplication of work

**GREAT**  
- Need to apply specific strategies and tactics to prove that we are truly the Quality and Service leader for hospital care  
- Efforts to improve performance for service, quality and efficiency in our hospitals are inter-related

**Quality**  
- Delays in transfers  
- Coordination between caregivers  
- Readmissions  
- Patient safety  
- Duplication of work

**Service**  
- Patient education re: conditions and treatment  
- Delays in treatment  
- Waiting time  
- Consistent and appropriate provider-patient communication (part of our Patient Experience Framework)

**Efficiency**  
- Standardization  
- Care paths  
- Discharges before noon  
- Waiting time for beds at ED  
- Bed Management / OT utilization
There are many rationale underlying the move towards clinical pathways.

Essential to understand why you and your organization have moved towards clinical pathways.
"Unlike the interstate highway system, which did produce smooth roads across state lines, healthcare wasn’t designed. It just happened."
The Role of Complexity In Reducing Performance

Pathways help us to identify unnecessary steps that do not add value to the process

In a way can serve as a basic “lean” tool to create a value stream map

<table>
<thead>
<tr>
<th>No of Steps</th>
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<th>0.99</th>
<th>0.999</th>
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<td>0.37</td>
<td>0.90</td>
<td>0.99</td>
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Clinical Pathways – What Are They?

Pathways employ a concept long used in the Construction Industry:

• Pathways were used to co-ordinate multiple contractors or people to accomplish a project within a given time line & with limited resources

• Pathways utilize an explicit design & documentation system
# Historical Development of Clinical Pathways

<table>
<thead>
<tr>
<th>Decade</th>
<th>Event</th>
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<tbody>
<tr>
<td>Origin</td>
<td>Clinical Pathway used as project management tool</td>
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<tr>
<td>1970s</td>
<td>Introduced in healthcare but not received well by user</td>
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<tr>
<td>Early 1980s</td>
<td>Interest in clinical pathway began to develop</td>
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<tr>
<td>Late 1980s</td>
<td>CP were first applied in Healthcare industry in 1985</td>
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<tr>
<td>1990s</td>
<td>CP widely implemented in hospital and healthcare agencies</td>
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<tr>
<td>1997</td>
<td>Changi General Hospital</td>
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<td>1998</td>
<td>National University Hospital &amp; Singapore General Hospital</td>
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A Clinical Pathway is an abbreviated version of the multidisciplinary process which needs to occur in a timely and sequential manner to achieve quality patient health outcomes.

“A multidisciplinary road map of patient management throughout an episode of care”
Villaire, M., 1995

“…an interdisciplinary plan of care that outlines the optimal sequencing and timing of interventions for patients with a particular condition, procedure or symptom”
Ignatavicius & Hausman, 1995
Clinical Pathway

*Is not*

- mandatory treatment plan
- a standard of care
- a substitute of clinical judgment
- a substitute for physician orders

*BUT*

An integrated documentation tool to stabilize:

- the process of patient care
- effectively manage clinical & financial outcome
- collaborative practice & team approaches
Objectives

• To **improve** quality and efficiency of care,
• To provide **means to conduct clinical audit** and helps to manage clinical risk,
• To promote **communication**,
• To ensure **continuity of care**,
• To incentivise you to do the right thing
• To manage length of stay and resources efficiently,
• To decrease unwanted clinical practice variation,
• To integrate clinical documentation and
• To provide a via media for culture change, especially of quality improvement and teamwork
Teamwork Across Hospital Units

9th dimension of patient safety culture

**F4** - There is good cooperation among hospital units that need to work together

**F10** - Hospital units work well together to provide the best care for patients

**F2** - Hospital units do not coordinate well with each other

**F6** - It is often unpleasant to work with staff from other hospital units

*AHRQ Hospital Survey on Patient Safety Culture 2014*
Advantage

- Improves multi-professional communication and care planning and delivery, including across health and social care sectors
F3** - Things "fall between the cracks" when transferring patients from one unit to another

F5** - Important patient care information is often lost during shift changes

F7** - Problems often occur in the exchange of information across hospital units

F11** - Shift changes are problematic for patients in this hospital

*AHRQ Hospital Survey on Patient Safety Culture 2014

**Reverse worded question
Clinical Pathways: Common Barriers to Success

• Clinicians see it as
  • Cook-book recipe
  • Loss of autonomy in professional judgement
• Seen as a nursing project
• Seen as an additional documentation component
• Becomes a documentation tool versus a tool that supports patient care management
• Lack of education of staff
Clinical Pathway Process Summarised

1. Select a Topic
2. Select a Team
3. Evaluate Current Process of Care; Gather Data
4. Evaluate Medical Evidence & External Practices
5. Determine Clinical Pathway Format
6. Determine Required Documentation & Variance Analysis
7. Seek Approval from Relevant Authorities
8. Revise & Modify Clinical Pathway
9. Set Date for Hospital-wide Rollout
10. Educate & Train Staff in Pilot Wards
11. Pilot Clinical Pathway
12. Gather Feedback
13. Review Pathway
14. Review Pathway Yearly or Earlier (as required)
15. Revise & Modify (if necessary)
16. Implement Hospital-wide
17. Monitor Compliance, Variance & Outcomes
18. Place Patients on Clinical Pathway
19. Share Data Trends with Relevant Bodies
20. Educate & Train Staff: Hospital-wide
21. Continue Monitoring
Developing Clinical Pathways: Selecting

Clinical Pathways (CP) are developed based on
- high volume,
- long length of stays (ALOS),
- high cost cases, and
- high risk cases, as well as
- new procedures and clinician preferences
- hospital or national strategic direction and
- other indicators such as high readmission rate

DRG and ICDs analysis done to identify high volume and long length of stays cases.
Exercise

Analyze data given in the handout

Identify areas to focus on for the development of clinical pathways / protocol

State the pathway identified for development

State reason, why selected (if not, state reason)
### Table 1: Top 20 Volume-based DRGs (2015)

<table>
<thead>
<tr>
<th>DRG</th>
<th>DRG Description</th>
<th>Vol</th>
<th>ALOS</th>
<th>Remarks</th>
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<td>O60Z</td>
<td>Vaginal Delivery</td>
<td>2519</td>
<td>2.5</td>
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<tr>
<td>P67D</td>
<td>Neonate, AdmWt &gt;2499 g W/O Significant OR Procedure W/O Problem</td>
<td>1313</td>
<td>2.1</td>
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<tr>
<td>P67C</td>
<td>Neonate, AdmWt &gt;2499 g W/O Significant OR Procedure W Other Problem</td>
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<tr>
<td>O01B</td>
<td>Caesarean Delivery W/O Catastrophic or Severe CC</td>
<td>933</td>
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<td>E62A</td>
<td>Respiratory Infections/Inflammations W Catastrophic CC</td>
<td>911</td>
<td>9.3</td>
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<tr>
<td>L63A</td>
<td>Kidney and Urinary Tract Infections W Catastrophic or Severe CC</td>
<td>904</td>
<td>9.1</td>
<td></td>
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<tr>
<td>G67B</td>
<td>Oesophagitis and Gastroenteritis W/O Cat/Sev CC</td>
<td>876</td>
<td>2.4</td>
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<tr>
<td>F74Z</td>
<td>Chest Pain</td>
<td>828</td>
<td>2.1</td>
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<tr>
<td>D63Z</td>
<td>Otitis Media and URI</td>
<td>789</td>
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<td>F62B</td>
<td>Heart Failure and Shock W/O Catastrophic CC</td>
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<td>G70B</td>
<td>Other Digestive System Diagnoses W/O Catastrophic or Severe CC</td>
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<td>T63Z</td>
<td>Viral Illness</td>
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<td>E69B</td>
<td>Bronchitis and Asthma W/O CC</td>
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<td>Antenatal and Other Obstetric Admission</td>
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<td>vol</td>
<td>Remarks</td>
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<td>Operative Insertion of Peritoneal Catheter for Dialysis W Cat or Sev CC</td>
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<td>Chronic and Unspecified Paraplegia/Quadriplegia W or W/O OR Procs W Cat CC</td>
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<td>A07Z</td>
<td>Allogeneic Bone Marrow Transplant</td>
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<td>Spinal Cord Conditions W or W/O OR Procedures W Catastrophic or Severe CC</td>
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<td>Bilateral/Multiple Major Joint Proc of Lower Extremity W Revision or W Cat CC</td>
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<td>A01Z</td>
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<td>L63B</td>
<td>Kidney and Urinary Tract Infections W/O Catastrophic or Severe CC</td>
<td>598</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>O66Z</td>
<td>Antenatal and Other Obstetric Admission</td>
<td>590</td>
<td>2.2</td>
<td>ALOS is short</td>
</tr>
<tr>
<td>J64B</td>
<td>Cellulitis W/O Catastrophic or Severe CC</td>
<td>584</td>
<td>3.9</td>
<td></td>
</tr>
<tr>
<td>D61Z</td>
<td>Dysequilibrium</td>
<td>569</td>
<td>3.0</td>
<td></td>
</tr>
</tbody>
</table>
### Table 2: Top 20 ALOS based DRGs (2015)

<table>
<thead>
<tr>
<th>DRG</th>
<th>DRG Description</th>
<th>ALOS</th>
<th>vol</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>P61Z</td>
<td>Neonate, AdmWt &lt;750 g</td>
<td>110.2</td>
<td>5</td>
<td>Volume is low</td>
</tr>
<tr>
<td>P62Z</td>
<td>Neonate, AdmWt 750-999 g</td>
<td>95.9</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>A06A</td>
<td>Tracheostomy W Ventilation &gt;95 hours W Catastrophic CC</td>
<td>93.7</td>
<td>85</td>
<td>Heterogenic patient population with different diagnoses makes it difficult for a common pathway</td>
</tr>
<tr>
<td>L02A</td>
<td>Operative Insertion of Peritoneal Catheter for Dialysis W Cat or Sev CC</td>
<td>63.5</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>B82A</td>
<td>Chronic and Unspecified Paraplegia/Quadriplegia W or W/O OR Procs W Cat CC</td>
<td>62.6</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>P03Z</td>
<td>Neonate, AdmWt 1000-1499 g W Significant OR Procedure</td>
<td>58.4</td>
<td>16</td>
<td>Volume is low</td>
</tr>
<tr>
<td>P04Z</td>
<td>Neonate, AdmWt 1500-1999 g W Significant OR Procedure</td>
<td>50.3</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>A07Z</td>
<td>Allogeneic Bone Marrow Transplant</td>
<td>46.3</td>
<td>51</td>
<td></td>
</tr>
<tr>
<td>B61A</td>
<td>Spinal Cord Conditions W or W/O OR Procedures W Catastrophic or Severe CC</td>
<td>42.5</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>I01A</td>
<td>Bilateral/Multiple Major Joint Proc of Lower Extremity W Revision or W Cat CC</td>
<td>42.0</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>F11A</td>
<td>Amputation for Circ System Except Upper Limb and Toe W Catastrophic CC</td>
<td>40.5</td>
<td>19</td>
<td>A pathway exists</td>
</tr>
<tr>
<td>A06B</td>
<td>Trach W Vent &gt;95 hours W/O Cat CC or Trach/Vent &gt;95 hours W Cat CC</td>
<td>37.8</td>
<td>329</td>
<td>Heterogenic patient population with different diagnoses makes it difficult for a common pathway</td>
</tr>
<tr>
<td>A01Z</td>
<td>Liver Transplant</td>
<td>37.7</td>
<td>36</td>
<td>Volume is low</td>
</tr>
<tr>
<td>P05Z</td>
<td>Neonate, AdmWt 2000-2499 g W Significant OR Procedure</td>
<td>37.4</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>B02A</td>
<td>Cranial Procedues W Catastrophic CC</td>
<td>36.1</td>
<td>154</td>
<td></td>
</tr>
<tr>
<td>W01Z</td>
<td>Ventilation or Cranial Procedures for Multiple Significant Trauma</td>
<td>36.0</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>P64Z</td>
<td>Neonate, AdmWt 1250-1499 g W Significant OR Procedure</td>
<td>34.7</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>P06A</td>
<td>Neonate, AdmWt &gt;2499 g W Significant OR Procedure W Multi Major Problems</td>
<td>34.2</td>
<td>13</td>
<td>Volume is low</td>
</tr>
<tr>
<td>W04A</td>
<td>Other OR Procs for Multiple Significant Trauma W Catastrophic or Severe CC</td>
<td>33.7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>T01A</td>
<td>OR Procedures for Infectious and Parasitic Diseases W Catastrophic CC</td>
<td>33.6</td>
<td>46</td>
<td></td>
</tr>
</tbody>
</table>
Analysis and Conclusion

- Most of the top 20 DRGs already have a short ALOS (between 1-3 days)

- 30% of the top 20 DRGs have pathways or guidelines in place; e.g. Heart Failure, Caesarean, Hypoglycemia

- Pathways are in existence for some of the high-risk but low volume surgeries such as gastrectomy, bariatric surgery, etc.

- Most of the high ALOS DRGs have low or very low volume (Table 2) except Tracheostomy, which has the highest volume but varied underlying disease conditions which cannot be addressed by a standardized clinical pathway.
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Clinical Pathways</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Volume</td>
<td>Stroke</td>
</tr>
<tr>
<td></td>
<td>TKR</td>
</tr>
<tr>
<td></td>
<td>Hip Fracture</td>
</tr>
<tr>
<td></td>
<td>Colectomy, Mastectomy</td>
</tr>
<tr>
<td>Clinical indicators - High</td>
<td>COPD</td>
</tr>
<tr>
<td>Readmission Rate</td>
<td>Asthma</td>
</tr>
<tr>
<td></td>
<td>Renal Failure</td>
</tr>
<tr>
<td>High Complication Rate / High</td>
<td>Gastrectomy</td>
</tr>
<tr>
<td>Risk</td>
<td>Craniectomy</td>
</tr>
<tr>
<td>High Cost</td>
<td>Liver resection</td>
</tr>
<tr>
<td></td>
<td>Bariatric surgery</td>
</tr>
</tbody>
</table>
Essentials of Developing & Managing Clinical Pathways

- Clinical champion to drive
- Multi-disciplinary team comprising all relevant stakeholders
- Well defined roles and responsibilities of the leader, facilitator and members of the team
- Leverage on evidence-based best clinical practices (literature search)
- Resources
- Leadership support
- Administrative support e.g. printing, implementing, piloting, evaluating, data management, IT systems etc.
Developing Clinical Pathways

- Selecting the Pathway

  - Selecting the right team is key to the success

  People with fundamental knowledge
  - clinical knowledge
  - organisational knowledge
  - patient knowledge
  - work process knowledge
  - continuity of care

  Are all the right people included?
  - The process after selecting the team includes convening the team, sanctioning the content, forming an authoring team

- Engaging the Clinicians

- The Implementation Process

Example of Team: Hip Fracture

Leader:
Orthopaedic surgeon

Facilitator:
Case Manager; or Quality Manager

Members
- Geriatrician (preferably an ortho geriatrician)
- Rehab Physician
- Anaesthetist
- Radiologist
- Nursing Administrator
- Staff Nurse
- Nurse Clinician
- Physiotherapist
- Occupational Therapist
- Medical Social Worker
- Dietician
- Psychology Medicine (as & when necessary, for advise on cognitive assessment)
- Operations staff from Operating Theatre and Clinic (Invitees)
Relentless
Drum Beater and Major
Exercise

Implementing a Pathway

Discuss as a team

- How will you overcome challenges in implementing and getting the buy-in
- Type of change-management principles you would apply
- How will you convince your CEO that the pathway has helped to improve care
Key Considerations When Developing & Implementing a Pathway

- Evaluate current process of care; and medical evidence
- Consider anticipated/desired outcomes
- Maintain a balance between too much specificity (generates lots of variance) and loose generality (generates too little variance).
- Consider improvement to care processes
- Do not create too wide a gap between current reality (systems & processes) and revised content
- Incorporate utilization and quality indicators
- Must seek approval from relevant stakeholders including HOD

Clinical Paths are:
- Dynamic,
- educational/learning process
- reviewed 6 months and 12 months after implementation; annual review thereafter.
Documenting in Clinical Pathways

How do pathways help in integrating clinical documentation?
Referral Form: Notification to Case Managers

Case Manager / Clinical Pathway Referral Form

<table>
<thead>
<tr>
<th>Unit</th>
<th>Ward</th>
<th>Bed</th>
<th>Pt's Label</th>
</tr>
</thead>
</table>

Consultant in-Charge: ___________________ Referred by ___________________ Date __________

Please tick (✓) and fax it to Case Managers at 6775-6757

A) Name of Clinical Pathway / Guideline:

- [ ] Open Fracture (#)

B) Clinical Pathway Patient Requiring Case Management Services
(Please ✓ accordingly on the reasons / criteria below):

- [ ] No caregivers
  - Patient requiring ADL assistance but has good family support
- [ ] Referral to Step-down care services
- [ ] Significant decline in ADL related to medical reasons
- [ ] Readmission's within last 30 days due to medical reasons
- [ ] Experience the following for a prolonged period of time
  - Acute confusion or cognitive impairment
  - History of frequent falls
- [ ] Others (please specify): __________________________________________________________________

Effective Date: April 2002
Documentation on Pathway by Clinics

- Many pathways start from clinic
- This form is filled up by Clinic Nurse, PT, etc. as indicated.
Continuous Improvements

COLORECTAL ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOL

Protocols for Clinic (pre-op patients)

**Bowel Prep**
(All operations)
- 2 Litres PEG (day before operation + 1 Fleet enema (morning of operation)

**Nutrition**
- Nutrition screening
- Advise pre-op nutrition
- Supplement drinks for non-diabetic patients
- Diabetic nutrition supplements for diabetic patients
- Pre-op carbohydrate drinks for non-diabetic patients (3 sachets per patient)

**General advice**
- Stop smoking
- Exercise pre-operatively
- Address anxieties and answer questions or ask for help if not sure

Additional Reference Guides
Serve as Checklist

PRE - OPERATIVE (OUT - PATIENT)

**Education**
- Surgeon appt
- Consent taken
- ERAS counselling
- Information leaflets given (surgical procedure, diary, ERAS)
- Teach breathing and limb exercises
- Stop smoking
- Answer questions and address anxieties
- Post - op care discussed
- Contact numbers given
- Length of stay
- Patient support group
- Stoma education
- Tissue Repository (Research)

**Nutrition**
- Nutrition score
  (if at risk, refer to dietician)
- Weight
- Pre-operative nutrition supplement drinks x1 per day for a week prior to operation
  (diabetic patients: get advice from dietician, advise to take diabetic drinks)
- Carbohydrate pre-op 3 sachets per patient (not for diabetic patients)
- For ileostomy patients: give ileostomy diet leaflet

**Exercises**
- Teach breathing exercises + incentive Spirometry
- Teach limb exercises
- Encourage exercise at home before admission
- Refer to Physio for rehabilitation if required

**Pain**
- Review in A OCC
- PCA information given
- Refer chronic pain patients to pain team

**General**
- Bowel prep: 2 litres PEG + 1 Fleet enema
- Bloods:
  - FBC, Renal panel, Albumin, clotting screen (if on anticoagulants)
  - HbA1C (diabetic only)
  - GDM
- Other tests:
  - MRSA - if +ve, start eradication ECG
- Discharge planning:
  - Highlight patients with potential discharge problems, AIC for patients who need step-down care
  - Refer to Care Coordinator, CC to refer to MSW
Clinical Pathway Guidelines

Guidelines using of the Gastrectomy Clinical Pathway

1. Inclusion Criteria
   Patients listed for Gastrectomy shall be placed on this clinical pathway. The pathway will start at the clinic and continue in the Clinic. The pathway will be initiated either by doctors or listing nurses.

2. Exclusion Criteria
   - Patients who are unfit or refuse surgery are to be taken off the pathway.

3. The healthcare team shall use the pathway to:
   - Hand over report during inter-shift report / during doctors’ ward round.
   - Discuss plan of care, critical events and progress of the patients.
   - Discuss discharge plans /ELOS /patient /family’s needs.

4. Documentation guide
   For Doctors
   - Tick and sign standard orders as required.
   - Enter additional orders in the space provided.

   For Nurses and other allied healthcare team:
   - The following symbols shall be indicated in the boxes provided.

   ![Table]

   - **√**  Done / achieved (care activities are carried out as planned)
   - **×** Not done / not achieved. Reasons for non-compliance, together with an action and follow-up plan, shall be documented in the patient’s progress notes.
   - **—** Not Applicable

   **No box shall be left blank.**
   All amendments on the pathway shall be dated and signed.
   **All healthcare team members shall use the following legend, within Action column.**

   **Legend:**  
   D- dispatched, F- Form faxed, R- Requested, C- Completed.
### Clinical Pathway Documentation

**Nurse:** The Tick indicates compulsory orders to be carried out.

**Doctor’s Orders**

- Histology
- Gastroscopy (OGD)
- CT abd / pelvis
- FBC
- GXM 2 Units PCT
- Fe Panel
- Pre-Albumin

**Nurse:** Indicate action done according to Legend given.

**Clinical Pathway for Gastrectomy**

<table>
<thead>
<tr>
<th>UNIT</th>
<th>WARD</th>
<th>BED</th>
<th>Pre-op Assessment</th>
<th>Date: ________</th>
</tr>
</thead>
</table>

**Multidisciplinary Notes**

- Check operation consent
- Inform pt / family of estimated LOS
- Review oral medication (e.g. aspirin, antihypertensive, etc.)
- NBM night before operation

**Actions to be completed by doctors**

- When done

---

National University Hospital
### Clinical Pathway Documentation

<table>
<thead>
<tr>
<th>Activities - Nursing</th>
<th>AM</th>
<th>PM</th>
<th>ND</th>
<th>Activities - Physiotherapist</th>
<th>When done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor Vital Signs</td>
<td></td>
<td></td>
<td></td>
<td>Pre-Treatment Counseling done</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Chest physio and limb exercises</td>
<td></td>
</tr>
<tr>
<td>Monitor Urine Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assess stoma color and function</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitor drain/s amount &amp; color</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observe for signs/ symptoms of wound infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assess effectiveness of pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check IV site for thrombophlebitis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply TED stocking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pt Kept</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ NBM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Sips of water</td>
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<td></td>
<td></td>
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<tr>
<td>□ Small feeds</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>□ DOC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inform: (if not done)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ PT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Case manager</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Stoma nurse if pt has stoma</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educate patient on:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of PCA / epidural / others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assess pt/family education needs &amp; to refer Patient &amp; Family Education Form</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desired outcomes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient's Pain score &lt; 3 (if No, state reason: )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient's vital signs is stable (if No, state reason: )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient's Urine output is &gt; 120m/s/4hrs (if No, state reason: )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nurses' Initials</th>
<th>AM</th>
<th>PM</th>
<th>ND</th>
<th>Name: __________________ Date: ________</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Multidisciplinary Notes</th>
<th>Treatment Orders</th>
<th>Action</th>
</tr>
</thead>
</table>

**Indicate “✓” “X” “—”**

All nursing activities to complete unless Not Applicable then indicate it with “—”
Instructions for Home Care after Open or Laparoscopic Colectomy

- To be given when patient is ready for education (need not to be given only upon discharge)

- Please read the instructions carefully before giving advice to patient to avoid discrepancy

Supporting Documents: Home Care Instructions / Advice
Instructions for Home Care After Open or Laparoscopic Colectomy
(not including stoma care unless instructed)

Wound Care (Tick accordingly in the boxes below)
• You may shower on day of discharge
• Do not take tub baths, go into pools or hot tubs until your doctor says it is okay.

☐ Staples
• You are required to remove the staples on your incision on the given date.

☐ Steri-strips / Band aids
• Your wound incisions will be covered with steri-strips or band aids.
• Do not peel off the band aids or steri-strips. They will fall off on their own in 7-10 days.

Avoid lifting heavy loads

Activities
• As your stomach muscles are weak after surgery, avoid doing strenuous exercises.
• Avoid carrying loads of more than 15 pounds for 4 to 6 weeks.
• Increase activity level as tolerated and continue to walk several times a day from slow to moderate pace.
• Your Doctor will let you know when it is safe to start work, school or resume driving.
• Follow additional instructions as taught by the Physiotherapist in the ward before discharge.

Call your Doctor if:
• You feel constipated or excessively bloated.
• You have nausea, vomiting or diarrhoea.
• Your pain increases or is not controlled with the pain medications that have been prescribed.
• You develop signs of wound infection:
  - Redness
  - Increased pain
  - Swelling
  - Discharge or bleeding
• You have any questions.

During office hours:
• Your Colorectal Clinic Nurse @ 6772 2230

After office hours or on weekends:
• Call NUH Main Line @ 6779 5555 to be directed to Your Surgeon in-charge.

Medication: Pain and Other Medicines
(e.g. diabetes or high blood pressure, etc.)
• Take the pain medications as prescribed.
• Call the clinic if your pain is not adequately controlled with the prescribed medications.

Diet
• Follow the dietary instructions, as advised by the diettian.
• Increase your fluid intake after surgery, especially water.
• Avoid carbonated drinks that can cause bloating.
• Using straws to drink will increase gas pain.
Evaluation
Evaluation to be done on a regular basis

Objective:
• To improve compliance
• To reduce variance
• To identify areas of improvement
• To reduce complications

Standard Markers
Process and Outcome Indicators
• Length of stay (LOS)
• Average gross charges
• Unscheduled readmissions within 15 days
• In-hospital mortality rate
• Clinical performance indicators & complications e.g. pneumonia, UTI, pressure ulcer, DVT, wound infection etc.
• Process indicators e.g. CT scan within 24 hours, hip fractures operated within 48 hours, Trop I results turnaround time, PCI within 90 minutes
• Staff satisfaction
If you do what you have always been doing, you will get exactly the same result as you are getting.
The Continuous Quality Improvement (CQI) Link

Assess
History
Physical results

Plan
Implement
clinical path
& individualize

Do
Intervention & document (med, rx results, met/not met on path)

Evaluate
Outcome results, identify variances

Evaluate Practice

Knowledge

Data
Integrate other data such as utilization, satisfaction, cost quality indicators

Information
Variance Management

Definition

A deviation from the patient care activities outlined in the clinical pathway which may alter anticipated discharge date or the expected outcomes

e.g.

- Discharge is delayed due to no care giver
- Patient developed AMI, fever
- CT scan postponed to a later date due to mechanical failure

If the answer is “yes” to any of these questions, a variance should be recorded.
- Does it impact on the length of stay?
- Does it impact on the expected outcome measures?
- Does it alter the patient’s treatment plan?

Variance analysis is an integral part of managing gaps in your system
Case Management Unit in NUH

Prof Aymeric Lim
(Chairman Medical Board)

A/Prof Quek Swee Chye
(Head, Medical Affairs, CG)

Dr Sandhya Mujumdar
(Dy Dir, CG & CMU)

QA
HPO
CMU
( Dr LS Widjaja)

Day Surgery
General Surgery
Endocrine
Optimal prog
Neuro & Respi
Neurosurgery
Gen Med

CRP
CM Psy
CM Onco
CM Heart Inst
Peaks of excellence...within a mountain range

- TURP
- Mastectomy
- Stroke
- Colectomy
- Hypoglycaemia
Stroke Outcomes

Stroke Outcomes Trend in NUH

Stroke Complications (%) & Mortality Rates

- UTI -%
- Pneumonia -%
- Mortality rate (%)
Interventions

There are two major steps that contributed to the improvement of UTI and pneumonia:

1. Early monitoring and assessment upon admission of stroke patients with high risks for urinary tract infections and pneumonia

2. Early intervention by the multidisciplinary team to prevent the development of these complications.

Preventive care includes:
- Early mobilization
- Ensuring hydration
- Early removal of urinary catheter, if not contraindicated
- Mandatory swallowing assessment

Early support discharge to home & Fast Track Referral to Community Hospital helped to reduce ALOS & readmissions
Better Access to Relevant Care Component

**Indicator: Stroke Care (process indicators)**

**‘All PH/Is’ Performance (2010-2012)**
- Deteriorations were observed over the past 3 years.

**Thrombolysis within 1 hour, %**

<table>
<thead>
<tr>
<th>Year</th>
<th>Numerator</th>
<th>Denominator</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>16</td>
<td>123</td>
</tr>
<tr>
<td>2011</td>
<td>20</td>
<td>184</td>
</tr>
<tr>
<td>2012</td>
<td>15</td>
<td>207</td>
</tr>
</tbody>
</table>

**NUH’s Performance (2010-2012)**
- Deterioration was observed between 2011-12 for ‘Thrombolysis within 1 hour’, and performance in 2012 was worse than the ‘All PH/Is’ rate.

**Thrombolysis within 1 hour, %**

<table>
<thead>
<tr>
<th>Year</th>
<th>Numerator</th>
<th>Denominator</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>6</td>
<td>81</td>
</tr>
<tr>
<td>2011</td>
<td>8</td>
<td>89</td>
</tr>
<tr>
<td>2012</td>
<td>4</td>
<td>79</td>
</tr>
</tbody>
</table>

**rTPA within 1hr (NUH)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>9.8%</td>
</tr>
<tr>
<td>2011</td>
<td>11.6%</td>
</tr>
<tr>
<td>2012</td>
<td>5.1%</td>
</tr>
<tr>
<td>2013</td>
<td>12.0%</td>
</tr>
<tr>
<td>2014</td>
<td>18.7%</td>
</tr>
<tr>
<td>2015</td>
<td>46.6%</td>
</tr>
</tbody>
</table>
How did we improve RTPA Time <60min (Golden hour)

1. Activation Process Changes:
   • Early pre-activation to EMD based on SCDF call (Q2 2015)
   • Early activation of the Stroke Team even before imaging (Q1 2015)
   • Early optimization / BP control / prerequisites at EMD

2. High Dependency (HD) Beds:
   • Increased nursing staff 1 per shift from Nov 2014 & ring fencing Tissue Plasminogen Activator (TPA) beds while waiting for approval for increasing HD beds.
   • Early HD notification
   • In the event of surge of cases exceeding capacity, extra nurse with neurologist to initiate treatment at EMD

3. Logistics Related:
   • Pre-packed portable kits containing Recombinant Tissue Plasminogen Activator (RTPA), necessary blood pressure (BP) lowering medications & lines to facilitate TPA not only in high dependency ward (HD) but in uncommon settings such as CCU/EMD (2014)
   • Provision of mobile phones for direct nursing-to-neurologist contact on-the-move (Q2 2015)

4. Piloting of mobile stroke thrombolysis team (Q2 2015)
Colectomy Pathway

Colectomy ALOS & Readmission Rates

Laparoscopic Surgery 5%
Laparoscopic Surgery 50-55%

Patients not used to early discharge, low home support
Hot Clinics Started

[Graph showing Colectomy ALOS & Readmission Rates from 2001 to 2015]

- ALOS (days)
- Unscheduled Readmission Rates (%)
Minor Head Injury Pathway

ALOS, Mortality Rates and Complication Rates

- ALOS (days)
- Hospital Mortality rate %
- Complication Rate -%

2006: ALOS 1.42, Hospital Mortality 0.2%
2007: ALOS 1.42, Hospital Mortality 0%
2008: ALOS 1.48, Hospital Mortality 0%
2009: ALOS 1.49, Hospital Mortality 0%
2010: ALOS 1.49, Hospital Mortality 0%
2011: ALOS 1.67, Hospital Mortality 0.4%
2012: ALOS 1.54, Hospital Mortality 0.5%
2013: ALOS 1.67, Hospital Mortality 0%
2014: ALOS 1.8, Hospital Mortality 0%
2015: ALOS 1.8, Hospital Mortality 0%
Gastrectomy Clinical Pathway

ALOS & Readmission Rates

Mortality & Complication Rates

Anastomotic Leak
### Diabetes Care

#### Process Indicator

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c</td>
<td>Every 6mths</td>
<td>97</td>
<td>96.2</td>
<td>96.2</td>
<td>95.0</td>
<td>97.1</td>
</tr>
<tr>
<td>Serum Lipids</td>
<td>Every 15mths</td>
<td>88.2</td>
<td>87.2</td>
<td>89.4</td>
<td>87.5</td>
<td>85.6</td>
</tr>
<tr>
<td>Serum Creatinine</td>
<td>Every 15mths</td>
<td>93.6</td>
<td>94.6</td>
<td>94.8</td>
<td>94.0</td>
<td>94.8</td>
</tr>
<tr>
<td>Urine ACR</td>
<td>Every 15mths</td>
<td>77.6</td>
<td>78</td>
<td>81</td>
<td>79.6</td>
<td>78.8</td>
</tr>
<tr>
<td>Eye Screening</td>
<td>Every 15mths</td>
<td>30.3</td>
<td>36.6</td>
<td>36</td>
<td>35.0</td>
<td>36.3</td>
</tr>
<tr>
<td>Foot Screening</td>
<td>Every 15mths</td>
<td>38</td>
<td>51.2</td>
<td>52.8</td>
<td>56.9</td>
<td>66.3</td>
</tr>
</tbody>
</table>

#### Readmission Rates (%)

- **Readmission Rate (%)**
- **Readmission Rate in EDTU (%)**

#### Eye and Foot Screening

- **Eye Screening**
- **Foot Screening**
Diabetes Care

- Improving the standard of care is believed to favorably affect health outcomes of DM outpatients and helps reduce diabetes complications.

- Diabetes being a chronic illness requires continuing medical care and patient self-management to prevent acute complications.

- HbA1c, BP, serum lipids, serum creatinine, urine ACR, eye and foot assessment are essential to be done regularly to enable early intervention, but difficult to follow.

Initiatives:

- A clinical pathway & protocol guides standardized care.
- Process indicators are all doctors’ Key Performance Indicators (KPI).
- Clinic nurses track all patients who miss screenings, particularly eye & foot screening, which have the lowest rates.
- Call patients up to remind them of the doctor’s appointment date & screen them on that day itself.
- Enrolled Nurses (EN) trained to do walk-in foot screening.
- In addition to scheduled Eye Clinic services, a mobile bus offering walk-in fundal photography is parked outside the clinic for 2 days a week.
- Non-compliant patients are followed up by case managers & diabetes nurses providing education on the importance of timely screening, and help improve social and financial circumstances obstructing good self-care.
- Transition of patients from inpatient to outpatient, especially non-compliant ones, is closely monitored by case managers.
- Targeted efforts are made with an ambulatory stabilization project in poorly-controlled patients.
- Enhanced IT support for databases from May 2013 for better tracking of data.
One of the key success factors is information availability.
Hepatobiliary Pathway
Converted to electronic
Emergency Dept's Multiple Pathways

<table>
<thead>
<tr>
<th>Description</th>
<th>Test Date</th>
<th>Priority</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital Signs - BP, Pulse, Respiratory Rates ...</td>
<td>TODAY</td>
<td>Routine</td>
<td>6 Hourly</td>
</tr>
<tr>
<td>GCS - Conscious Level Chart (CLC) Mon ...</td>
<td>TODAY</td>
<td>Routine</td>
<td>Continuous 3-Lead Cardiac Monitoring</td>
</tr>
<tr>
<td>Observe for/Watch for (Specify signs ...)</td>
<td>TODAY</td>
<td>Routine</td>
<td>Consider Repeating Fbc Is Occult Bleedin ...</td>
</tr>
<tr>
<td>Full Blood Count (FBC)</td>
<td>TODAY</td>
<td>Routine</td>
<td>Consider Troponin Measurement If Mi Is S ...</td>
</tr>
<tr>
<td>Troponin I</td>
<td>TODAY</td>
<td>Routine</td>
<td></td>
</tr>
<tr>
<td>Diet of Choice (DOC)</td>
<td>TODAY</td>
<td>Routine</td>
<td></td>
</tr>
</tbody>
</table>
Integrated Pathways Across Different Care Settings

---------The MOH Drive

**Agenda**

- Introduction of Hip and Stroke Integrated Care Pathways (ICP)
- The ICP Journey: An overview of the approach
- Stroke and Hip Fracture ICP care elements in relation to National Standards of Healthcare

**Proposed Implementation Framework of Stroke and Hip Fracture ICP**

Implementation: Organization of Teams

1. Integrated Care Steering Committee
   - MOH
   - RH/CH

2. ICP Sub-Committee
   - Sub-Committee Members to oversee plans

**ICP Implementation Committee:**

- Comprises of:
  - HPO (1+ dedicated ICP executive)
  - Relevant Key Clinicians, Nursing/Allied Health reps
  - Appropriate IT/Finance reps
Staff Satisfaction

• Total No of Respondents – 216 (clinicians, nurses, medical social workers, occupational therapists, physiotherapists etc.)

• Overall assessment of Case Management services / clinical pathways - 84.7% felt is good or excellent

• Case Management services / clinical pathways add value to patient care - 96.3%

• Positive comments: Many of the respondents felt that they could not do without a Case Manager / clinical pathways.
Conclusion

- Organized multi-disciplinary approach with good leadership is crucial for pathways to be successful.

- Monitoring and tracking results for discussion helps.

- Teamwork is another key factor to achieve desired results.

- Long term perseverance is needed to see the impact.

- Integrated pathways across the continuum of acute and mid / long term care and partnership with step-down care facilities and community services is the way to go.

- Learning from best practices and care models from elsewhere e. Geisinger and Kaiser Permanante.