**Message From Dr S Thanasekaran**

Our Journey to Excellence continues. This second publication of Reflections is further testimony to our commitment to stay the course and continue publishing clinical outcome and performance data. We believe that the reputation of our hospitals must be grounded on good clinical governance and transparency.

With the support of the Medical Advisory Boards of our three hospitals, we have continued to make progress in refining some of our clinical outcome and performance measures.

The face of medicine is rapidly changing. New technology, new treatment options, a more knowledgeable patient base and competition mean that private hospitals cannot be run the way they used to be. The days when private hospital CEO’s were mere innkeepers for “hotel services” are over. Clinicians and hospitals have to work together in providing the best possible clinical care and service standards for our patients. We must demonstrate a joint responsibility for patients admitted to our hospitals.

To have been able to achieve this measure of progress in performance measurement is a reflection of the commitment of the Specialists accredited with us to work with hospital management in ensuring that our hospitals remain the pre-eminent names in private healthcare in the region.

With continued commitment, passion for quality and outstanding clinical outcomes, we remain confident that ParkwayHealth hospitals will continue to make a difference in the lives of our patients.

**Dr S Thanasekaran**

Group Vice President
Medical Affairs / Quality

---

**Message From Dr Lim Cheok Peng**

I wish to thank and congratulate the editorial team and all the staff and doctors who put together this second edition of Reflections.

Publishing clinical performance data is not yet routine in Singapore, but much is being done towards moving hospitals here in that direction. There is much to be gained by sharing clinical performance information and I am happy to see our hospitals take the lead.

With healthcare becoming ever more complex, it is important for hospitals not just to look at clinical performance data but also put in place rigorous internal and external clinical review processes to ensure we provide appropriate care for our patients. Towards this end, we are working towards establishing independent expert panels that can review and endorse the standard of clinical practice in our hospitals.

Quality is one of our five strategic initiatives. Our reputation and success as a private healthcare provider was built on excellence. We need to ensure that our patients continue to receive the best possible care.

**Dr Lim Cheok Peng**

Executive Vice Chairman, Managing Director,
Group President and Chief Executive Officer
Parkway Holdings Limited
INTRODUCTION

01 About ParkwayHealth
04 Moving Forward
05 Our Vision, Mission and Values, and our Strategic Priorities
06 Enterprise Strategy Map
07 Quality Team & Framework
08 Quality Week 2008
09 Service Excellence

CLINICAL QUALITY INITIATIVES

13 Clinical Quality Scorecard
16 Clinical Safety & Risk Management
16 HOR
17 Adverse Outcomes
17 Sentinel Event Review Process
18 Care Management in ParkwayHealth
20 Infection Control
25 Occupational Safety & Health
27 Joint Commission International Accreditation
28 High-Five Initiatives at ParkwayHealth Hospitals

PARKWAYHEALTH CLINICAL PROGRAMMES

33 Primary Care Clinical Programme
35 Primary Care & Chronic Disease Management Programme
38 Transplant & Cellular Therapy Programme
41 Oncology Clinical Programme
44 Women & Children Clinical Programme
48 Neurosciences Clinical Programme
50 Heart & Vascular Clinical Programme
56 Musculoskeletal Clinical Programme
59 Surgery Clinical Programme
63 Concluding Remarks

About ParkwayHealth

ParkwayHealth is a leading healthcare group based in Singapore, operating 16 hospitals with more than 3,300 beds in Asia, as well as patient assistance centres throughout the world. It has an extensive network across Asia, Europe and the Middle East with ParkwayHealth Patient Assistance Centres (PPAC) in Bangladesh, Brunei, Cambodia, China, India, Indonesia, Malaysia, Mongolia, Myanmar, Pakistan, the Philippines, Russia, Saudi Arabia, Sri Lanka, Ukraine, the United Arab Emirates, Uzbekistan and Vietnam. With a team of more than 1,300 accredited specialists covering 40 different specialties, ParkwayHealth is committed to its vision to be a global leader in value-based integrated healthcare.
Our Singapore Operations Division runs three of Asia’s premier hospitals — East Shore Hospital, Gleneagles Hospital and Mount Elizabeth Hospital, with a combined capacity of more than 1000 beds. The hospitals are supported by an extensive network of primary care clinics, a full range of diagnostic services plus a state-of-the-art facility that provides surgical supplies sterilisation services. With over 1,300 accredited medical professionals, ParkwayHealth provides a wide and comprehensive spectrum of medical services.

ParkwayHealth hospitals are proud of their reputation for exceptional clinical outcomes and outstanding service standards. This has been the foundation of our success in becoming a leading private healthcare provider.

In order to achieve the finest clinical outcomes, ParkwayHealth has continuously invested heavily in the latest technology and the best people.

We are the first healthcare provider in Asia, outside of Japan, to operate the state-of-the-art Aquilion ONE dynamic volume CT (computed tomography) scanner, which can create an image of an entire human organ like the heart or brain in a single rotation, allowing a medical exam to be completed in minutes and with less exposure to radiation and contrast dose for the patient.

ParkwayHealth is committed to making world-class healthcare available for patients who are overseas. Towards this end, we are building facilities or providing management expertise to numerous healthcare ventures outside Singapore. In addition, we have established more than 42 ParkwayHealth Patient Assistance Centres (PPAC) worldwide. These ParkwayHealth Patient Assistance Centres are a one-stop service that connects overseas patients to relevant specialists in our hospitals.

With 16 hospitals across Asia and more in the pipeline, ParkwayHealth is poised to set new standards in the quality of care, efficiency and value integrated health systems can provide.
To achieve our vision of becoming a global leader in value-based integrated healthcare, we are investing heavily not only in upgrading of our existing facilities but also in new growth projects.

In Singapore, work is in progress at Novena Square, where ParkwayHealth is building its new hospital in the centre of the Novena medical hub. This technologically advanced and patient-centric hospital will have 350 inpatient suites and offer new medical suites to complement targeted specialty centers in Orthopaedics, Cardiology and General Surgery.

Besides Singapore, work is also in progress at a new hospital in India where, with a local partner, we are building a multispeciality hospital in the city of Mumbai, which is the financial capital of South Asia. The hospital seeks to redefine the standards of healthcare delivery in India.

In the United Arab Emirates, ParkwayHealth has signed an agreement with United Eastern Medical (UEM) Services LLC to manage a new hospital in the capital, Abu Dhabi. The Danat Al Emarat (Arabic for “Pearl of the Emirates”) Women and Children’s Hospital will be developed by UEM, while ParkwayHealth will provide its quality clinical development services. The hospital will be a Centre of Excellence for women’s and children’s health in the UAE.

Our Mission
To make a difference in people’s lives through excellent patient care.

Our Vision
The global leader in value-based integrated healthcare.

Our Values

People above all... by treating those we serve and each other with compassion, dignity, integrity and mutual respect.

Excellence... by striving for the finest clinical, service and operational outcomes.

Results... by exceeding the expectations of the people we serve and those we set for ourselves.

Our Strategic Priorities

People... to attract, develop, retain engaged employees

Quality... to achieve the finest clinical outcomes.

Service... to attain the highest levels of service excellence.

Finance... to meet and exceed our financial goals and targets.

Growth... to grow the system per our strategic plans.
ParkwayHealth has developed a comprehensive and robust quality framework. Currently, the Quality Division is organised into seven distinct teams that work in close collaboration with each other and look after each critical domain of our quality system:

- Medical Affairs
- Quality Management
- Clinical Safety & Risk Management
- Infection Control
- Strategic Clinical Projects
- Clinical Review Team
- Communications & Information Management

These teams work closely with clinical departments. They oversee, administer and support the following programmes and initiatives:

- The Hospital Occurrence System
- Clinical Safety & Risk Management Programme
- Clinical Quality Scorecard
- Clinical Outcomes for Parkway Health
- Clinical Programmes
- Occupational Safety & Health Programme
- Infection Control Programme

In addition, the Quality Division is also responsible for ensuring that our hospitals meet the accreditation & licensing standards. Parkway Hospitals took a lead in becoming the first private healthcare providers in Singapore to be accredited by Joint Commission International.

Besides supporting our Singapore operations, the Quality Team works very closely with Quality Leaders & Hospital CEOs at our overseas facilities to ensure that ParkwayHealth’s Clinical Quality Standards are uniformly implemented across the system. The quality leaders from across our global hospitals regularly discuss various issues pertaining to clinical quality at Group Quality Huddles which are held every month. 2008 saw a great progress towards integration of our quality system as the Clinical Quality Scorecard was extended to include our hospitals in India, China, Malaysia & Brunei as well.

We look forward to further integration and enhancement of ParkwayHealth Quality Framework through teamwork and greater collaboration in 2009.
The Quality Week is an annual event to reaffirm and reflect on our commitment to deliver the finest clinical care to our patients by strengthening the safety culture in our hospitals and clinics.

A specific theme is selected for each year. The theme for 2008 was “Enhancing Patient Safety through International Patient Safety Goals.” The focus was to drive home the 6 international patient safety goals.

In Singapore, Quality Week kicked off on 6 October at Gleneagles Hospital with a line-up of games, talks, and quizzes, all in order to raise staff awareness of patient safety and the 6 International Patient Safety Goals. Subsequently, East Shore Hospital, Mount Elizabeth Hospital played host to the Quality Week activities for a day each.

Capping off the week was the 1st International Patient Safety Conclave on Friday, 10th October, at Park Hotel. The event was marked by a key note speech by Dr Paul Chang, Managing Director of Joint Commission International (Asia Pacific), who spoke on the JCI international safety goals.

The Conclave also brought together other eminent quality leaders from Singapore, India & Malaysia — each of whom shared their thoughts on patient safety and clinical quality.

Dr S. Thanesekaran, Group VP of Quality and Medical Affairs and Chief Medical Officer, provided the closing remarks for the Conclave and conclusion of Quality Week 2008. All in all, Quality Week was a rousing success, with active participation of our staff members who enjoyed the various activities and an increased awareness of patient safety.

This year the Quality Week will be organised in October 2009. The theme for 2009 will be “A Journey to Excellence.”

In January 2007, ParkwayHealth engaged QS-First Pte Ltd to conduct independent Patient Satisfaction surveys on our patients. QS-First is affiliated to the Press Ganey Company that some of the best hospitals in the USA use.

Patient Satisfaction is tracked through a layered patient experience indexing system. The top-line indicator is the Total Experience Index (TEI).

The TEI is a composite index, calculated from patient ratings of around 18 Items.

<table>
<thead>
<tr>
<th>Item Type</th>
<th>Number of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Satisfaction</td>
<td>1</td>
</tr>
<tr>
<td>Loyalty</td>
<td>6</td>
</tr>
<tr>
<td>Operations</td>
<td>12</td>
</tr>
</tbody>
</table>

The LOYALTY Index is a composite index of 6 Items:

- Medical Treatment
- Coordination of Care
- Service
- Value for Money
- Return
- Recommend

The OPERATIONS Index is a composite of the overall for 12 Items:

- Registration services
- Doctor services
- Nurse services
- Triage services
- Other services
- Medication services
- Facilities
- Meals services
- Family Treatment services
- Housekeeping services
- Discharge services
- Appointment services

Patient ratings are on a 5-point scale, of which only the top 2 ratings are used for TEI calculation. Hence, the TEI is the percentile mean of the “Excellent” and “Good” ratings given by patients, or their qualified proxies.

The survey methodology is as follows:

- Inpatients are interviewed face-to-face in the wards, followed by a phone call to complete the survey of their discharge experience.
- Day Surgery, Outpatient, Ancillary Services and A&E patients are interviewed over the telephone.
- Each month, twenty patients from each ward/unit in the three hospitals are randomly selected to be surveyed.

Overall, Parkway Hospitals in Singapore achieved a TEI performance of 90.5 % in year 2008 against a target of 93%.
ParkwayHealth strongly believes that clinical excellence and the creation of value for our customers is best achieved through having a rigorous system of measurement, and using this information to make continuous improvements. It was with this in mind that ParkwayHealth embarked on the Enterprise Balanced Scorecard project in 2007. The Balanced Scorecard (BSC) is a performance management tool for measuring whether the smaller-scale operational activities of a company are aligned with its larger-scale objectives in terms of vision and strategy. The ParkwayHealth Balanced Score Card identifies key performance indicators and measurements in our 5 strategic initiatives – People, Quality, Service, Finance and Growth.

On the enterprise balance score card, “Quality” has five measurable domains. These are:

1. To meet or exceed globally recognised clinical outcomes and benchmarks.
2. Achieve the finest clinical outcomes.
3. Build strong relationships with doctors and other partners.
4. Create a climate of open communication.
5. Build a reputation for clinical excellence.

Domain 1 “To meet or exceed globally recognised clinical outcomes and benchmarks” has been measured since the beginning of 2007. In 2008 this measurement was extended to include our international hospitals in India, China, Malaysia and Brunei. In Singapore we were also able to measure domain 2, domain 3 & domain 4 of quality. In year 2009 we look forward to measuring domain 5 also which is “Building a reputation for clinical excellence”.

To measure our ability to Exceed Globally Recognised Clinical Outcomes and Benchmarks, we use a set of six indicators which we have named as the Clinical Quality Scorecard. These indicators were selected essentially because many international health care quality agencies recognise these indicators as being good markers of quality.

“You can only manage what you measure” – Robert Kaplan
Baker Foundations Professor Harvard Business School and Co-Creator of Balanced Scorecard
The six indicators comprising clinical quality scorecard are:

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>EXPLANATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Adverse outcome rate</td>
</tr>
<tr>
<td>Q2A</td>
<td>Aspirin within 2 hours of admission with AMI</td>
</tr>
<tr>
<td>Q2B</td>
<td>PCI within 90 minutes of admission with STEMI</td>
</tr>
<tr>
<td>Q3</td>
<td>Objective LV assessment for admissions with CCF</td>
</tr>
<tr>
<td>Q4</td>
<td>Antibiotic Therapy commenced within 4 hrs of admission with Bacterial Pneumonia (Q4)</td>
</tr>
<tr>
<td>Q5</td>
<td>Prophylactic antibiotics 1 hr before Knee Replacement Surgery</td>
</tr>
<tr>
<td>Q6A</td>
<td>MRSA (Methicillin Resistant Staphylococcus aureus) infection rate</td>
</tr>
<tr>
<td>Q6B</td>
<td>Central line-associated BSI in ICU</td>
</tr>
</tbody>
</table>

Adverse outcome are incidents that had resulted with patient injuries requiring interventions or extended length of stay. Lower Adverse Outcome rates indicate the effectiveness of Clinical Safety measures being implemented in the facility.

Aspirin is known to help in AMI by preventing formation of blood clots and dissolving blood clots already formed causing damage to heart muscles.

Percutaneous Coronary Interventions (PCI) is one of the most effective procedure for opening blocked blood vessels that cause heart attacks.

An evaluation of the LV function checks the effectiveness of left chamber of the heart in pumping blood.

Timely use of antibiotics is known to improve the clinical outcomes of pneumonia caused by bacteria.

Administration of antibiotics within one hour before surgery is known to reduce the risk of wound infections.

MRSA is a highly dangerous and drug resistant bacterium which is known to cause Hospital Acquired Infections. Lower MRSA Rate in facility indicates the effectiveness of Infection control measures being implemented.

Lower Blood stream Infection rates in ICU indicate the high level of hygiene & ensure patient safety from dangerous infections in these critical care areas of hospital.

The performance of each hospital is measured in these areas and adjusted by an assigned Weightage as follows:

**Scoring Weightage & Framework**

<table>
<thead>
<tr>
<th>FINAL SCOREBAND</th>
<th>EXCELLENT</th>
<th>AVERAGE</th>
<th>POOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1 Score</td>
<td>Indicator 1 x assigned weightage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tier 2 Score</td>
<td>Indicator 6 x assigned weightage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tier 3 Score</td>
<td>Indicator 2 x assigned weightage + Indicator 3 x assigned weightage + Indicator 4 x assigned weightage + Indicator 5 x assigned weightage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An overall maximum score of 5 is allocated to the Clinical Quality Scorecard. The scorecard is updated on monthly basis & shared with all staff regularly. The progressive improvement in scores from the first quarter of 2007 onwards demonstrate how measurement changes performance. This change in performance in turn translates into better clinical outcomes and improved patient safety.
Clinical Safety & Risk Management

HOR

Our quality system is grounded on a Voluntary Hospital Occurrence Reporting System. Staff is encouraged to report any incident that puts patients, staff, doctor, or visitor’s safety at risk regardless whether or not the person suffers an adverse outcome. Near miss reporting is also strongly encouraged. For a voluntary hospital occurrence reporting system to be successful it must:

- Be safe (that is – it must protect staff from blame)
- Be simple and convenient to submit reports
- Add value (the system must provide feedback and must be seen to serve as a tool for improvement)

Much has been done in recent years to cultivate a “no-blame” culture. Our Internal Reviews and Sentinel Event Reviews are firmly centered on identifying and correcting process failures.

An Electronic Hospital Occurrence Report was successfully implemented in January 2007. This has simplified occurrence reporting for our staff and speeded up the routing process.

The number of Hospital Occurrence Reports increased to 2272 in year 2008 as compared with 1324 in year 2006 & 2056 in year 2007. We see this progressive increase in voluntary reporting as an endorsement of the Hospital Occurrence Reporting System.

Clinical incidents constituted 45% of all HORs raised in 2008, whereas non clinical incidents like near miss, workplace safety & health issues and feedback constituted 55% of hospital occurrence reports in year 2008.

HOR Adverse Event / Outcome for Jan 2007 - Dec 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abs Number</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>Jan</td>
<td>143</td>
<td>136</td>
</tr>
<tr>
<td>Feb</td>
<td>156</td>
<td>133</td>
</tr>
<tr>
<td>Mar</td>
<td>150</td>
<td>164</td>
</tr>
<tr>
<td>Apr</td>
<td>223</td>
<td>201</td>
</tr>
<tr>
<td>May</td>
<td>223</td>
<td>186</td>
</tr>
<tr>
<td>Jun</td>
<td>195</td>
<td>152</td>
</tr>
<tr>
<td>Jul</td>
<td>70</td>
<td>135</td>
</tr>
<tr>
<td>Aug</td>
<td>66</td>
<td>165</td>
</tr>
<tr>
<td>Sep</td>
<td>70</td>
<td>198</td>
</tr>
<tr>
<td>Oct</td>
<td>82</td>
<td>201</td>
</tr>
<tr>
<td>Nov</td>
<td>73</td>
<td>201</td>
</tr>
<tr>
<td>Dec</td>
<td>69</td>
<td>270</td>
</tr>
</tbody>
</table>

Adverse Outcome

Adverse outcome are incidents that resulted in the patient sustaining an injury, or requiring additional interventions or which resulted in the patient’s length of stay in the hospital having to be extended.

Year 2008 saw a two-third decline in number of adverse outcomes over Year 2007. A similar trend was also noted last year.

Sentinel Event Review Process

ParkwayHealth hospitals are actively engaged in the national Sentinel Review Programme. A Sentinel Event is one that results in an unanticipated death or major permanent loss of function, not related to the natural course of the patient’s illness or underlying condition. All clinical incidents are evaluated using a tool called the Safety Assessment Code (SAC). This tool uses the SEVERITY of the incident and the PROBABILITY of that incident recurring, to compute an overall risk score (1 to 4) for a particular incident. A SAC score of 1 would indicate a catastrophic Incident whilst a score of 4 indicates a relatively minor incident.

The object of the sentinel review is to identify the root causes and the process failures that lead to the occurrence of the incident. The Sentinel Review panel will also make recommendations for process improvements. Targets are set for these improvements to be implemented and adoption and compliance of these new or improved processes is audited.
Care Management in ParkwayHealth

As a demonstration of our commitment to excellence in quality and service provision to our patients and doctors, we have recently embarked on a Care Management Programme. In ParkwayHealth, we are using the terminology of Care Management (rather than “case”) as it is more customer friendly. The definition is

“Case Management is the collaborative process of assessment, planning, facilitation, & advocacy for options & services to meet an individual’s health needs through communication & available resources to promote quality, cost effective outcomes”

- Case Management Society of Australia

This initiative is focused on understanding the needs of various patient populations and redesigning our care processes to ensure that we are optimising the opportunity of achieving the desired clinical outcomes.

It is anticipated that the Care Management Programme will fit ‘hand in glove’ with the Clinical Programme Strategy and has been identified as a key quality initiative moving forward.

Elements of a Care Management model are:

- Preadmission Assessment
- Discharge Planning (preferably at preadmission stage)
- Managing the inpatient stay (by clinical pathways where there are homogenous, predictable patient populations)
- Discharge Coordination
- Home Care (may or may not be required)
- Outcomes Management

The overall aims of the programme are to improve patient care and satisfaction, improve our coordination of care, improve care team’s mutual understanding of what various patient populations require, reduce paperwork and improve documentation. The programme also aims to demonstrate outcomes of the process of care, improve patient safety and manage length of stay.

Currently, the Care Management team group consists of a multidisciplinary team with representatives from Nursing, Quality Division and Care Managers. The Care Managers have undergone a comprehensive training and education programme.

This is an exciting time as we prepare to launch the pathways. The outcomes we are looking to achieve are to provide the care that is expected by our doctors and to optimise the outcomes achieved and the experience of our patients. We also aim to support the nurses by guiding their practice and giving them clarity as to what is expected of them and when to notify the doctors regarding variation, or the patient’s response to care. Documentation by variation also enables analysis to be attended at a patient population group level and so future versions of the pathway will be based upon the evidence of patient’s response to care. This provides the mechanism for linking our care delivery to the quality improvement cycle.

---

### CLINICAL PROGRAMME

<table>
<thead>
<tr>
<th>CLINICAL PROGRAMME</th>
<th>AREA OF CARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women and Children</td>
<td>Post delivery care Normal Vaginal Delivery &amp; Care of Newborn (well baby)</td>
</tr>
<tr>
<td>Transplant Programme</td>
<td>Renal Transplant (Care of Renal Donor)</td>
</tr>
<tr>
<td>Oncology Programme</td>
<td>End of Life Care plan</td>
</tr>
<tr>
<td>Musculoskeletal Programme</td>
<td>Anterior Cruciate Ligament Reconstruction</td>
</tr>
<tr>
<td>Heart &amp; Vascular Programme</td>
<td>Percutaneous Coronary Intervention</td>
</tr>
<tr>
<td>Surgery Programme</td>
<td>Video Laparoscopic Cholecystectomy</td>
</tr>
</tbody>
</table>
Infection Control

“Infection Control is Everyone’s Responsibility”

Infection control is an integral part of patient care and an institutional priority at ParkwayHealth hospitals.

**Goals**
- To protect our patients by preventing or reducing the risk of healthcare associated infections.
- To protect our staff and visitors from contracting infections in the hospital.

The primary focus of our infection control programme is on prevention and reducing the risk of infection among patients, staff and visitors.

Infection control policies and practices are in line with international best practices and guidelines to ensure effective clinical quality and safety for patients, staff and visitors.

The key elements of our infection control programme are:
- Effective hand hygiene programme
- Standard (Universal) precautions
- Transmission-based precautions
- Safe disposal of medical waste and clinical sharps
- Effective environmental services
- Prevention, surveillance and control of healthcare-associated infections

**Preventive Measures**
Hand hygiene is the single most important measure in preventing the spread of microorganisms. Hand hygiene resources are available in all patient care areas to ensure easy access by healthcare workers and visitors. Ongoing audit is conducted to monitor hand hygiene practices and compliance among healthcare professionals in our hospitals.

To prevent the importation and spread of multi-drug resistant organisms, patients admitted directly from other hospitals and long term care facilities are placed on preventive isolation and screened to determine the need for further isolation precautions.

**Targeted Surveillance**
Surveillance of healthcare-associated infections at ParkwayHealth is priority-directed and targeted; based on the needs and requirements of the organisation and health regulations. The following indicators have been identified for surveillance:

- Device-associated infections in ICUs:
  - Central-line associated Blood Stream Infection
  - Ventilator-associated Pneumonia
  - Catheter-associated Urinary Tract Infection
- Surgical site infections for Coronary Artery Bypass Grafting (CABG) and Hip Replacement surgery
- Healthcare-associated MRSA infections
- Vancomycin-resistant enterococci (VRE)
- Timely administration of antibiotic prophylaxis for knee replacement surgery
- Timely administration of antibiotics for patients admitted with bacterial pneumonia.

**Patient Care Bundles**

In line with international best practices, ParkwayHealth hospitals in Singapore have adopted and implemented two evidence-based bundles recommended by the Institute of Healthcare Improvement (IHI), USA. The objective of these bundles is to significantly reduce the risk of infections associated with the use of mechanical ventilators and central lines.

**Ventilator Bundle**
By definition, ventilator-associated pneumonia (VAP) is an airway infection that developed more than 48 hours after the patient was intubated. There are reasons to be concerned about the impact of pneumonia associated with ventilator use. VAP is associated with high morbidity and mortality among ICU patients. In addition, VAP prolongs time spent on the ventilator, length of ICU stay, and length of hospital stay after discharge from the ICU and adds an additional cost to a typical hospital admission.

Reducing morbidity and mortality due to VAP requires an organised process and consistent application of the best evidence-based practices. The ventilator bundle is a series of interventions related to ventilator care that, when implemented together, will achieve significantly better outcomes than when implemented individually.

The key components of the Ventilator Bundle are:
- Elevation of the Head of the Bed
- Daily “Sedation Vacations” and assessment of readiness to extubate
- Peptic Ulcer Disease Prophylaxis
- Deep Venous Thrombosis Prophylaxis

**Central Line Bundle**
Central venous catheters (CVCs) are being used increasingly in the inpatient and outpatient setting to provide long-term venous access. CVCs disrupt the integrity of the skin, making infection with bacteria and/or fungi possible. Infection may spread and severe sepsis may ensue.

The central line bundle is a group of evidence-based interventions for patients with intravascular central catheters that, when implemented together, result in better outcomes than when implemented individually.

The 5 components of central line bundle are:
- Hand hygiene
- Maximal barrier precautions
- Chlorhexidine skin antisepsis
- Optimal catheter site selection, with subclavian vein as the preferred site for non-tunneled catheters
- Daily review of line necessity, with prompt removal of unnecessary lines
CENTRAL LINE BUNDLE
...is a group of interventions related to patients with intravascular central catheters that, when implemented together, result in better outcomes than when implemented individually.

Central Line Elements
- Hand hygiene
- Maximal barrier precautions
- Chlorhexidine skin antisepsis
- Appropriate catheter site and administration system
- Avoid routine replacement

Maximal barrier precautions
- Hand hygiene
- Sterile gown and gloves
- Non-sterile cap and mask
- Large sterile drape for patient’s head and body

Skin Antisepsis
- 2% CHG in 70% Alcohol
- Allow solution to dry before insertion
- Lower CHG concentration for neonates

Catheter Site Selection
- Preferred site – subclavian
- Higher risk of infection for femoral

Catheter Site Care & Dressing
- Use large transparent dressing
- Gauze – change at 48 hours
- Transparent dressing – change

VENTILATOR BUNDLE
...is a series of interventions related to ventilator care that, when implemented together, will achieve significantly better outcomes than when implemented individually.

Ventilator Bundle Elements
- Raise head of the bed to between 30 and 45 degrees
- Daily “sedation vacation”
- Daily assessment of readiness to wean
- DVT prophylaxis (unless contraindicated)
- Stress ulcer prophylaxis
- Oral Care Regime
- Reduce head of bed 30 to 45°
- Reduces potential for aspiration
- Potential to improve ventilation
- 4 Hourly Oral Care Regime
- Reduces risk of aspiration of subglottic secretions
- Reduces dental plaque
- Reduces bacterial colonisation of oropharyngeal area
- Daily Sedation Vacation
- Daily weaning of sedation
- Decrease sedation requirements
- Daily Weaning Assessment
- Assess readiness to extubate
- Assess weaning when sedation is decreased

Healthcare-associated MRSA Infection Rate 2002 to 2008

<table>
<thead>
<tr>
<th>Year</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESH</td>
<td>0.27</td>
<td>0.14</td>
<td>0.0</td>
<td>0.05</td>
<td>0.0</td>
<td>0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>GHL</td>
<td>0.18</td>
<td>0.40</td>
<td>0.33</td>
<td>0.30</td>
<td>0.36</td>
<td>0.22</td>
<td>0.20</td>
</tr>
<tr>
<td>MEH</td>
<td>0.34</td>
<td>0.17</td>
<td>0.15</td>
<td>0.20</td>
<td>0.16</td>
<td>0.11</td>
<td>0.10</td>
</tr>
<tr>
<td>PARKWAYHEALTH</td>
<td>0.22</td>
<td>0.14</td>
<td>0.14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S’PORE</td>
<td>0.36</td>
<td>0.28</td>
<td>0.34</td>
<td>0.33</td>
<td>NA*</td>
<td>NA*</td>
<td>NA*</td>
</tr>
</tbody>
</table>

*NA* = Not Available
**Occupational Safety & Health**

Occupational safety and health is taken seriously by ParkwayHealth and it has always been our top priority to create a safe and healthy working environment for all staff working in our hospitals.

The following initiatives were implemented following a gap analysis conducted by external consultants in 2004:

- A risk assessment framework
- A hazard and spills management programme
- A register of hazardous materials / chemicals was established
- Surveillance and monitoring of workplace safety

A dedicated Occupational Safety and Health Department was created in year 2004 as a unit within the Quality Division.

The Workplace Safety and Health Act is the key legal instrument supporting the WSH framework in Singapore. It was enacted on 1 March 2006, replacing the Factories Act, under Ministry of Manpower and since then, this Act has been expanded to include the Healthcare sector with effect from 1 March 2008. This act requires every person at the workplace to take reasonably practicable steps to ensure the safety and health of every workplace and worker. The shift from a prescriptive legislative approach to a performance-based liability regime holds accountable those who create risks to reduce risks at source. The basic premise is that every worker deserves to be protected against safety and health risks. This Act is currently governed by the Workplace Safety and Health Act Council.

After the act came into enforcement we have renamed our Occupational Safety and Health Unit to the Workplace Safety and Health Unit. The aim of this move is to standardise the terminology used by the council.

This WSH unit has continuously been creating safety awareness among all Parkway staff, reiterating that all safety measures must be taken at all times during their course of work and that various trainings are also provided for staff to undergo. Currently, the WSH unit, Infection Control Unit, Radiation Department and together with Parkway College provide safety trainings such as Hazard and Risk Assessment, Safety Orientation for all new staff, Radiation Safety Training and Infection Control Training.

It is Parkway Health’s belief that safety and health at work is integral to growth as it translates to higher productivity and cost savings. The graph below reflects the trend of the total number of workplace injury claims for Y2007 and Y2008. There was a drop of the total number of workplace injuries reported from 173 to 162. This translates into significant cost savings for the organisation.

---

**Device-associated Infections in ICU 2008**

<table>
<thead>
<tr>
<th></th>
<th>ESH</th>
<th>MEH</th>
<th>GHL</th>
<th>NNIS*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central line - associated BSI</td>
<td>0</td>
<td>0</td>
<td>0.7</td>
<td>3.2</td>
</tr>
<tr>
<td>Ventilator - associated pneumonia</td>
<td>0</td>
<td>0</td>
<td>4.2</td>
<td>5.1</td>
</tr>
<tr>
<td>Catheter - associated UTI</td>
<td>0</td>
<td>0</td>
<td>1.2</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*National Nosocomial Infections Surveillance System*
Moving forward, the WSH unit will be developing a more holistic framework in accordance to the requirements of the Act. The plan shall include identifying, assess and control workplace hazards and risks, minimise events that could lead to injury, loss and damage, the reduction cost of claims and total compliance to the WSH legislations and regulations. Risk Assessment is carried out at all workplace so as to identify the hazards and reduce the risks at source. This initiative was in place since year 2006, but as it was carried out as per each individual facility, hence, this round, it shall be standardised across the 3 hospitals, ensuring consistency of the delivery standards.

The WSH unit will also focus on delivering a staff health programme that will include:

- Workplace Safety and Health of Elderly Staff Members
- A “No Lift Policy” for patient transfers
- Train the Trainer Programme to ensure that supervising staff are able to inculcate safety awareness culture in their work environment
- Regular Workplace Safety inspections.

Note: Information provided by AON, ParkwayHealth’s Insurance Broker

Joint Commission International Accreditation

An independent, not-for-profit organisation, The Joint Commission accredits and certifies more than 15,000 health care organisations and programmes in the United States. Joint Commission accreditation and certification is recognized around the world as a symbol of quality that reflects an organisation’s commitment to meet certain performance standards.

Its international arm is known as Joint Commission International (JCI). The mission of Joint Commission International is to continuously improve the safety and quality of care of patients in the international community through the provision of education, consultation services and international accreditation.

Joint Commission International has developed more than 1000 comprehensive standards covering all aspects of patient & staff safety in healthcare organisations. These standards are audited for compliance every 3 years.

All our three hospitals in Singapore have been accredited by Joint Commission International. Besides our hospitals in Singapore, Parkway Hospitals overseas are also getting prepared for accreditation by Joint Commission International. Apollo Gleneagles Hospital, Kolkata a Parkway Health Hospital in India was accredited recently. Some hospitals in Malaysia that are managed or owned by ParkwayHealth are preparing for their accreditation surveys at end of 2009.

Mount Elizabeth Hospital & Gleneagles Hospital which were the first private hospitals in Singapore to be accredited by Joint Commission International in 2006 are currently preparing for their first Triennial re-accreditation Survey in July 2009.
High-Five Initiatives at ParkwayHealth Hospitals

In December 2006, The World Health Organisation (WHO) in collaboration with The Joint Commission International announced an international collaborative initiative known as the High 5 Project to improve patient safety in hospitals. The ParkwayHealth Hospitals in Singapore embraced the High 5 (International Patient Safety Goals) as their Clinical Quality and Patient Safety Improvement initiative for 2008. Workgroups were formed in early 2008 to work on solutions.

Led by senior leadership and representatives from across the three facilities, processes and measures were implemented to achieve the objectives set.

The Concentrated Injectable & Medication Reconciliation Workgroup

This workgroup was formed with an objective of promoting the effective management of concentrated injectables & electrolytes (IPSG 3) and to ensure medication accuracy at transition in care (Medication Reconciliation).

A frequently cited medication safety issue is the unintentional administration of concentrated electrolytes (for example, potassium chloride [2 mEq/ml or more concentrated], potassium phosphate, sodium chloride [> 0.9% or more concentrated], and magnesium sulphate [50% or more concentrated]). The most effective way to reduce or eliminate this occurrence is the removal of concentrated electrolytes from patient care units to the pharmacy.

In addition to the above initiative, pre-diluted potassium chloride solutions are made available on all wards:

- 500mls Dextrose 5% with 10mmol potassium chloride
- 500mls Dextrose 5% /Sodium Chloride 0.33% with 10mmol potassium chloride
- 500mls Normal Saline with 10mmol potassium chloride

Other high-concentrated solutions and drugs are properly segregated when stored.

ii) Special Labeling of Concentrated Electrolytes

Another initiative from the workgroup was the development and implementation of a printed warning label "INFUSE WITH CARE". All prepared IV infusions with potassium and calcium additives shall have bright orange warning labels "INFUSE WITH CARE" affixed on the IV infusion packs to alert nurses.

iii) Improved Checking Process

Studies at the Institute for Safe Medication Practices have shown that independent double-checks detect approximately 95 percent of errors. The workgroup re-looked and improved the checking process to ensure safe handling and administration process of intravenous medication administration through infusion. A new standard Drug Dilution Label was introduced.

Independent double checks by two qualified staff on the correct medication, correct calculated dose / volume and correct patient identification shall be carried out whenever medications, especially the high-alert and high-risk group of medications are reconstituted for intravenous infusion.

The Hospital Operating Policy on Intravenous Administration of Medication was also amended to reflect the new initiatives.

iv) Medication Reconciliation

Medication errors occur mostly at transition of care. This workgroup started with small practical solutions. The objective was to reconcile the medications patients were taking prior to admission to those being ordered during hospitalisation, to ensure continuity of treatment, prevent drug omissions or overdosing and avoid potential drug interactions.

On admission, a record on the patient’s regular medications, over-the-counter drugs, vitamins and herbal remedies that the patient has been taking at home is obtained as accurately as possible. The information is recorded in the Admission History and Nursing Assessment Form and is accessible to the doctors and pharmacists.

Drug Dilution Label

<table>
<thead>
<tr>
<th>Drug added</th>
<th>Dose / Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rate of infusion (when applicable):

Start Time:       Est. End Time (if applicable):

Checked by:       Prepared by:  Administered by:

Verify calculation before signing.

*New Additive Label
Effective Communication & Hand-Off Workgroup

The workgroup focused on improving the handover process where exchanges of patient information were essential for patient care management. The aim was to ensure continuity of care as well as to reduce errors arising from informational ‘drops’, misunderstanding, miscommunication or lack of communication person-to-person or shift-to-shift, or department to department.

To ensure that accurate, complete, unambiguous communication is delivered timely and understood by the recipient, the use of SBAR methodology was introduced.

The SBAR (Situation-Background-Assessment-Recommendation) methodology was adopted as a tool to enhance communication in both clinical and non-clinical situations. The evidence-based interactive communication model assists the speaker by providing a mental model or framework to organise and convey information. This model allows opportunities for clarification through questions and answers.

Prior to the full implementation of the SBAR methodology in January 2009, rigorous trainings was conducted for staff, primarily nurses. In addition, doctors new to the organisation were briefed on the use of this methodology. SBAR cue cards were printed and distributed to all staff and doctors to facilitate induction.

Compliance monitoring through direct observations and patient chart reviews was conducted during the pilot run from October to December 2008.

The next steps will be to introduce the SBAR methodology to the non-clinical and clinic staff.

Surgical Patient Safety Workgroup

When the Joint Commission Sentinel Event Policy was first introduced in 1998 in USA, the Accreditation Committee of the Board of Commissioners reviewed 15 cases related to wrong site surgery. There was an escalating trend and it stood at 116 cases in 2008. The root causes identified often relate to communication, preoperative assessment of the patient, and the procedures used to verify the operative sites.

Although ParkwayHealth Hospitals in Singapore had a process in place to verify correct-patient, correct-site and correct-procedure surgery, compliance and practices were inconsistent. This led to the formation of the Surgical Patient Safety Workgroup in 2008 to review the entire process from patient identification verification, surgical site marking and ‘Time-Out’ before the start of the procedure.

The workgroup reviewed and implemented the following initiatives:

- ‘Time-Out’ was to be conducted before any invasive or surgical procedures that expose the patients to more than minimal risk, including procedures done in settings other than the operating theatre such as the Endoscopy unit, Cardio-Vascular laboratory and at Interventional Radiology department.

- The Operating Theatre Policy was amended, to clarify who was to conduct the ‘time-out’, when it was to be carried out and the elements to be checked.

- The elements / criteria were printed on the peri-operative form and nurse was required to verify and check-off before the start of the surgical procedure. In August 2008, a new ‘time-out’ checklist was introduced with the following elements / criteria:
  - Correct patient (2 unique patient identifiers)
  - Correct procedure
  - Correct side/site, including surgical site marking if applicable
  - Correct patient position
  - Availability of special equipment & implant(s)
  - List of names of the participants on Time-Out

- To create awareness and encourage compliance, staff and surgeons / doctors working in areas where Time-Out was conducted watched a video presentation on ‘Time-Out’ procedure.

To determine the progress of this initiative, data on compliance was collected from our patient records review and from direct audit observations.

![SBAR Diagram](image-url)
Data revealed the inconsistency in the practice of surgical site marking. This may be attributable to the learning curve. It is envisaged that this will improve over time with further awareness / training of our physicians and staff.

Clinical Programmes

Our clinical programme initiatives were launched in 2007. These clinical programmes support our vision of being a truly integrated, seamless health care system that is firmly focussed on providing excellent patient care.

Our 8 clinical programmes cover a wide range of specialities. Each programme has a designated Clinical Programme Leader providing administrative support. The programmes are integrated horizontally through all our hospitals in Singapore.

“Quality is the result of a carefully constructed cultural environment. It has to be the fabric of the organisation, not part of the fabric.”

- Philip Crosby
“Chronic Diseases are those conditions that are permanent, leave residual disability, are caused by non-reversible pathological alteration, require special training of the patient for rehabilitation, or may be expected to require a long period of supervision, observation, or care.”

- World Health Organisation

Primary Care & Chronic Disease Management Programme

The ParkwayHealth Primary Care and Chronic Disease Management Programme, helmed by ParkwayHealth – Primary Care Network, offer comprehensive healthcare solutions for the patients with chronic illnesses. With 48 clinics across Singapore, our Primary care network delivers clinical services to people across the island nation.

Patients with Diabetes, Hypertension and High Cholesterol are offered focused care via this programme. These patients are managed according to evidence based, peer reviewed Clinical Practice Guidelines. This ensures that our patients consistently receive high quality clinical care based on the latest medical advancements.

Clinical data is harvested and tracked on a periodic basis. We determine our clinical outcomes through Clinical Quality Performance Indicators. This information is used to improve patient care and engage in clinical research.
Clinical Quality Performance Indicators

Performance indicators to measure the quality of care we provide for patients with some of the chronic diseases were developed and measured in 2008.

The clinical outcomes for these indicators are as follows.

**Hypertension Management:**
Hypertension is a common condition. There is good clinical evidence that maintaining the Systolic Blood Pressure (BP) below 140 mm Hg and the Diastolic BP below 90 mm Hg decreases the risk of heart disease, kidney disease and stroke.

**Clinical Indicators:** Maintenance of Systolic BP of 140 or below and Diastolic BP of 90 or below in patients with Hypertension.

**Performance:** Random sample of hypertensive patients followed up at our primary care clinics showed that our performance was better than the benchmark NCQA (National Committee for Quality Assurance, USA) average of 59.7%.

**Diabetes Mellitus Management:**
Diabetes Mellitus is an increasingly common disease that can lead to development of cardiac, neurologic, renal and ophthalmic complications. Maintaining good glycaemic control reduces the risks of microvascular and other long term complications associated with this disease.

**Clinical Indicators:** The following two indicators were selected for our Diabetes Management Programme:
- HbA1c is a measure of control of blood sugar in diabetics. A HbA1c Level of 7 or less indicates good sugar control.
- Hypertension is known to occur very commonly in diabetic patients and is associated with an increased rate of complications associated with diabetes.

**Performance:** Random sampling for control of Blood Pressure in patients with Diabetes and Hypertension was conducted. In 2008, our results compared favourably to the NCQA (USA) average of 29.9% for this indicator.

---

*All outcomes are non-risk adjusted*
Transplant & Cellular Therapy Programme

This Programme offers both living donor solid organ transplants as well as bone marrow stem cell transplants for hematological conditions.

Renal Transplant:
Living Donor Kidney Transplant

The number of living donor Renal Transplant cases done at our hospitals has been increasing progressively.

Number of Renal Transplant Cases

Clinical Outcome

<table>
<thead>
<tr>
<th>YEAR</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cases</td>
<td>31</td>
<td>58</td>
<td>61</td>
</tr>
<tr>
<td>1 Year Survival Rate</td>
<td>96.5%*</td>
<td>96.15%*</td>
<td>N.A.</td>
</tr>
<tr>
<td>2 Year Survival Rate</td>
<td>92.6%*</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

*Adjusted

Targeted Therapy for Multiple Myeloma (April 2007 to Dec 2008):

Multiple Myeloma is a cancer of the plasma cells which are a type of white blood cells present in the bone marrow. The disease is called Multiple Myeloma because these abnormal cells can occur in multiple bone marrow sites in the body. ParkwayHealth offers targeted therapy for such patients which is emerging as treatment of choice in this disease.

- Average time to best response: 2.9 months*
- Best depth of response to therapy *

<table>
<thead>
<tr>
<th>Period</th>
<th>Data Type</th>
<th>Total Cases</th>
<th>Stable Partial Response</th>
<th>Complete Remission</th>
<th>Partial Response</th>
<th>Minimal Response</th>
<th>Complete, Partial &amp; Stable Partial Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>April to Dec 2008</td>
<td>Number</td>
<td>16</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Ratio</td>
<td>100%</td>
<td>12.5%</td>
<td>37.5%</td>
<td>43.7%</td>
<td>6.2%</td>
<td>93.7%</td>
</tr>
</tbody>
</table>

Observed Response

* Excludes Pending assessment, Stable disease
Living Donor Liver Transplant (LDLT):

The Asian Centre for Liver Disease at Gleneagles Hospital is the first fully integrated centre for Liver Transplant in Asia. The centre has been instrumental in bringing the latest technological innovations in the area of Liver Transplant to Asia.

Due to scarcity of cadaveric donors, the Living Donor Liver Transplant has become the treatment of choice for patients requiring Liver Transplant. Our Liver Transplant team is lead by eminent Liver Transplant Surgeon Dr K.C. Tan.

A study conducted in 2007 showed an overall 1 year survival rate of more than 80% for our Liver Transplant Patients, which is comparable to some of the best Liver Transplant Centre’s around the world. For Liver Transplant Operations performed in 2008 the 30 day survival rate was close to 96%.

To date, the liver transplant team has undertaken 132 liver transplants. The common causes for liver transplant are liver failure due to hepatitis B, hepatitis C and liver cancer. Patients come mainly from Malaysia, Indonesia and India. The donors are either blood relatives or emotionally related to the recipients.

In order to maintain its leadership role in the clinical management of liver failure patients, The Asian Centre for Liver Disease has recently upgraded its liver failure treatment options to include 2 newer modalities in addition to MARS (Molecular Adsorbents Recirculation System) dialysis which was available earlier.

1) IMPACT:

IMPACT is a newer generation non-biological system that utilises modern bead & adsorption technologies to maximise clinical benefits. It also uses a plasma separator and does not utilise albumin dialysis like the MARS system.

2) ELAD (Extracorporeal Liver Assist Device):

ELAD is a novel treatment option that uses cartridges containing human hepatocytes. These cartridges are ordered on a per patient basis from the United States. The treatment is continuous and can last for several days. As this is a biological system, the cells may provide synthetic activity that is not available in the non-biological systems like MARS.

In Singapore, IMPACT and ELAD are currently only available at this center. They represent major advances over the standard MARS dialysis that was the only treatment option available previously.

Oncology Clinical Programme

The Parkway Cancer Center helps patients and their families cope with cancer. At PCC patients undergo proven innovative therapies for the best clinical outcomes. Parkway Health is one of the few centers in the region to have a Positron Emission Tomography — Computed Tomography (PET-CT) scanner, a highly advanced diagnostic tool for scanning tumors. At same time, Parkway Cancer Center was also the first medical provider in Southeast Asia to deploy the TomoTherapy® Hi Art System, the most advanced integrated cancer treatment system in the world. It allows doctors to deliver highly accurate radiation doses with precision and can capture real-time images of the targeted tumor immediately before and after the treatment.
Our Services

CanHOPE
- Patient Counselling
- Patient Education
- Psychosocial & Emotional Support

Cancer Research & Development

Cancer Screening
- Cancer Diagnostic Screening
- Cancer Risk Assessment

Cancer Treatments
- All types of Cancer including Solid Tumours
- Chemotherapy Treatment
- Pediatric Oncology

Radiotherapy Treatment:
The Parkway Cancer Centre is well-equipped to offer various cutting-edge radiation treatment modalities including:
- Tomotherapy
- Intensity-modulated radiation therapy (IMRT)
- Image-guided radiation therapy (IGRT)
- 3D conformal radiation therapy
- Conventional radiation therapy
- Stereotactic radiation therapy
- Radiosurgery
- Brachytherapy and implants

Surgical Treatment
Home Care & After Care Services

Clinical Outcomes
An International Advisory Board guides the Oncology Programme. A multi-disciplinary Tumor Board reviews and plans treatment strategy for individual patients to ensure that patients receive the most appropriate care.

Management of Acute Lymphoblastic Leukemia:
Acute Lymphoblastic Leukemia (ALL) is one of the most common malignancies diagnosed in children, representing nearly one third of all pediatric cancers.

Clinical Indicator:
Medical Research has proven that initial response to remission induction therapy is one of most important prognostic factor in patients with ALL.

Performance:
The PCC achieved a 100% induction remission rate for patients with ALL.

Breast Cancer:
Breast cancer is one of the most common types of cancers in world after lung cancer and the fifth most common cause of cancer death.

Clinical Indicator:
1, 3 & 5 year survival rates for patients with Carcinoma of breast are a good indicator of long term prognosis of the disease.

Performance:
We have started collecting data for 1 year survival rate for such patients from 2008 (for patients who received treatment in 2007). This data shows a 100% survival for 1 year for patients with Breast Cancer who received treatment at Parkway Cancer Center.

We will be publishing our 3 & 5-Year survival rate for these patients.

**Breast Cancer:**

**Clinical Indicator:**
1, 3 & 5 year survival rates for patients with Carcinoma of breast are a good indicator of long term prognosis of the disease.

**Performance:**
We have started collecting data for 1 year survival rate for such patients from 2008 (for patients who received treatment in 2007). This data shows a 100% survival for 1 year for patients with Breast Cancer who received treatment at Parkway Cancer Center.

We will be publishing our 3 & 5-Year survival rate for these patients.
Management of Women’s Diseases:

Minimally Invasive Surgery:

Minimal invasive laparoscopic surgery is being increasingly used for procedures like Hysterection, Myomectomy and Cystectomy for treatment of various gynecological problems. In 2008 more than 2000 MIS procedures were performed at our facilities.

Clinical Indicator: Rate of unexpected return to operation room following a laproscopic procedure.

Performance: The rate of unexpected return to operation room for Minimally Invasive Laparoscopic Surgery (Hysterectomy, Myomectomy & Cystectomy) was 0% in year 2008.

Management of Infertility: In Vitro Fertilization (Mount Elizabeth Hospital):

Clinical Outcomes:

The IVF Centre at Mount Elizabeth Hospital reported a Live Baby Birth Rate close to 40% for years 2006 & 2007 as compared with a rate of 34.4% reported by the Centre for Disease Control, USA.
**Management of Congenital & Pediatric Heart Conditions:**

**Pediatric Open Heart Surgery at ParkwayHealth (ASD, VSD and Fallot’s Tetralogy):**

49 open heart procedures were done on children in 2008 at our facilities for treatment of conditions like Ventricular Septal Defect, Atrial Septal Defect and Fallot’s Tetralogy.

**Clinical Indicator:** Rate of unexpected return to operation room following pediatric open heart surgery.

**Performance:** The rate of unexpected return to the OR was 0% in 2008.

**Pediatric Open Heart Surgery at ParkwayHealth (ASD, VSD and Fallot’s Tetralogy)**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Outcome in 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unexpected Return to OR</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

*All outcomes are non-risk adjusted for women & children programme
Neurosciences
Clinical Programme
The Neuroscience programme is designed to provide integrated, holistic care for patients with diseases of the nervous system (Brain and nerves).

Our Services:
Diagnostic Procedures
- Computed Tomography (CT) Scans
- Digital Subtraction Angiography (DSA)
- Electroencephalogram (EEG)
- Electromyogram (EMG)
- Magnetic Resonance Imaging (MRI)
- Positron Emission Tomography (PET) Scan

Neurological Surgery
- Brain & Spinal Surgery
- Neurovascular Surgery
- Robotic Surgery

Neuro Rehabilitation Therapy
- Occupational Therapy
- Physiotherapy
- Speech Therapy

Stereotactic Radiosurgery / Fractionated Stereotactic Radiotherapy
- BrainLAB Stereotactic Radiosurgery System
- Gamma Knife Radiosurgery
- TomoTherapy®
- X-Knife Stereotactic Radiosurgery System

Management of Cervical Spine:
Anterior cervical decompression and fusion:
Problems of neck such as cervical radiculopathy, disc herniations and spinal instability can be treated by performing an operation called anterior cervical decompression and fusion.

Anterior cervical decompression and fusion is removal of disc and/or bone through an approach through the front of the neck and then filling the cavity formed with a specially prepared bone graft and sometimes placing screws and plates to hold the whole construct in place.

Clinical Indicator: The Average Length of Stay for anterior cervical spine surgery.

Performance: The Average Length of Stay for anterior cervical decompression and fusion procedures performed at our facilities was 4.5 days for Single Level Procedures & 4.8 days for Multiple Level procedures. This is comparable to the length of stay at best centres in the world.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>ALOS in 2008 (Multiple Level)</th>
<th>ALOS in 2008 (Single Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior Cervical Discectomy &amp; Fusion</td>
<td>4.5 Days</td>
<td>4.8 Days</td>
</tr>
</tbody>
</table>

Management of Stroke:
Stroke is the clinical term for acute loss of perfusion to vascular territory of the brain, resulting in ischemia and a corresponding loss of neurologic function. Our neuroscience programme is well equipped to take care of patients with this condition.

Clinical Indicator: Time-to-CT-Scan for suspected Acute Stroke Patients.
Early diagnosis of stroke patients with CT scan helps in identifying the site & extent of brain injury and enable care provider to proceed with the best possible treatment modality. This in turn is often associated with an improved clinical outcome.

Performance: In 2008 that the average time to perform CT Scan for suspected cases of Acute Stroke was 91.2 minutes against a target of 130 minutes.

<table>
<thead>
<tr>
<th>Suspected Acute Stroke Patients</th>
<th>Observed Time for CT Scan at ParkwayHealth in 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>91.2 minutes</td>
</tr>
</tbody>
</table>
Our heart & vascular programme offers a full range of services by eminent cardiologists, cardiac surgeons and a skilled and experienced nursing team.

Heart & Vascular Clinical Programme

Our Services:

Heart Screening Procedures
- Chest X-ray
- Electrocardiogram (ECG)
- Stress Test

Non-Invasive Procedures
- Ambulatory Blood Pressure Monitoring
- Cardiac Calcium Scoring
- Cardiac Magnetic Resonance Imaging (MRI)
- Holter Monitoring
- Nuclear Perfusion Scan
- Trans-thoracic Echocardiogram

Invasive Procedures
- Coronary Angiogram
- Electrophysiological Study
- Trans-esophageal Echocardiogram (TEE)

Interventional Procedures
- Bi-Ventricular Pacing for Heart Failure
- Defibrillator (AICD) Implantation
- Pacemaker Implantation
- Percutaneous Coronary Intervention
- Radiofrequency Catheter Ablation of Arrhythmias
- Thoracic Aortic Valvular Surgery & Endovascular Aneurysm Repair

Surgical Procedures

Heart
- Aortic Surgery
- Coronary Artery Bypass Grafting (CABG)
- Device Closure of Cardiac Septal Defects
- Endoscopic Vein & Radial Artery Harvesting
- Endovascular Stenting (Open Heart Method)
- Heart Valve Repair/Replacement
- Pediatric/Congenital Heart Repair Surgery
- Percutaneous Closure of Ductus Arteriosus
- Robotics Heart Surgery
- Stem Cell Therapy for Heart Failure
- Surgery for Atrial Fibrillation
- Surgery for Heart Failure
- Transmyocardial Laser Revascularisation
- Thoracic Aortic Valvular Surgery & Endovascular Aneurysm Repair
- Carotid Endarterectomy & Stenting
- Laser Surgery for Varicose Veins
- Limb Salvage for Critical Ischemia of Leg
- Peripheral Vascular Bypass & Reconstruction Surgery
Management of AMI:

Acute myocardial infarction (AMI), commonly known as a heart attack occurs when the blood supply to part of the heart is suddenly interrupted causing some heart cells to die. Prompt & active management of patients with AMI may be life saving.

Clinical Outcomes

Clinical Indicator: Aspirin to be given within 2 hours of admission with AMI is associated with improved clinical outcomes.

Performance: Our hospitals achieved 97.9% compliance which is comparable to the best cardiac centres in the world.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Compliance in Year 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin to be given within 2 hours of admission with AMI</td>
<td>97.9%</td>
</tr>
</tbody>
</table>

Clinical Indicator: PCI to be done within 90 minutes of admission in cases of ST Elevated Myocardial Infarction.

Performance: ParkwayHealth Hospitals in Singapore achieved 94.8% compliance for this indicator in 2008 against a target of 90%.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Compliance in Year 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI to be done within 90 minutes of admission in cases of ST elevated Myocardial Infarction</td>
<td>94.8%</td>
</tr>
</tbody>
</table>

Management of Heart Failure:

Clinical Outcomes

Clinical Indicator: Objective LV assessment to be done for patients with Congestive Cardiac Failure. An evaluation of the LV function checks the effectiveness of left chamber of the heart in pumping blood.

Performance: The compliance was 96%.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Compliance in Year 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective LV assessment to be done for patients with Congestive Cardiac Failure</td>
<td>96%</td>
</tr>
</tbody>
</table>

Management of Coronary Artery Disease (Ischemic Heart Disease)

Coronary Angiography:

Coronary angiography enables the cardiologist to visualize the coronary vessels & detect occlusions or narrowing of the arteries that may require treatment.

Number of Angiographies done at ParkwayHealth

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Angiographies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1792</td>
</tr>
<tr>
<td>2007</td>
<td>1756</td>
</tr>
<tr>
<td>2008</td>
<td>1803</td>
</tr>
</tbody>
</table>

Percutaneous Transluminal Coronary Angioplasty (PTCA):

This is a technique used to dilate an area of arterial blockage in heart with the help of a catheter that has an inflatable small balloon at its tip. In PTCA a balloon catheter is introduced through the skin of the groin (sometimes the arm) and is placed within a coronary blood vessel to remove the blockage. This is often accompanied by inserting an expandable metal stent. Stents are wire mesh tubes used to prop open arteries after PTCA.

Number of PTCA Performed at ParkwayHealth

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of PTCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1407</td>
</tr>
<tr>
<td>2007</td>
<td>1086</td>
</tr>
<tr>
<td>2008</td>
<td>1172</td>
</tr>
</tbody>
</table>
CABG (Coronary Artery Bypass Grafting):
CABG surgery is advised for selected groups of patients with significant narrowing and blockages of the heart arteries (coronary artery disease). CABG surgery creates new routes around narrowed and blocked arteries, allowing sufficient blood flow to deliver oxygen and nutrients to the heart muscle. Thousands of CABG procedures have been done at Parkway Hospitals in the last few years.

Clinical Outcomes

Number of CABG done at ParkwayHealth

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of CABG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>403</td>
</tr>
<tr>
<td>2007</td>
<td>377</td>
</tr>
<tr>
<td>2008</td>
<td>384</td>
</tr>
</tbody>
</table>

Clinical Indicator: Surgical Site Infection rate for CABG.
Performance: The Surgical Site Infection rate for CABG was 0.3% in 2008.

Clinical Indicator: Mortality Rate following CABG.
Performance: The mortality rate for CABG was 1.6% (Non-Risk Adjusted including both Primary & repeat CABG procedures) in 2008 at our facilities as compared to a Mortality Rate of 1.9% reported by the Cleveland Clinic.

Clinical Indicator: Median Length of stay for CABG.
Performance: The median length of stay for CABG was 8 days for procedures performed in 2008 at Parkway Health.

Clinical Indicator: Rate of unexpected return to operation room following pediatric open heart surgery.
Performance: The rate of unexpected return to the OR was 0% in 2008.

Pediatric Open Heart Surgery at Parkway Health (ASD, VSD and Fallot’s Tetralogy):
49 open heart procedures were done on children in 2008 at our facilities for treatment of conditions like Ventricular Septal Defect, Atrial Septal Defect & Fallot’s Tetralogy.

Clinical Indicator: Rate of unexpected return to operation room following pediatric open heart surgery.
Performance: The rate of unexpected return to the OR was 0% in 2008.
Management of Joints:

Total Knee Replacement Surgery:
Total Knee replacement (TKR) is surgery for people with severe knee joint damage. A total knee replacement is a surgical procedure where the diseased knee joint is replaced with artificial joint. When done on both sides this is called bilateral TKR.

Clinical Outcomes

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Bilateral TKR</th>
<th>Year</th>
<th>Number of Unilateral TKR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>37</td>
<td>2006</td>
<td>289</td>
</tr>
<tr>
<td>2007</td>
<td>32</td>
<td>2007</td>
<td>334</td>
</tr>
<tr>
<td>2008</td>
<td>44</td>
<td>2008</td>
<td>307</td>
</tr>
</tbody>
</table>

Clinical Indicator: Prophylactic antibiotics 1 hr before Knee Replacement Surgery. Administration of antibiotics within one hour before surgery is known to reduce the risk of wound infections.

Performance: In 2008 the compliance for this indicator was 96.4% against our target of 90%.

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
<th>Clinical Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prophylactic Antibiotics to be administered 0 to 60 min before total knee replacement</td>
<td>96.4%</td>
</tr>
</tbody>
</table>
Total Hip Replacement:

Total hip replacement is most commonly used to treat joint failure caused by osteoarthritis. A total hip replacement is a surgical procedure where the diseased cartilage and bone of the hip joint is surgically replaced with artificial ball and socket joints.

Number of Hip Replacement Surgeries at ParkwayHealth

Clinical Indicator: Surgical Site Infection Rate for Total Hip Replacement.

Performance: ParkwayHealth Hospital had 0.86% surgical site infection rate for total hip replacement surgery.

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
<th>Clinical Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Site Infection Rate for Total Hip Replacement</td>
<td>0.86 %</td>
</tr>
</tbody>
</table>

*All outcomes are non-risk adjusted for Musculoskeletal Clinical Programme
Management of BHP & Cancer of Prostate:

Clinical Outcomes

TURP:
TURP is a common procedure used for treatment of benign prostatic hyperplasia. In transurethral resection of the prostate (TURP), an instrument is inserted through the urethra to remove the section of the prostate that is blocking urine flow.

Number of TURP Cases at ParkwayHealth

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>291</td>
</tr>
<tr>
<td>2007</td>
<td>253</td>
</tr>
<tr>
<td>2008</td>
<td>235</td>
</tr>
</tbody>
</table>

Clinical Indicator: Average time for removal of urinary catheter post TURP.

Performance: In 2008 the average time for removal of urinary catheter was 1.98 days as compared with 2.1 days in 2007. These figures compare favourably with other centres of excellence.
Robotic Prostatectomy:

More than hundred Robot assisted Radical Prostatectomy Procedures have been performed at Mount Elizabeth Hospital since 2004.

Outcome Data

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
<th>Clinical Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Transfusion</td>
<td>0 %</td>
</tr>
<tr>
<td>Rectal Injury</td>
<td>0 %</td>
</tr>
<tr>
<td>Conversion into Open Surgery</td>
<td>0 %</td>
</tr>
</tbody>
</table>

Number of Robot Assited Prostatectomy at Mount Elizabeth Hospital

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>3</td>
</tr>
<tr>
<td>2005</td>
<td>20</td>
</tr>
<tr>
<td>2006</td>
<td>19</td>
</tr>
<tr>
<td>2007</td>
<td>29</td>
</tr>
<tr>
<td>2008</td>
<td>33</td>
</tr>
</tbody>
</table>

Management of Gall Bladder Disease:

Video Laparoscopic Cholecystectomy:

Laparoscopic Cholecystectomy is the surgical removal of the gallbladder using a Laparoscope. This is a minimally invasive surgery resulting in shorter stay in hospital for patient and helps him to resume normal activities sooner than Open Cholecystectomy.

Clinical Indicator: Average Length of stay for Video Laparoscopic Cholecystectomy

Performance: The average length of stay for Video Laparoscopic Cholecystectomy was 1.9 days at Parkway Hospitals. The average length of stay reported by Cleveland Clinic, USA is 4.4 days

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
<th>Clinical Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Length of Stay for Video Laparoscopic Cholecystectomy</td>
<td>1.9 Days</td>
</tr>
</tbody>
</table>

*All outcomes non-risk adjusted for Surgery Programme

CONCLUDING REMARKS

In July 2008, we published some of ParkwayHealth’s clinical outcomes and performance for the very first time. This was very well received. The overwhelming response resulted in us having to print additional copies.

This success provided the impetus for our team to put together an even more comprehensive publication this year.

We hope you have found this to be a useful document highlighting our clinical quality initiatives and our clinical performance.

The development of good clinical indicators isn’t an easy task as clinical outcomes are affected by factors such as age, underlying co-morbid conditions, socio-economic background etc, in addition to the training and experience of the attending doctor(s) and the health care team. These variables make it difficult for health care organisations to do apple-for-apple comparisons of the quality of their care. We are however continuing to develop more sophisticated severity adjustment tools to try and overcome these difficulties.

The editorial team hopes that you have enjoyed reading about our continuing “Journey to Excellence” and we look forward to your feedback on how this publication can be further enhanced.

We would like to thank the leadership team at ParkwayHealth and our Board of Directors for their continued support to this quality initiative.

Dr. Sachin Gupta, MBBS, MBA
Editor – Reflections
Senior Manager – Strategic Clinical Projects
East Shore Hospital
321 Joo Chiat Place
Singapore 427990
Tel: +65 6344 7588

Gleneagles Hospital
6A Napier Road
Singapore 258500
Tel: +65 6473 7222

Mount Elizabeth Hospital
3 Mount Elizabeth
Singapore 228510
Tel: +65 6737 2666

ParkwayHealth
Day Surgery & Medical Centre
363 Balestier Road
Singapore 329784
Tel: +65 6305 7305

ParkwayHealth
Primary Care Network
20 Bendemeer Road, #01-02/06
Singapore 339914
Tel: +65 6227 7777

ParkwayHealth
Imaging Services
3 Mount Elizabeth
Singapore 228510
Tel: +65 6731 2727

ParkwayHealth
Laboratory Services
28 Ayer Rajah Crescent
Singapore 139959
Tel: +65 6278 9188

Gleneagles
Clinical Research Centre
363 Balestier Road
Singapore 329784
Tel: +65 6737 3642