REFLECTIONS ON QUALITY

Clinical Performance Indicators & Outcome Measures of Parkway’s Quality Initiatives

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Reflections on Quality 2010
Editor’s Note

Dr. Sachin Gupta

**Reflections on Quality** documents Parkway’s quality journey by highlighting structures and processes that we have put in place to ensure that we deliver the best possible clinical outcomes for our patients.

There are many variables other than quality of care that can influence clinical outcomes. In order to make this data even more meaningful for medical professionals and patients, we continually refine risk adjustment tools and benchmark ourselves against international standards. Our participation in the Joint Commission International (JCI) International Cardiac Surgery Benchmarking Project is a good start in that direction.

This is the third edition of **Reflections on Quality**. The first two editions were very well received and the success has motivated our team to put together an even more comprehensive publication this year.

We thank the management team at Parkway and our Board of Directors for their continued support of this quality improvement initiative which aims to bring greater transparency and accountability for our patients.

Dr. Sachin Gupta
Editor – Reflections
Senior Manager – Strategic Clinical Projects
Ideals are like stars. You will not succeed in touching them with your hands. But like the seafaring man, you choose them as your guides, and following them, you will reach your destiny.

- Charles Shurz

An unwavering commitment to quality patient care is what defines the best hospitals in the world.

At Parkway, we believe that quality and patient safety must be woven into the fabric of our professional lives to enable us to stay focused on the fact that our patients depend on us to keep them safe and to do what’s best for them.

Over the last three years, we have used Reflections on Quality to explain our quality framework and showcase some of our performance indicators benchmarked against international standards. Continuous quality improvement is made through the consistent use of performance measures to track performance and to make changes to improve processes where necessary.

We hope this publication will continue to stimulate improvements among medical professionals, raise quality awareness and serve as an inspiration for Parkway staff to achieve even higher standards of care for our patients.

Dr S Thanasekaran
Vice President
Medical Affairs / Quality
As one of the leading private healthcare providers in the region, Parkway's reputation and success have been anchored on clinical excellence and quality patient care.

The pursuit of clinical excellence and quality care is an on-going journey. In 2008, we took a bold step forward with the inception of Reflections on Quality to publish our hospitals’ performance and clinical outcomes across different specialties.

What’s more important is that the publication is made readily available for patients and serves as a guide for them to make better and more informed choices on possible treatment options.

The central role of measurement in the improvement of patient care is irrefutable. As we strive for higher quality standards, we have started to benchmark our performance consistently against the best in class by aligning some of our clinical outcome measures with those adopted internationally.

This is the way forward and we are fortunate to have doctors and medical professionals in our hospitals that are equally passionate about clinical excellence and delivering the best care for our patients.

At the heart of it all is the deeply held belief that we have to be accountable for our hospitals’ performance and clinical outcomes because we are our patients’ advocates. It is not just a duty or obligation to provide the best possible care to our patients; it is our privilege and commitment.

I would like to thank the editorial team, doctors and Parkway staff who have contributed their time and effort in bringing the third edition to fruition.

Dr Tan See Leng
Group CEO and Managing Director
About Parkway

Parkway Holdings Limited, listed on the Singapore Stock Exchange since 1975, is one of the region’s leading providers of private healthcare services, with a network of 16 hospitals and more than 3,400 beds throughout Asia, including Singapore, Malaysia, Brunei, India and China.

In Singapore, the Group owns Parkway Group Healthcare Pte Ltd and Parkway Hospitals Singapore Pte Ltd, which operate three of Singapore’s premier hospitals: Gleneagles, Mount Elizabeth and Parkway East. The Group also owns Parkway Shenton Pte Ltd, a major provider of primary healthcare services; Medi-Rad Associates Ltd, a leading radiology services provider; and Parkway Laboratory Services Ltd, a major provider of laboratory services.

In addition, Parkway Trust Management Limited provides management services to Parkway Life REIT, while Parkway Education Pte Ltd offers healthcare education through Parkway College of Nursing and Allied Health.

The Group operates 37 ParkwayHealth Patient Assistance Centers (PPAC) across the globe.
Our Network of Hospitals

Gleneagles Hospital

Gleneagles Hospital is a tertiary acute care private hospital which offers a comprehensive range of specialties and ancillary services. Established in 1959, the Gleneagles Hospital which is centrally located in Singapore is highly regarded by many expatriates and Singaporeans who seek premium and quality patient care. Key specialties include Cardiology, Gastroenterology, Liver Transplant, Obstetrics & Gynaecology, Oncology and Orthopaedics. With 272 beds, over 1,100 accredited doctors, 900 medical and support staff, Gleneagles Hospital has been internationally accredited by the Joint Commission International (JCI) since 2006.

Parkway East Hospital

Parkway East Hospital (formerly known as East Shore Hospital) is a boutique 118-bed general acute care private hospital which offers a broad range of specialties and ancillary services. Located in the eastern part of Singapore (Joo Chiat Place), Parkway East Hospital has been highly regarded for its clinical expertise and quality patient care. With over 1,000 accredited doctors, 270 medical and support staff, key specialties include Pediatrics, Obstetrics & Gynaecology, Otorhinolaryngology (ENT), Orthopaedics and Sports Medicine. Parkway East Hospital has been internationally accredited by the Joint Commission International (JCI) since 2007.

Mount Elizabeth Hospital

Mount Elizabeth Hospital is one of Asia’s leading tertiary acute care private hospitals offering a comprehensive range of specialties within its state-of-the-art medical facilities. Located in the heart of Singapore’s Orchard Road, Mount Elizabeth Hospital which is established in 1979 is the preferred private healthcare provider for medical tourists, expatriates and Singaporeans who seek premium and quality patient care.

Key specialties include Cardiothoracic Surgery, Neurosurgery, Obstetrics & Gynaecology, Orthopaedics, Transplant Surgery, Haematology and Oncology. With 357 beds, over 1,200 accredited doctors, 1,100 medical and support staff, Mount Elizabeth Hospital has been internationally accredited by the Joint Commission International (JCI) since 2006.
Overseas

MALAYSIA

Gleneagles Hospital Kuala Lumpur
Gleneagles Medical Centre, Penang
Pantai Hospital Ampang
Pantai Hospital Ayer Keroh
Pantai Hospital Batu Pahat
Pantai Hospital Cheras
Pantai Hospital Ipoh
Pantai Hospital Klang
Pantai Hospital Kuala Lumpur
Pantai Hospital Penang
Pantai Hospital Sungai Petani

BRUNEI DARUSSALAM

Gleneagles JPMC

INDIA

Apollo Gleneagles Hospital, Kolkata

CHINA – MEDICAL CENTRES

Gleneagles Medical and Surgical Centre
Hong Qiao Medical Centre
Specialty and Inpatient Centre
Jin Qiao Medical and Dental Centre
Mandarine City Medical Centre
Shanghai Centre Medical and Dental Centres
Shanghai JinMao Tower Medical Centre
Expanding our global footprint

As we strive towards our vision to become a global leader in value-based integrated healthcare, we have been strengthening our international network with new development projects. At the same time, we are investing continually in medical technology and equipment and enhancing our existing healthcare facilities to bring about greater benefits for our patients.

In Singapore, we are establishing our fourth hospital – Parkway Novena Hospital – a new premiere, state-of-the-art multi-disciplinary hospital which aims to raise the benchmark and set new standards of quality patient care in Singapore and the region. Strategically located at Singapore’s upcoming medical hub in the Novena area, the Hospital will have over 300 single patient suites and over 200 medical suites for specialists. It is expected to be completed by end of 2012.
Beyond our local shores, work is also in progress in the city of Mumbai, India, where we have partnered Koncentric Investments Ltd to build a new multispecaility hospital - Parkway Khub Chandani Hospital - which aims to redefine patient care standards in India. It is expected to be completed by 2012.

In the United Arab Emirates, we have been appointed by the United Eastern Medical (UEM) Services LLC to manage their new hospital in Abu Dhabi - Danat Al Emarat (Arabic for “Pearl of the Emirates”) Women and Children’s Hospital. Aside from hospital management, our role is to provide clinical development services. Developed by UEM, the Hospital which aims to be a Centre of Excellence for Women and Children is estimated to cost US$200 million. It is expected to be completed by 2012.

In Malaysia, new projects are also coming on stream. These projects include two new hospitals under development in Sri Manjung, Perak and the Iskandar region which are targeted to be completed by 2013.
Vision
The global leader in value-based integrated healthcare.

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

Values:
People Above All...
We begin with the people who work with us, treating them with the same traits with which we would like them to treat you – compassion, dignity, integrity and mutual respect.

Excellence...
Then we live by example to show what ‘excellence’ means in real life – by striving for the finest clinical, service and operational outcomes.

Results...
When these elements are combined successfully, we believe your expectations will be exceeded, and we in turn will achieve our status of being the global leader in value-based integrated healthcare.

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.
Quality Team & Framework

Parkway has developed a comprehensive and robust quality framework. Currently, the Quality Division is organised into eight 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 and Coding Team
- Medical Records 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 Program
- Clinical Quality Scorecard
- Clinical Outcomes across various clinical specialities
- Occupational Safety & Health Program
- Infection Control Program

In addition, the Quality Division is also responsible for ensuring that our hospitals meet the accreditation and licensing standards. Parkway took a lead in becoming the first private hospitals in Singapore to be accredited by Joint Commission International.
In January 2007, Parkway 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 engage.

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.

1 Overall Satisfaction Item
6 Loyalty Items
12 Operations Items

The LOYALTY Index is a composite index of 6 Items:
1. Medical Treatment
2. Coordination of Care
3. Service
4. Value for Money
5. Return
6. Recommend

The OPERATIONS Index is a composite of the overall for 12 Items:
1. Registration services
2. Doctor services
3. Nurse services
4. Triage services
5. Other services
6. Medication services
7. Facilities
8. Meals services
9. Family Treatment services
10. Housekeeping services
11. Discharge services
12. 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.

When the PSS survey was started in 2007, the surveyors from QS First would conduct face-to-face interviews with the inpatients.

In 2009, we wanted to have more even objectivity in our PSS results, and some changes were made to the methodology:

- We called patients to obtain their consent for the survey before giving their names to QS First
- All patients were interviewed via the telephone
- Number of patients surveyed at each ward / unit per month was decreased to 10
- Reports are available every quarter
- Target is set at 85%

### Total Experience Index (2009)

<table>
<thead>
<tr>
<th></th>
<th>Q1'09</th>
<th>Q2'09</th>
<th>Q3'09</th>
<th>Q4'09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parkway Hospitals</td>
<td>82.1</td>
<td>81.9</td>
<td>82.1</td>
<td>82.7</td>
</tr>
<tr>
<td>ESH</td>
<td>85.1</td>
<td>86.4</td>
<td>87.9</td>
<td>87.9</td>
</tr>
<tr>
<td>GHL</td>
<td>81.9</td>
<td>79.7</td>
<td>82.2</td>
<td>82.8</td>
</tr>
<tr>
<td>MEH</td>
<td>79.6</td>
<td>81.5</td>
<td>79.7</td>
<td>82.0</td>
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</tbody>
</table>
Clinical Quality Initiatives
Parkway 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 Parkway 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 three measurable domains. These are:

1. Achieve the finest clinical outcomes.
2. To meet or exceed globally recognized clinical outcomes and benchmarks.
3. Attain high levels of physician support.

Domain 2, “To meet or exceed globally recognized clinical outcomes and benchmarks” has been measured since the beginning of 2007. From 2008, we were also able to measure domain 1 and domain 3.

To measure our ability to Exceed Globally Recognised Clinical Outcomes and Benchmarks we use a weighted matrix of eight clinical indicators which measures clinical performance of our hospitals against globally recognized clinical benchmarks. The overall matrix is called as The Clinical Quality Scorecard. These indicators were selected essentially because many international health care quality agencies recognize these indicators as being good markers of quality.
The eight indicators comprising clinical quality scorecard are:

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>EXPLANATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1  Adverse outcome rate</td>
<td>Adverse outcome are incidents that resulted in patient injury requiring interventions, or an extended length of stay.</td>
</tr>
<tr>
<td>Q2  Aspirin within 2 hours of admission with AMI</td>
<td>Timely administration of Aspirin in AMI is associated with better clinical outcomes.</td>
</tr>
<tr>
<td>Q3  Antibiotic Therapy commenced within 4 hrs of admission with Bacterial Pneumonia (Q4)</td>
<td>Timely use of antibiotics is known to improve the clinical outcomes of bacterial pneumonia.</td>
</tr>
<tr>
<td>Q4  Prophylactic antibiotics 1 hr before Knee Replacement Surgery</td>
<td>Administration of antibiotics within one hour before surgery is known to reduce the risk of surgical site infections.</td>
</tr>
<tr>
<td>Q5  Nosocomial MRSA (Methicillin Resistant Staphylococcus aureus) infection rate</td>
<td>MRSA is associated with Hospital Acquired Infections. A lower MRSA Rate reflects the effectiveness of Infection control measures, in place at the hospital.</td>
</tr>
<tr>
<td>Q6  Central line-associated BSI in ICU</td>
<td>Central Line associated Blood Stream Infections contribute significantly to morbidity and mortality in ICU patients. Stringent infection control measures must be in place to reduce the risk.</td>
</tr>
<tr>
<td>Q7  Urinary Catheter induced UTI Rate</td>
<td>Patients on urinary catheters are exposed to an increased risk of urinary tract infection. Stringent infection control measures must be in place to reduce this risk.</td>
</tr>
<tr>
<td>Q8  Ventilator associated Pneumonia Rate</td>
<td>Ventilator associated pneumonias contribute significantly to morbidity and mortality in mechanically ventilated patients. Stringent infection control measures must be in place to reduce this risk.</td>
</tr>
</tbody>
</table>
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>Tier 1</th>
<th>30%</th>
<th>Indicator 2 x assigned weightage</th>
</tr>
</thead>
</table>
|Tier 2|70%| Indicator 3 x assigned weightage
Indicator 4 x assigned weightage
Indicator 5 x assigned weightage
Indicator 6 x assigned weightage
Indicator 7 x assigned weightage
Indicator 8 x assigned weightage

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 demonstrates 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 centred 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 reported in 2009 was 1920. HOR Data from 2001 onwards shows a progressive increase in hospital occurrence reporting. We see this progressive increase in voluntary reporting as an endorsement of the Hospital Occurrence Reporting System.

Dedicated Email for Quality

In addition to e HOR System for reporting hospital occurrences, we also encourage our staff to speak up regarding any concerns they may have relating to any aspect of patient care or on anything that impacts the safety of our patients by providing various platforms to do so.

One such platform is creation of a dedicated e-mail account, quality@parkway.sg that serves as an additional avenue for our staff to communicate with management on quality issues. It is important to note that this does not replace our e HOR system but provides an additional tool for communication.

The object in giving feedback is not to find scapegoats or witch-hunt, but to address deficiencies in the system before a disaster happens. All information received is treated confidentially and feedback on action taken is given to the person raising the issue.
The above chart shows the degree of harm in relation to the incidents reported in 2009 as defined below:

**Extreme**
Patients with death unrelated to the natural course of the illness and differing from the immediate expected outcome.

**Major**
Patients with major permanent loss of function (sensory, motor, physiologic or intellectual) unrelated to the natural course of the illness and differing from the expected outcome of patient management or required surgical intervention or increased length of stay.

**Minor**
Patients requiring increase level of care for example requires monitoring for any complications arise from the incidents. None of the incidents classified as minor harm developed into major harm.

**Insignificant**
Patients with no injury or increased level of care or length of stay. These include near misses
Adverse Outcomes

Adverse outcomes 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.

Adverse Events

Adverse events are incidents where patient had been exposed to an error, but did not suffer any injury and/or require any additional intervention and the patient’s length of stay in hospital had not been extended as a result of that exposure.
Parkway hospitals are actively engaged in the national Sentinel Review Program. As a Joint Commission International accredited hospital, all sentinel events are also reported to the Joint Commission International.

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.
The Clinical Review Program

The Clinical Review Program (CRP), a quality initiative to identify adverse events through the retrospective review of medical records is into its 3rd year at Parkway. This program complements the Hospital Occurrence Reporting structure that we have. It is designed to pick up adverse events through the review of case notes selected on the basis of occurrences that are referred to as “flags”.

Currently we use three such flags. These are:
1) Unplanned return to Operation Theatre
2) Unplanned Transfer to Acute Care Unit
3) Unexpected mortality

The year 2009 was marked by the appointment of Prof. P H Feng, as Independent Advisor on Clinical Practice (IA-CP) to provide clinical inputs on issues identified by the Clinical Quality Reviewers as possible clinical failures.

To date the Clinical Review Program has helped us identify some preventable or potentially preventable adverse events and helped us to implement process improvements to reduce the risk of similar events recurring in following clinical areas:
- Revised Protocols for the early feeding of newborns delivered by mothers with gestational diabetes
- Protocols regarding the handling of External Ventricular Device (EVD) and neurological devices
- Assessment of patients for ‘Discharge from Recovery Room’
- Revised Mortality Protocols to include all fresh stillbirths
- BMI documentation for patients undergoing Liposuction
- Revised Protocols for prevention of aspiration pneumonia
- Revised Protocols for Tracheostomy care
- Revised Protocols for post-operative care of patients who underwent cervical spine surgery
- Revised protocols on Post Partum monitoring
- Revised protocols on the Management of Patients with pre-Eclampsia
- Standard Guidelines for stopping anticoagulant therapy prior to surgery
- Revision of Nursing Assessment forms to incorporate history of other medications (including over the counter and Herbal Preparations)
- Routine ante-natal Group B Streptococcus Screening
Infection Control

“Infection Control is Everyone’s Responsibility”

Infection control is an integral part of patient care and an institutional priority at Parkway 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 program 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 program are:

- Effective hand hygiene program
- 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
Response to H1N1 Pandemic

For the second time since the SARS outbreak in 2003, infection control took centre stage during the 2009 as hospitals responded to H1N1 influenza pandemic.

The swine flu outbreak that started in Mexico spread rapidly to North America and almost all parts of the world. WHO declared it a pandemic on the 11th of June.

Parkway hospitals activated their pandemic flu response plan that has been tested annually since 2006. The plan involved close coordination between our hospitals and Ministry of Health.

Hand Hygiene

Reducing the risk of healthcare associated infections through compliance with generally accepted hand hygiene guidelines in an International Patient Safety Goal. Hand hygiene is the single most important measure in preventing the spread of micro-organisms and it continues to be the corner stone of the infection control programme at Parkway hospitals. There is continued emphasis on providing adequate resources and ensuring easy access to hand hygiene facilities in all clinical areas.

To bring home the message on the importance of hand hygiene, posters with catchy slogans and attractive designs were displayed at strategic locations throughout the hospital as part of the ongoing campaign to raise awareness among doctors, staff and visitors. These posters in four unique designs were rotated quarterly to keep the message on hand hygiene “alive”.

In addition, there is ongoing audit to monitor hand hygiene adherence among healthcare professionals in the hospitals. Feedback on hand hygiene compliance is provided regularly at appropriate forums to motivate doctors and staff to improve compliance.

Targeted Surveillance

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

- Device-associated infections in ICUs:
  1) Central-line associated Blood Stream Infection
  2) Ventilator-associated Pneumonia
  3) 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.

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In line with international best practices, Parkway 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.

Patient Care Bundles

Ventilator Bundle

By definition, ventilator-associated pneumonia (VAP) is an airway infection that develops 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 results in additional cost for the patient.

Reducing morbidity and mortality due to VAP requires an organized 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:

1. Elevation of the Head of the Bed
2. Daily “Sedation Vacations” and assessment of readiness to extubate
3. Peptic Ulcer Disease Prophylaxis
4. Deep Venous Thrombosis Prophylaxis

In addition to these elements, a 4-hourly oral care regime is implemented for ventilated patients.

Central Line Bundle

Central venous catheters (CVCs) are being used increasingly in the inpatient and outpatient settings to provide long-term venous access. CVCs carry the risk of getting infected. 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:

1. Hand hygiene
2. Maximal barrier precautions
3. Chlorhexidine skin antisepsis
4. Optimal catheter site selection, with subclavian vein as the preferred site for non-tunneled catheters
5. Daily review of line necessity, with prompt removal of unnecessary lines
Patient Care Bundles
Delivering Safer Healthcare is our top Priority

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 every 7 days or earlier if there is bleeding

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

Raise 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 colonization 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
Our hospitals saw a decrease in the incidence of VAP and Central Line associated Blood Stream Infections following the implementation of these two bundles in March 2009.

To ensure compliance of the elements of these two bundles, frequent audits and in-service education were conducted by the Infection Control Department. Overall, the compliance has been satisfactory, especially for the key elements. For example, there is consistent 100% compliance on “Raise Head of Bed” and “4 hourly oral care” in the ventilator bundle and “maximal barrier” in the central line bundle.
### Healthcare-associated MRSA Infection Rate 2002 to 2009

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEH</td>
<td>0.27</td>
<td>0.14</td>
<td>0.0</td>
<td>0.05</td>
<td>0.0</td>
<td>0.06</td>
<td>0.10</td>
<td>0.00</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>
<td>0.09</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>
<td>0.02</td>
</tr>
<tr>
<td>ParkwayHealth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.22</td>
<td>0.14</td>
</tr>
<tr>
<td>SPORE</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>
<td>NA</td>
</tr>
</tbody>
</table>

* NA = Not Available

### Healthcare associated MRSA Infection 2002 - 2009

#### Incidence Per 1000 Patient Days

<table>
<thead>
<tr>
<th>Year</th>
<th>PEH</th>
<th>GHL</th>
<th>MEH</th>
<th>ParkwayHealth</th>
<th>SPORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>0.27</td>
<td>0.18</td>
<td>0.34</td>
<td></td>
<td>0.36</td>
</tr>
<tr>
<td>2003</td>
<td>0.14</td>
<td>0.40</td>
<td>0.17</td>
<td></td>
<td>0.09</td>
</tr>
<tr>
<td>2004</td>
<td>0.00</td>
<td>0.15</td>
<td>0.28</td>
<td></td>
<td>0.20</td>
</tr>
<tr>
<td>2005</td>
<td>0.00</td>
<td>0.33</td>
<td>0.14</td>
<td></td>
<td>0.10</td>
</tr>
<tr>
<td>2006</td>
<td>0.05</td>
<td>0.30</td>
<td>0.16</td>
<td></td>
<td>0.02</td>
</tr>
<tr>
<td>2007</td>
<td>0.00</td>
<td>0.20</td>
<td>0.11</td>
<td></td>
<td>0.09</td>
</tr>
<tr>
<td>2008</td>
<td>0.00</td>
<td>0.15</td>
<td>0.10</td>
<td></td>
<td>0.00</td>
</tr>
<tr>
<td>2009</td>
<td>0.00</td>
<td>0.05</td>
<td>0.09</td>
<td></td>
<td>0.00</td>
</tr>
</tbody>
</table>
Device-associated Infections in ICU 2009

<table>
<thead>
<tr>
<th></th>
<th>PEH</th>
<th>GHL</th>
<th>MEH</th>
<th>NNIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central line - associated BSI</td>
<td>0.0</td>
<td>1.02</td>
<td>0.0</td>
<td>3.2</td>
</tr>
<tr>
<td>Ventilator - associated pneumonia</td>
<td>0.0</td>
<td>1.12</td>
<td>0.0</td>
<td>5.1</td>
</tr>
<tr>
<td>Catheter - associated UTI</td>
<td>0.0</td>
<td>0.43</td>
<td>0.68</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Needlestick/Sharps Injury 2006 to 2009

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEH</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>MEH</td>
<td>24</td>
<td>31</td>
<td>27</td>
<td>14</td>
</tr>
<tr>
<td>GHL</td>
<td>16</td>
<td>29</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>64</td>
<td>50</td>
<td>40</td>
</tr>
</tbody>
</table>
Workplace Safety & Health (WSH)

It has been two years since The Workplace Safety and Health Act (WSHA), covering healthcare came into effect.

To ensure compliance to WSHA and in tandem with National objectives, Parkway continued to provide a safe and healthy working environment through its governance, risk assessment programs, training & education to staff and safety activities.

In August 2009, Hazmat training was introduced to all staff to understand the different types of hazmat symbols used within the organisation, such as the Universal Symbols, the ECB (European Chemical Bureau), the NFPA (National Fire Protection Agency), the WHMIS Canada (Workplace Hazardous Materials Information System) and the HMIS (Hazardous Materials Identification System).

Following recommendations from JCI, Parkway adopted and implemented Kaiser Permanente’s Hazard Vulnerability Assessment (HVA) model in October 2009. Besides meeting JCI requirements, the HVA tool helps Parkway identify potential hazards that could have an adverse impact on hospital operations.

Our first Hazard Vulnerability Assessment analysis was to review measures to control an Epidemic Outbreak within Parkway. A policy on Epidemic Outbreak Management was introduced in November 2009.

The two HVA projects for 2010 are:

a) Communications Failure- Parkway Off-Site Call Centre
b) Workplace Violence

Failure Mode and Effects Analysis (FMEA) was used to identify issues and address the deficiencies. Implementation of process improvement arising from the FMEA was tracked by the Facility Management and Safety (FMS) committee. The hospital performance improvement committee was updated on regular basis.

The total number of workplace injury claims for Y2007 - Y2009 in Parkway has shown a healthy trend as shown in the graph below. This can be attributed to better staff awareness of workplace safety issues and regular audits.

<table>
<thead>
<tr>
<th>Year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Claims</td>
<td>173</td>
<td>162</td>
<td>109</td>
</tr>
</tbody>
</table>

Note: Information as provided by AON, Parkway’s Insurance Broker.

“Safety begins with me”
Joint Commission International Accreditation

An independent, not-for-profit organization, The Joint Commission accredits and certifies more than 15,000 health care organizations and programs in the United States. Joint Commission accreditation and certification is recognized around the world as a symbol of quality that reflects an organization’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 organizations. These standards are audited for compliance every 3 years.

All our three hospitals in Singapore are accredited by Joint Commission International.

Mount Elizabeth Hospital & Gleneagles Hospital which were the first private hospitals in Singapore to be accredited by Joint Commission International in 2006 underwent a reaccreditation survey in July 2009. Parkway East Hospital will be surveyed for reaccreditation in December 2010.

Further to the findings at the reaccreditation survey we have selected to focus on the following areas in 2010 and 2011:

- Documentation of clinical assessment at admission and re-assessment
- Safe Anaesthesia Care
- Discharge Summaries
- Governance and Leadership in effecting Change
International Patient Safety Goals (IPSGs)

In 2006 the Joint Commission International introduced 6 international patient safety goals (IPSGs). Hospital accreditation survey now includes an evaluation of how hospitals have adopted and implemented these IPSGs. 2009 was a year of learning and improvement, following the implementation of the International Patient Safety Goals in year 2008.

International Patient Safety Goal 1:
Identify Patients Correctly

Requirement 1: Use at least two (2) ways to identify a patient when giving medicines, blood or blood products; taking blood samples and other specimens for clinical testing, or providing any other treatments or procedures. The patient’s room number cannot be used to identify the patient.

International Patient Safety Goal 2:
Improve Effective Communication

Requirement 2: Implement a process/procedure for taking verbal or telephone orders, or for the reporting of critical test results that requires a verification “read-back” of the complete order or test result by the person receiving the information.

NOTE: Not all countries permit verbal or telephone orders.

International Patient Safety Goal 3:
Improve the Safety of High-alert Medications

Requirement 3: Remove concentrated electrolytes (including, but not limited to, potassium chloride, potassium phosphate, sodium chloride >0.9%) from patient care units.

International Patient Safety Goal 4:
Eliminate Wrong-site, Wrong-patient, Wrong-procedure Surgery

Requirement 4: Use a checklist, including a “time-out” just before starting a surgical procedure, to ensure the correct patient, procedure and body part.

Requirement 5: Develop a process or checklist to verify that all documents and equipment needed for surgery are on hand and correct and functioning properly before surgery begins.

Requirement 6: Mark the precise site where the surgery will be performed. Use a clearly understood mark and involve the patient in doing this.

International Patient Safety Goal 5:
Reduce the Risk of Health Care–acquired Infections

Requirement 7: Comply with current published and generally accepted hand hygiene guidelines.

NOTE: This should recognize that not all countries have a CDC (Centers for Disease Control and Prevention) or may not recognize the US CDC.

International Patient Safety Goal 6:
Reduce the Risk of Patient Harm Resulting from Falls

Requirement 8: Assess and periodically reassess each patient’s risk for falling, including the potential risk associated with the patient’s medication regimen, and take action to decrease or eliminate any identified risks.

The focus in 2009 was on IPSG3 and 4.

Improve the Safety of High-Alert Medication (IPSG 3)
The efforts to raise the awareness of High Alert/Risk medication led the nurse managers in the wards to review drugs kept in the ward as ward stock.

Pre-Diluted KCL Solutions were introduced in 2008 with the purpose of reducing the need to keep concentrated KCL in clinical areas. Unfortunately we have not been as successful as we had hoped in getting doctors to use the pre-diluted preparations. This continued to be an area of focus in 2010.
Eliminate Wrong-site, Wrong-patient, Wrong-procedure Surgery (IPSG 4)
To meet surgical patient safety goals, the following process have been put into practice and are being monitored for compliance:

- Surgical Site Marking
- A ‘time-out’ immediately prior to commencement of surgery

To verify that policies matched practice closed chart reviews and direct observation audits were conducted at the hospitals. While Parkway has yet to achieve 100% compliance in surgical site marking, we are moving toward it.

Parkway hospitals are committed to the International Patient Safety Goals. We will through rigorous implementation of policy ensure that we meet these goals and reduce risk for our patients as a result.
The Medical Affairs Department supports the Medical Advisory Board in all of its activities including:

- The Accreditation & Privileging of Specialists
- Performance Evaluation for Accredited Physicians
- Continuous Medical Education

Accreditation & Privileging of Specialists

Doctors in private practice who meet Parkway hospitals credentialing criteria may apply for accreditation and admitting privileges.

Accreditation and privileging standards are set by Credentials Committee of the MAB in consultation with the appropriate Speciality Interest Group.

We use a common application form for all our three hospitals in Singapore.

Accreditation and privileging is reviewed every three years.
Performance Evaluation for Accredited Physicians

All accredited doctors are subject to an annual performance evaluation. This is a Joint Commission requirement and also demonstrates good governance.

Annual evaluation is based on the doctor’s compliance with hospital policies that impact patient safety and quality of care.

Continuous Medical Education & Clinical Events

Parkway hospital support continuous learning by our doctors by organizing regular weekly CME talks at each of our three hospitals in Singapore. In addition to the weekly talks, Mount Elizabeth and Gleneagles Hospitals also have an annual seminar which showcases the clinical expertise available in our hospitals.
Parkway Operating System

Parkway Operating System Project was launched in the last quarter of 2008 under leadership of Dr Kelvin Loh with following key objectives in mind:

a. Improving existing operating systems and standards
b. Adding value to our services and reducing waste in processes
c. Raising morale of our people by eliminating ‘waste’ so that they can focus on value added activities and benefit our patients.

By sharing the best practices in process management from within and outside healthcare industry, a total of 37 storyboards were completed in 2009 at the 3 hospitals in Singapore.

Showcase POS Project:

Pain Assessment Project at Mount Elizabeth Hospital

In March 2009, a multifunctional team from Mount Elizabeth Hospital embarked on a project to enhance the operational efficiency of the value stream for Total Knee Replacement. After mapping the entire value stream, one of the major problems that surfaced was the massive amount of documentation that nurses had to perform. This resulted in less time spent in direct patient care.

One of the suggestions that came up during brainstorming was to streamline the pain assessment process. The project team studied the existing workflow for pain assessment by nurses and found several redundancies. The entire process was reengineered. Nurses now have to enter an average of 11 fields related to pain assessment (for a typical medical patient when the pain score is below 3) compared to 45 fields previously. This translates into saving 4.7 minutes for the pain assessment process for each patient per day.

Although this project initially looked only at the preoperative pain assessment process for Total Knee Replacement at one hospital, the lessons learnt and the process improvement have been extended to the pain assessment process for all medical and surgical cases across all three hospitals in Singapore.
Speciality Specific Clinical Outcomes

We track speciality specific clinical outcomes to measure how we “achieve the finest clinical outcomes” on Parkway Enterprise Strategy Map. Clinical outcomes are currently being measured in following clinical areas and specialities:

- Cardiology & Cardiothoracic Surgery
- Parkway Transplant & Cellular Therapy Program
  - Liver Transplant
  - Renal Transplant
  - Stem Cell Transplant
  - Targeted Therapy
  - Cornea Transplant
- Obstetrics & Gynaecology
- Assisted Fertility (Parkway Fertility Centre)
- Neurology & Neurosurgery
- Orthopaedics
- General Surgery and other Surgical Specialities
- Oncology
- Ophthalmology
- ParkwayHealth Laboratory Services
- ParkwayHealth Radiology
Cardiology & Cardiothoracic Surgery

Parkway Health offers a full range of clinical services to patients suffering from heart and vascular problems through its network of eminent cardiologists, cardiac surgeons and a skilled and experienced nursing team.

Clinical Outcomes

Management of Acute Myocardial Infarction (AMI): Prompt & active management of patients with AMI may be life saving.

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

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Compliance in Year 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin to be given within 2 hours of admission with AMI.</td>
<td>94.4%</td>
</tr>
</tbody>
</table>

Performance: In 2009, our hospitals achieved 94.4% compliance for this indicator. This is comparable to the best hospitals in the world.

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.

![Coronary Angiography Cases Done at Parkway Hospitals](image)

Volume of Coronary Angiography Cases done at Parkway Hospitals
Percutaneous Transluminal Coronary Angioplasty (PTCA)

This is a technique used to dilate an area of arterial narrowing in the heart with the help of a catheter that has an inflatable balloon at its tip. In PTCA (Percutaneous Transluminal Coronary Angioplasty) the balloon catheter is introduced through the groin (sometimes the arm) and is guided under X-ray vision to the site of narrowing. An expandable metal mesh tube called stent is commonly placed in the segment of vessel that was dilated by balloon angiography. The stent holds the vessel walls up and keeps the vessel patent.

CABG (Coronary Artery Bypass Grafting):

CABG surgery creates new routes around narrowed and blocked arteries, allowing sufficient blood flow to deliver oxygen and nutrients to the heart muscle. Mount Elizabeth and Gleneagles Hospital are major centres for CABG Surgery in Singapore.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Clinical Indicator</th>
<th>Clinical Outcome (2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary Angiography</td>
<td>Median Length of Stay</td>
<td>1 Day</td>
</tr>
<tr>
<td>Coronary Angiography</td>
<td>Median Length of Stay</td>
<td>1 Day</td>
</tr>
</tbody>
</table>
Catheter Ablation Procedure

Catheter ablation is an invasive procedure used to treat cardiac arrhythmias (heart beat irregularities). Hundreds of these sophisticated procedures have been performed at our facilities in last few years.

Clinical Indicator: Surgical Site infection rate for CABG.

Performance: The Surgical Site Infection rate for CABG was 0.7% in 2009.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Outcome in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Site Infection Rate for CABG</td>
<td>0.7%</td>
</tr>
</tbody>
</table>

Clinical Indicator: Mortality Rate following CABG.

Performance: The average mortality rate for CABG was 1.8% (Non Risk Adjusted including both Primary & repeat CABG procedures) in 2009 at our facilities as compared to an average mortality Rate of 3% reported for hospitals in state in California (USA) and 2.2% for hospitals in New York state.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Outcome in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality Rate for CABG</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

Clinical Indicator: Median Length of stay for CABG.

Performance: The median length of stay for CABG was 8 days for procedures performed in 2009 at Parkway Health.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Outcome in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Length of stay for CABG</td>
<td>8 Days</td>
</tr>
</tbody>
</table>

*All Outcomes are Non Risk Adjusted for Cardiology and Cardiothoracic Surgery
Mount Elizabeth Hospital is the only private hospital in Singapore that is participating in the International Cardiac Surgery Benchmarking (ICSB) Project of Joint Commission International.

The International Cardiac Surgery Benchmarking (ICSB) Project is a pilot project of JCI that aims to help hospitals outside USA by enabling them to evaluate risk-adjusted mortality rates for CABG and valve surgeries performed at respective facilities. Our participation in this project is a step forward to get our clinical outcome data validated by independent third parties. On one hand clinical outcome data of this sort will help us in initiating and implementing quality improvement programs, on the other hand it will also serve as a useful source of clinical outcome information for our patients to help them make valid comparisons.

We have been submitting data to JCI since October 2009 and we are hoping to receive the first set of risk adjusted clinical outcome report in 2010.
Transplant & Cellular Therapy at Parkway Health

Haematopoietic Stem Cell Transplants together with living donor kidney and liver transplants are the foundation of our Transplant & Cellular Therapy services at Parkway Health.

Haematopoietic Stem Cell Transplant

This programme provides both autologous and heterologous bone marrow transplant options for children and adults with a wide range of haematological conditions such as leukaemia, thalassaemia, sickle cell anaemia, metabolic diseases and inherited immune deficiencies. Bone Marrow Transplant is an exciting new frontier in the treatment of these disorders.

<table>
<thead>
<tr>
<th>Stem Cell and Bone Marrow Transplant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2009</td>
</tr>
</tbody>
</table>

Volume of Bone Marrow Transplant Cases at Parkway Health

* includes cord and peripheral blood stem cell transplants
Clinic for Blood Disorders and Research

Targeted Therapies for various disorders (April 2007 to March 2010):

The clinic for blood disorders and research has been using targeted therapy for patients with Multiple Myeloma, Autoimmune diseases, Myelodysplastic disorders and other diseases.

Targeted Therapy for Multiple Myeloma (April 2007 to March 2010):

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.

Clinical Outcomes:

(a) Median time to best response was noted to be 2.5 months*

(b) Best depth of response to therapy *

*Excludes cases with pending assessment, default cases or those who could not continue treatment
Renal Transplant

Living Donor Kidney Transplant:
The number of living donor Renal Transplant cases done at our hospitals shows an upward trend.

Volume of Renal Transplant cases performed at Parkway Health

One, Two and Three Year Survival Rates for Renal Transplant Cases performed at Parkway Health

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Volume</td>
<td>31</td>
<td>58</td>
<td>61</td>
<td>51</td>
</tr>
<tr>
<td>1 Year Survival Rate</td>
<td>96.6%</td>
<td>96.4%</td>
<td>97.5%</td>
<td>N.A.</td>
</tr>
<tr>
<td>2 Year Survival Rate</td>
<td>92.5%</td>
<td>94.4%</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>3 Year Survival Rate</td>
<td>87.5%</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

* Percentage of survival rate has been adjusted to exclude cases which could not be followed up (e.g., lost to follow up cases) or are not due for review at the time of submission of this data to the Quality Division.
Living Donor Liver Transplantation (LDLT)

Contributed by Dr Lee Kang Hoe

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

Due to the scarcity of cadaveric donors, Living Donor Liver Transplantation has become the treatment of choice for patients requiring Liver Transplantation. The team is led by Dr. Tan Kai Chah, who pioneered living donor liver transplant surgery in Singapore.

A study conducted in 2007 showed an overall 1 year survival rate of more than 80%, which is comparable to the best Liver Transplant Centre’s results around the world. For patients undergoing their liver transplant in 2009, the 30 day survival rate was 100%.

To date, the liver transplant team has undertaken 160 liver transplants. The common causes for liver transplant are liver cirrhosis from hepatitis B, hepatitis C and liver cancer. Patients come mainly from Malaysia, Indonesia, India, UAE, and Vietnam. 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 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 (Intermittent Modular Plasma Adsorption of Cytokines and Toxins):

IMPACT is a newer generation non-biological system that utilizes modern bead & adsorption technologies to maximize clinical benefits. It also uses a plasma separator and does not utilize 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 centre. They represent major advances over the standard MARS dialysis that was the only treatment option available previously.

Liver Transplant at MEH

2009 marked the commencement of Living Donor Liver Transplant Programme at Mount Elizabeth hospital. The Mount Elizabeth programme is headed by Liver Transplant Surgeon Dr Prema Raj.
Obstetrics & Gynaecology

Our Obstetrics & Gynaecology services are tailored to provide seamless care for the specialized healthcare needs of women.

Management of Women’s Diseases

Minimally Invasive Surgery: Minimal invasive laparoscopic surgery is being increasingly used for the treatment of various gynaecological problems. In 2009 more than 1,972 such procedures were performed at our facilities in Singapore.

Clinical Indicator: Conversion Rate into open surgery for minimally invasive laparoscopic surgical procedures. (Hysterectomy, Myomectomy & Cystectomy)
Performance: The conversion rate into open surgery for Minimally Invasive Laparoscopic Surgery was 0.66% in year 2009.

Clinical Indicator: Unexpected return to operation room for minimally invasive laparoscopic surgical procedures. (Hysterectomy, Myomectomy & Cystectomy)

Performance: Unexpected return to operation room for minimally invasive laparoscopic surgical procedures was 0.00% in year 2009.

Obstetric Care

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Clinical Indicator</th>
<th>Outcome in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Vaginal Delivery</td>
<td>Median Length of Stay</td>
<td>2 Days</td>
</tr>
<tr>
<td>Caesarean Section Delivery</td>
<td>Median Length of Stay</td>
<td>3 Days</td>
</tr>
</tbody>
</table>

Clinical Indicator | Outcome in 2009
Conversion into open surgery | 0.66%
Unexpected Return to Operation Room | 0.00%

Minimal Invasive Laparoscopic Surgery (Hysterectomy, Myomectomy & Cystectomy)

*All Outcomes are Non Risk Adjusted for Obstetrics and Gynaecology

Number of Normal Vaginal Delivery Procedures performed at Parkway Health

Number of Assisted Vaginal Delivery Procedures performed at Parkway Health

Number of Caesarean Section Deliveries performed at Parkway Health
Assisted Fertility - Parkway Fertility Centre

Parkway Fertility Centre located at Mount Elizabeth Hospital has a team of highly experienced and dedicated IVF specialists, embryologists and nurses that delivers personalized treatment and helps couples having difficulty in conception to achieve their dream of parenthood.

Over the last 23 years, some 250,000 patients from all over the world have sought medical attention at our Fertility Centre for a wide range of male and female infertility problems. To date, we have performed over 4800 IVF treatment cycles. With more than 370 treatment cycles last year, we account for the largest number of IVF cycles in the private sector of Singapore.

**Clinical Outcomes**

**Live Baby Birth Rate:** Data from 2006 to 2009 shows that 852 embryo transfer procedures were performed at our centre that resulted in delivery of 425 live babies at a success rate of 49.9% which is comparable to the best centers in Europe and the US. The Centre for Disease Control (CDC) use 34.4% as the benchmark for this procedure.

Management of Infertility at Parkway Fertility Centre
Neurology & Neurosurgery

The Neurology and Neurosurgery services at Parkway taps the expertise of a wide variety of specialists that we have in our system including Neurologists, Neurosurgeons, Neuroradiologists, Intervention Radiologists and Pain Management Specialists.

Clinical Outcomes

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 Median Length of Stay for Anterior Cervical Spine Surgery.

Performance: The median length of stay for anterior cervical decompression and fusion procedures performed at our facilities in 2009 was 3 days for Single Level Procedures & 3.5 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>Median LOS</th>
<th>Modal LOS</th>
</tr>
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<tbody>
<tr>
<td>Anterior Cervical Discectomy &amp; Fusion</td>
<td>3 Days</td>
<td>2 Days</td>
</tr>
<tr>
<td>(Single Level)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior Cervical Discectomy &amp; Fusion</td>
<td>3.5 Days</td>
<td>3 Days</td>
</tr>
<tr>
<td>(Multiple Level)</td>
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</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 program focuses on meeting the standards for patients presenting with a “Brain Attack” as well as rehabilitating patients with neurological deficits.

Clinical Indicator: Time–to-CT-Scan/ MRI for suspected Acute Stroke Patients.

Early diagnosis of stroke patients with CT or MRI 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: Data collected during first 3 quarters showed that the average time to perform CT scan/ MRI for suspected cases of Acute Stroke was 91.2 minutes against a target of 120 minutes.

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
<th>Result Quarter 1</th>
<th>Result Quarter 2</th>
<th>Result Quarter 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Time-to-CT-Scan/ MRI for suspected Acute Stroke Patients</td>
<td>84 minutes</td>
<td>100 minutes</td>
<td>87 minutes</td>
</tr>
</tbody>
</table>

*All Outcomes in Neurology and Neurosurgery are not risk adjusted
Orthopaedics

Clinical Outcomes
Management of Joints:

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

Clinical Indicator | Compliance/Outcome in 2009
--- | ---
Prophylactic antibiotics to be given with in 0 to 60 minutes before TKR Surgery | 97.6%
Median length of Stay for Unilateral TKR | 4 Days
Median length of Stay for Bilateral TKR | 6 Days
Total Hip Replacement:
A total hip replacement is a surgical procedure where the diseased cartilage and bone of the hip joint is surgically replaced with an artificial ball and socket joint.

Parkway Hospitals had 0.00% surgical site infection rate for total hip replacement surgery in year 2009.

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
<th>Clinical Outcome in 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Site Infection Rate for Total Hip Replacement Surgery</td>
<td>0.00%</td>
</tr>
<tr>
<td>Median Length of stay for THR Procedures</td>
<td>5 Days</td>
</tr>
</tbody>
</table>

*All Outcomes in Orthopaedics are not risk adjusted*
General Surgery and other Surgical Specialities
Clinical Outcomes

Management of Benign Prostatic Hyperplasia (BPH) & Cancer of Prostate:

**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.

The median length of stay for a total of 324 TURP procedures carried out in year 2009 was 3 days. This compares favourably against an average length of stay of 4 to 5 days reported by some NHS Hospitals in the UK.

**Robotic Prostatectomy:** A robotic prostatectomy is the removal of the prostate gland through a minimally invasive robotic surgery using Da Vinci Surgical System.

Management of Gall Bladder Disease

**Clinical Indicator** | **Outcome**
---|---
Median Length of Stay for Video Laparoscopic Cholecystectomy | 1 Day
Median Length of Stay for Open Cholecystectomy | 3 Days

*All Surgical outcomes are not risk adjusted*
Appendicetomy

Volume of Appendicetomy cases at Parkway Health

Management of Haemorrhoids

Volume for Laser Excision of Haemorrhoids

Tonsillectomy

Volume of Tonsillectomy cases at Parkway Health (with or without adenoidectomy)

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
<th>Outcome</th>
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</thead>
<tbody>
<tr>
<td>Median Length of Stay for Tonsillectomy</td>
<td>1 Day</td>
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<tr>
<th>Clinical Indicator</th>
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<tr>
<td>Median Length of Stay for Laser Excision of Haemorrhoids</td>
<td>1 Day</td>
</tr>
<tr>
<td>Median Length of Stay for Haemorrhoidectomy</td>
<td>1 Day</td>
</tr>
</tbody>
</table>
Clinical Outcomes

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:

Research shows that initial response to remission induction therapy is one of the most important prognostic factors 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 affecting thousands of women across the world.

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:

2009 data (for patients treated in 2008) shows 100% survival rate for these patients. We aim to publish our 3 & 5 year survival rate for these patients in subsequent editions of this publication.

<table>
<thead>
<tr>
<th>Clinical Indicator</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1 Year Survival Rate for Patients of Breast Cancer (Stage I and II only)</td>
<td>100%</td>
</tr>
</tbody>
</table>

*All Outcomes for Oncology are not risk adjusted*
Ophthalmology

Parkway Hospitals offers a full range of specialized eye care services.

Volume of Cornea Transplant cases at Parkway Hospitals

Volume of Cataract Extraction with IOL implant cases at Parkway Hospitals
ParkwayHealth Laboratory Services

ParkwayHealth Laboratory Services caters to inpatients and outpatients at the three Parkway hospitals in Singapore as well as to the doctors who operate within and outside of the hospitals’ medical centers.

Our Services

Clinical Laboratory Services
- Hematology & Immunohematology
- Biochemistry
- Immunology & Serology
- Hormones
- Therapeutic Drug Monitoring
- Drug of Abuse Screen
- Body Fluids, Seminal Fluid, Urine & Stool Analysis
- Microbiology
- Clinical Molecular (PCR Testing) & Specialized Testing
- Triple Testing for Down’s Syndrome

Histopathology Services
- Cytology
- Histology

Genetics Services
- Prenatal Karyotyping
- Perinatal, Pediatric and Adult Karyotyping
- Oncology Karyotyping
- Special Cytogenetics Tests (Fragile X, Fanconi’s Anemia, Bloom’s Syndrome, Ataxia Telangiectasia, Fluorescent In-Situ Hybridisation)
- Molecular Genetics Testing
- HER-2/neu FISH (Breast Cancer)
- PCR Female/Male (General Infertility)
ParkwayHealth Radiology comprises of a team of experienced specialist radiologists and healthcare professionals, providing a full range of diagnostic and therapeutic radiology services.

ParkwayHealth Radiology operates a network of specialist radiology clinics in Singapore including a Nuclear Medicine and PET Centre at Mount Elizabeth Hospital.

Our Services:

- Bone Mineral Densitometry
- Breast Imaging Services
- Cardiac Magnetic Resonance Imaging (MRI)
- Computed Tomography
- Contrast Study
- Fluoroscopy
- General Radiography
- Magnetic Resonance Imaging (MRI)
- Nuclear Medicine & PET Scan
- Ultrasound
Recently we have launched Rubidium-82 Cardia PET Stress and Rest Myocardial Perfusion Scan services for our patients that help to evaluate blood flow to the heart muscles. This technology helps to get superior quality true stress images of heart with less overall radiation exposure and lesser time taken to complete the procedure.

**Clinical Outcomes:**

**Clinical Indicator:** Time–to-CT-Scan/ MRI for suspected Acute Stroke Patients.

**Performance:** Data collected during first 3 quarters showed that the average time to perform CT scan/ MRI for suspected cases of Acute Stroke was 91.2 minutes against a target of 120 minutes.

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GleneaglesCRC Overview

GleneaglesCRC (a joint venture of Parkway and Mitsui & Co. Ltd) is a premier full-service Contract Research Organization (CRO) in the Asian-Australasian region. GleneaglesCRC has now its own subsidiaries and representative offices in seven countries that include Singapore, China, Thailand, the Philippines, Indonesia, Australia and South Korea. It has operational offices in India, Malaysia and Vietnam.

It has conducted over 230 studies to date since its incorporation in late October 1999. These studies were conducted over 300 different hospital sites and 850 investigators across eight countries in Asia. It has also completed the largest ever epidemiological study conducted in Indonesia involving the screening of 18,000 in-patients and recruiting 2000 patients with upper respiratory tract infection.

In 2006, Frost and Sullivan honored GleneaglesCRC with the award for the Asia Pacific Healthcare Award for Clinical Research Outsourcing Industry & Asian CRO of the Year. Gleneagles CRC was also chosen as the Emerging CRO Company of Singapore (Editors’ Choice by BioSpectrum Asia) in 2008.

GleneaglesCRC established the first Parkway Independent Ethics Committee (PIEC) for clinical trials in Singapore in year 2000 that is now recognized by the Association for the Accreditation of Human Rights Protection Program (AAHRPP) USA. It is one of the very few ethics committee in the Asia Pacific Rim countries that has gone through audits to achieve this recognition for excellence and quality.

Our Services:
- Development Consulting including clinical trial protocol design
- Feasibility Studies
- Project Management
- Regulatory Affairs
- Data Management
- Biostatistics
- Pharmacovigilance
- Medical Monitoring
- Medical Writing
- Quality Assurance

Experience across Therapeutic Areas
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An Annual publication by Quality Division, Parkway

September, 2010

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Clinical Performance Indicators & Outcome Measures of Parkway’s Quality Initiatives