Surgical Outcomes Monitoring and Improvement Program (SOMIP) and Quality Improvement in Surgery

Prof. Paul BS LAI
Program Director, SOMIP, Hospital Authority
Patients need “high value health care”

- **Quality**
  - Structure, process, outcome
- **Safety**
  - Avoid preventable harms
- **Appropriate use of resource**
  - Avoidable procedures
- **Patients’ experience**
  - Did we ever ask?
Targeting high value surgical care?

Value = \frac{Quality}{Cost}
Quality of Surgery in Hospital Authority
Three-phase development

1995
Surgical outcomes study
QA subcommittee

2002 to 2007
Comparative audit
(Central Surgical Audit Unit)

2008-
SOMIP (Quality and Safety Division)
The Department of Veterans Affairs’ NSQIP

The First National, Validated, Outcome-Based, Risk-Adjusted, and Peer-Controlled Program for the Measurement and Enhancement of the Quality of Surgical Care

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Objective

To provide reliable risk-adjusted morbidity and mortality rates after major surgery to the 123 Veterans Affairs Medical Centers (VAMCs), performing major surgery, and to use risk-adjusted outcomes in the monitoring and improvement of the quality of surgical care to all veterans.

Summary Background Data

Outcome-based comparative measures of the quality of surgical care among surgical services and surgical subspecialties have been elusive.

Results

The National VA Surgical Quality Improvement Program (NSQIP) data base includes 417,844 major surgical procedures performed between October 1, 1991, and September 30, 1997. In FY97, 11 VAMCs were low outliers for risk-adjusted observed-to-expected mortality ratios; 13 VAMCs were high outliers for risk-adjusted observed-to-expected mortality ratios. Identification of high and low outliers by unadjusted mortality rates would have assigned an outlier status incorrectly to 25 of 39 hospitals, an error rate of 64%. Since 1994, the 30-day mortality and morbidity rates for major surgery have fallen 9% and 3%, respectively.

Conclusions

Reliable, valid information on patient presurgical risk factors, process of care during surgery, and 30-day mortality and morbidity rates is available for all major surgical procedures in the 123 VAMCs performing surgery in the VHA. With this information, the VHA has established the first prospective outcome-based program for comparative assessment and enhancement of the quality of surgical care among multiple institutions for several surgical subspecialties. Key features to the success of the NSQIP are the support of the surgeons.
Surgical Outcomes Monitoring and Improvement Program (SOMIP)

- Started in 2008
- Elective and emergency operations (~25,000 procedures per year)
- Major and Ultra-major operations
- Covers General surgery, Urology, Plastic and Paediatric surgery
- 66 peri-operative risk factors and outcome data
- Collect post-operative mortality and morbidity at 30-, 60- and 90-day
Special features of SOMIP

• Focus on hospital (17 HA hospitals), rather than individual surgeon
• Single-year comparison and continuous monitoring
• Compare a bundle of operations rather than individual operation
• Robust and reliable data capturing by nurse reviewers
• A comprehensive set of variables to help construct risk-adjusted models
• All variables are well-defined and documented in a data definition manual
Why risk adjustment?

- Patient Factors +
- Quality of Care +
- Random Variation =
- Outcome

Reliable Clinical Database

Valid Analytic Models
Why risk adjustment?

Patient Factors + Quality of Care + Random Variation = Outcome

Reliable Clinical Database + Valid Analytic Models
risk-adjusted mortality rates for peer comparison
Low Outliers
risk-adjusted mortality rates

High Outliers
Actionable data from SOMIP
Multi-level analysis to identify contributing system factors

Workload issues – no. of patients requiring surgical care
Manpower issues – surgeons, anaesthetists, intensivists, nurses, etc.
Hardware issues – ICU beds, operating theatres, ward beds, etc.
Other supports – physicians, diagnostics, interventional radiology, etc.
The Donabedian Model (1966) structure - process - outcome

Figure 2. TRIAD conceptual model of relationships among system-level factors, processes, and outcomes of care

- **System factors**
  - Health system structure.
  - Disease management strategies.
  - Performance feedback.
  - Physician reminders.
  - Guideline use.
  - Formal case management.
  - Patient education resources.
  - Management of referral care.
  - Clinical payment, incentives.
  - Cost-containment strategies.
  - Data systems.

- **Processes of care**
  - Periodic HbA1c testing.
  - Periodic lipid testing.
  - Retinal examinations.
  - Periodic microalbuminuria testing.
  - Periodic foot examinations.
  - Smoking cessation counseling.
  - Aspirin prescription/advise.

- **Health outcomes**
  - Glycemic control.
  - Blood pressure control.
  - LDL-cholesterol control.
  - Cardiovascular disease.
  - Nephropathy/Stage renal disease.
  - Retinopathy.
  - Mortality.
  - Health status.
  - Symptoms.
  - Utilization and costs.

**essentially the whole patient journey**
Action plans for SOMIP team

• Yearly SOMIP forum
• Discuss with senior surgeons and frontlines in
  for areas of improvement
  ** from defensive to proactive
  ** focus on quality improvement measures
  ** sharing of best practice
  ** involvement of senior surgeons within HA to
  assist the process of review and quality
  improvement measures
PDSA Quality Improvement Cycles

Act
- Plan the next cycle
  - Decide whether the change can be implemented

Plan
- Define the objective, questions, and predictions
  - Plan to answer the questions
  - Who? What? Where? When?
  - Plan data collection to answer the questions

Do
- Carry out the plan
  - Collect the data
  - Begin analysis of the data

Study
- Complete the analysis of the data
  - Compare data to predictions
  - Summarise what was learned

Resource as fuels

- Act
- Plan
- Study
- Do
Are we achieving?
SOMIP provides an objective estimation of patient’s risk

Before SOMIP

• The estimation of risk were usually subjective,

• varied with individual clinician who bases one’s past experience in one’s own hospital

With SOMIP

• SOMIP provides us with an objective estimation based on results of all our peer hospitals
Dropping crude mortality after surgery

Crude mortality

Case number
Significant reduction of HA Emergency mortality rates

**Crude mortality rates**

<table>
<thead>
<tr>
<th>Year</th>
<th>Emergency mortality rate %</th>
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<tbody>
<tr>
<td>09-10</td>
<td>10.8</td>
</tr>
<tr>
<td>10-11</td>
<td>9.9</td>
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<tr>
<td>11-12</td>
<td>9.1</td>
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<tr>
<td>12-13</td>
<td>7.7</td>
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<tr>
<td>13-14</td>
<td>7.7</td>
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**Risk-adjusted O/E ratio**

<table>
<thead>
<tr>
<th>Year</th>
<th>Risk-adjusted O/E ratio</th>
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<tbody>
<tr>
<td>09-10</td>
<td>1.109</td>
</tr>
<tr>
<td>10-11</td>
<td>1.02</td>
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<tr>
<td>11-12</td>
<td>0.988</td>
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<tr>
<td>12-13</td>
<td>0.857</td>
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Significantly lower
Significant reduction of HA Elective mortality rates

**CRUDE MORTALITY RATES**

<table>
<thead>
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<th>Year</th>
<th>Rate</th>
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<tbody>
<tr>
<td>09-10</td>
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<tr>
<td>10-11</td>
<td>0.7</td>
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<tr>
<td>11-12</td>
<td>0.7</td>
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<tr>
<td>12-13</td>
<td>0.7</td>
</tr>
<tr>
<td>13-14</td>
<td>0.5</td>
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**RISK-ADJUSTED O/E RATIO**

<table>
<thead>
<tr>
<th>Year</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>11-12</td>
<td>1.06</td>
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<tr>
<td>12-13</td>
<td>1.127</td>
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<tr>
<td>13-14</td>
<td>0.807</td>
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Significantly lower
Way forward....
League table effect?

O/E Ratio and 90% Confidence Intervals for 30 day Mortality following Emergency Surgery.

High Outliers
League table effect?

術後沒深切治療 死亡率較預期高33%

威院緊急手術全港最差

部分公立醫院外科手術表現倒數排行榜

<table>
<thead>
<tr>
<th>醫院名稱</th>
<th>實際與預期死亡比例*</th>
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<tbody>
<tr>
<td>獨立醫院</td>
<td>1.33</td>
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<tr>
<td>伊利沙伯醫院</td>
<td>1.28</td>
</tr>
<tr>
<td>愛丁堡醫院</td>
<td>1.24</td>
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注：實際與預期死亡比例高於1，代表實測死亡率較預期為高。
Adoption of other display tool?

<table>
<thead>
<tr>
<th>Funnel plot</th>
<th>Caterpillar plot</th>
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</table>

- Funnel plot
- Caterpillar plot
Funnel plot for Hospital Z: a 5-year trend
Self-comparison possible √
Deterioration in performance can be detected earlier √
My NHS – NHS Choices

Surgeon-specific outcomes

Vipin Yadao Zamvar

GMC Number: 4133379
Hospital(s): Royal Infirmary Edinburgh
Special Interests: Adult Cardiac Surgery

Number and type of operations performed
In-hospital mortality rate (risk adjusted)
Average patient risk profile

See other Surgeons

Back
In-hospital mortality rate (risk adjusted)

This graph shows the percentage of patients who die before being discharged from the hospital they had their operation at. This is called the 'in-hospital mortality rate'.

Some consultants do more complicated surgery on patients who are more sick, whilst others do fairly routine surgery. So that we can make fair comparisons between these consultants, the mortality rate has been 'risk adjusted' to take into account the difficulty of each operation.

The green line in the middle of the graph shows the average mortality rate for heart surgery in the UK. The blue dot shows the risk adjusted mortality rate for the consultant you are looking at. The lower the blue dot is on the graph, the lower the percentage of patients who have died after surgery.

If the blue dot is underneath the red line near the top of the graph, then the mortality rate shown by the blue dot is within the limits we would expect.

For more information on understanding mortality rates, look at the Understanding the graphs page.
Can do attitude  Safety first culture
Sustainable improvement is not easy
# Acknowledgements

<table>
<thead>
<tr>
<th>Nurse reviewers</th>
<th>Nelson Kong, Jennie Aw, Y Ng, Stella Wong, Doris Leung, Eva Choy, Peggy Leung, CT Choi, May Ho, Margaret Lee</th>
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<tbody>
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<td>SOMIP Steering Committee</td>
<td>Francis Mok, Paul Lai, C W Man, Judy Ho, KM Chan, Miranda Chan, FH Ng, W S Chau, John Liu, YF Chow, Anne Kwan, Joseph Lui, YC Yuen</td>
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<td>HAHO</td>
<td>PY Leung, S Solomon, HW Liu, MY Cheng, Ian Cheung, Alex Chiu, CM Leung, Ella Lei, Edmond Fan, Fred Chan, Margaret Yick, Rebecca Fan, Andy Wai,</td>
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<tr>
<td>IT</td>
<td>Ricky Siu, Marita Cheng, Peter Wan, S Y Wu, Maggie Siu, WN Wong, Antonio Shek, NT Cheung, ...</td>
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<tr>
<td>Clinical</td>
<td>Surgical Supervisors, COS (Surgery), DOM (Surgery)</td>
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