Safety: Beyond Swiss Cheese-Systems Analysis tools for Surgical M&M

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• Member of NSW State Wide Reference Group for Mortality & Morbidity Meetings review.
• Member of NSW CHASM Committee

**Acknowledgements:**
Prof David Storey CEC NSW
Why are M & M Meetings important?

- Accountability & safety
- Learning “unforgettable lessons”
- Intradepartmental / interdisciplinary communication
- Setting standards of care
- Improving patient care
Digital M&M

Reflecting on what really matters

Introduction
Mortality & Morbidity audits are generally underutilised resources with a great deal of potential to contribute to the governance of patient safety. Many hospitals gather data such as: unexpected death, unplanned return to theatre and admission to ICU and readmission within thirty days (CED 2014). However, these factors are not specific to surgical measures of quality and what should be considered measurable outcomes of surgery. Subsequently there is significant variability across the states in data collection, measurement and action on this information.

Method
Using a Plan-Do-Study-Act methodology, our aim was to standardise the collection of surgical mortality and morbidity data by the introduction of key performance indicators. The RACS MALT tool was used to clarify inspected reportable complications for all major general surgery case types. A concurrent clinician engagement survey was also undertaken.

Results:
An online ‘M & M Meeting Hub’ web tool was developed to centralise the collection of audit data and ensure recommendations from audit meetings are actioned appropriately with the inclusion of an ‘electronic meeting agenda’.

The portal facilitates clinician engagement and enables care business activities in quality and safety to be achieved and documented which was a major theme recognised in the clinician engagement survey. This has led to our teams working together more effectively and improving the work environment and culture.

Discussion:
The potential for the M & M Meeting hub to provide a standardised format for running a meeting, presenting cases, and acting on information is significant. The hub acts as a log of ‘action items’ so that escalation of issues to relevant individuals and forums is simplified. MMs or RAs can be initiated, and also feedback can be received. Key performance indicators introduced (see audit sheet below) were crucial in clarifying the volume of work the unit was undertaking, gave context to the complication rates encountered and established a benchmark to which improvement could be measured. This aspect was essential in understanding how systems could be improved and how our centre compared to similar hospitals.

Conclusion
A void exists in the literature and government guidelines with respect to how best to manage the surgical mortality and morbidity audit process such that patient care is improved and surgical learning is facilitated. The introduction of standardised key performance indicators in this regional centre and the use of an electronic data hub to facilitate meetings greatly improved surgeon and administrative satisfaction with the audit process and ensured recommendations were appropriately documented and actioned. Digitisation of Mortality and Morbidity audit has the capacity to fundamentally alter the way clinical governance occurs and M & M processes are reviewed and acted upon.

References
The Ideal MMR

- Simple and fast to use without training and can be repeated for multiple cases.
- Critically evaluate both surgical and systems factors
- Facilitate learning for the whole team
- Distil recommendations and action items within prescribed time frame
- Facilitate documentation and connect to relevant incident reporting system internal or external, e.g.: IIMS, CHASM or RCA.

Figure 1: Royal Australasian College of Surgeons Matrix for MMR Standards (RACS 2017)
Barriers to Overcome

• Closed single disciplinary meetings
• Qualified Legal Privilege
• “Expected” complications vs adverse events
• Inadequate appropriate systems based analysis tools
• Failure to recognise the between individual error and systems factors
• Lack of administrative support
Methods

- Professional standards & guidelines reviewed eg: CHASM, QASM, RACS, CEC.
- Literature searched for quality improvement tools for surgery
- “People-Processes-Paradigm” tool developed
- Initial Pilot testing
Safety: Beyond Swiss Cheese

A Timeline of the Development of Methods for Complex Systems and Safety*


Key:
- Traditions
- Key Studies
- Methods

- FMEA = Failure Modes and Effects Analysis
- MEAD = Macroergonomics Analysis and Design
- CSE = Cognitive Systems Engineering
- CWA = Cognitive Work Analysis
- HRA = Human Reliability Analysis
- ODAM = Organisational Design and Management
- STAMP = Systems Theoretic Accident Modelling and Processes
- CREAM = Cognitive Reliability Error Analysis Method
- FRAM = Functional Resonance Analysis Method

- Tavistock Institute London
- Cognitive Revolution
- Action Research
- Variance Analysis
- HF, Safety Engineering
- Cognitive Engineering and Decision Making
- Naturalistic Decision Making (NDM)
- Resilience Engineering
- Hollnagel, Woods & Leveson
- Hendrick (ODAM)
- Systems Safety
- Cognitive Systems Engineering (Risea)
- Macroeconomics
- HFES Technical Group
- IEA Committee
- Rasmussen’s risk management model
- Swiss Cheese
- STAMP
- AcciMap
- CREAM
- FRAM


Age of Technology

Age of Human Factors

Age of Complex Systems
# Systems Analysis Tools

## Work System
- Tools & Technology
- Organization
- Person(s)
- Tasks
- Environment

## Processes
- Physical
- Cognitive
- Social/behavioral

## Professional Work
- Collaborative Professional-Patient Work

## Outcomes
- Desirable
- Distal
- Patient
- Organizational
- Proximal
- Undesirable

## Adaptation
- Anticipated or unanticipated
- Short- or long-lasting
- Intermittent or regular

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**Figure 1.** Ichikawa (“fishbone”) cause-and-effect diagram.
# NSWCEC New Tool: People-Processes-Paradigm

<table>
<thead>
<tr>
<th>Date of Meeting</th>
<th>Admissions</th>
<th>Length of Stay</th>
<th>Source of Error</th>
<th>Patient Age</th>
<th>ASA</th>
<th>Procedure ( elective or emergency)</th>
<th>Surgeon</th>
<th>ASA</th>
<th>Date/Time</th>
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**Contributory Factors**
- Identify these factors that contributed in any way to the incident and their impact.

**Paradigm**
- Technology & Tools
  - Equipment/Time/Technology
  - Appropriate/Inadequate/Inadequately?
  - Instructed/Instructed?
  - anything else?
- Processes
  - Environment
    - Physical Layout? Monoculture?
    - Lighting? Temp? Space?
    - Ward occupancy rate?
  - Internal Environment
    - Personality/Attitude? Autocratic/Dictatorial?
    - Standard operating procedure? Checklist?
    - anything else?
- Organisational Factors
  - Quality Assurance Program?
  - Organisational Culture?
  - Clinical/Administrative?
  - anything else?

**Literature Review**
- What does the literature show regarding this procedure/complication? How does your hospital compare? (NSQIP)

**Summary & Comments**
- i.e.: Preventable or not: Ways to improve?

**Recommendations & Actions**
- By whom
- By whom

**Problem**
- Name
- Signature
- Date
## Results

<table>
<thead>
<tr>
<th>Date of Meeting:</th>
<th>Admission: / / to / /</th>
<th>Length of Stay: ___days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of case: Clinician/Administration/IIMS/NSQIP</td>
<td>Patient MRN:</td>
<td>Consultant(s):</td>
</tr>
</tbody>
</table>

**Indication for Discussion:**
- Safety I: Death/Complication/Unplanned return to theatre/ Unplanned ICU/ Transfer/Readmission in 30days/NSQIP review
- Safety II: near miss/exceptional care/positive patient feedback

**Clinical Case Description**

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<td>B</td>
<td>A</td>
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<td>R</td>
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# NSWCEC
## Results

### Contributory Factors

#### Patient Factors
- Age/gender/BMI
- Diagnosis/Prognosis/Malignancy?
- Delay in Diagnosis?
- Comorbidities/Medications
- Social/Cultural Factors?
- Clinical Risk Scores: e.g. P-FOSSUM
- Anything else?

#### Surgical Team Factors
- Regular Team? Defined Roles? Experience?
- Supervision?
- Roles: Surgeon/Trainee/SMO/Nursing
- Other medical teams involved?
- Communication — good/bad? Escalation?
- Team Culture/Morale?
- Fatigue/Stressors? Task Overload?
- Physical/Mental Health?
- Anything Else?

#### Task Factors
- Routine/emergency?
- Simple/Complex?
- Time Constraints? Time to theatre — in category or not?
- Known complication of this procedure?
- Decision to operate? Choice of procedure?
- Anything Else?
## Results

<table>
<thead>
<tr>
<th>Processes</th>
<th>Technology &amp; Tools</th>
<th>Environment Factors</th>
<th>Paradigm</th>
<th>Organisational Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equipment/EMR/Technology</td>
<td>Internal Environment</td>
<td>External Environment</td>
<td>Quality Assurance Program?</td>
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<td>Multi-tasking? Senior help available? /Locums</td>
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# NSWCEC

## Results

### Literature Review:

What does the literature show regarding this procedure/complication? How does your hospital compare? (NSQIP)

### Summary & Comments

I.e.: Preventable or not? Ways to improve?

### Recommendations & Actions

E.g.: IIMS, CHASM, RCA, internal review- refer to surgical services, peri-operative committee or Quality & Safety Committee or external escalation?

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<th>By whom</th>
<th>By when</th>
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### Reporting

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Key: Consideration - care COULD have been better | Concern - care SHOULD have been better | Adverse Event - direct harm
Conclusion

- The “People-Processes-Paradigm” tool has been developed for surgeons by surgeons.
- Incorporates current professional, legal and regulatory requirements in Australasia
- Easily transferrable to electronic platforms
- Requires larger scale pilot study
References


