Perioperative PDMS
Postoperative Outcome Data Collection

Walder Bernhard
Anaesthesiology
University Hospital of Geneva

1. Clinical context
2. Clinical concept
3. Aims and local PDMS solutions
4. Limitations
5. Conclusions
Context: Perioperative pathways
Context: Risk factors of unfavourable postoperative outcome

- Co-morbidities
- Severity of surgery
- Emergency
- Physiologic and cognitive reserve (frailty)
- Age
- Postoperative complications

Surgeon (?)

30 days mortality
Local context: Postanaesthesia Care Unit – Intermediate Care Unit

- Case-mix with many, low and less, high risk patients: **different needs of documentation**

- Highly variable patient flow with peaks: **assure minimal safety standards including documentation**

- High number of emergency patients: **low or no preoperative documentation (chronic diseases)**

- High number of late arrivals due to long intervention times: **documentation with reduced personnel**

- +3.3% / year patients (increase higher in high risk patients): **simple documentation**
Clinical postoperative concept

Pathobiology of surgical “stress”

- Hypoxia
- Reduced organ perfusion (hypotension?)
- To much of infusion
- Hypo- / hypercapnia

Intensity

Tissue trauma

Local + Systemic Injury cascade

Iatrogenic factors

Recovery period

High vulnerable period

Inflammation
Ischemia/reperfusion
Edema
Hemorrhage
Clinical postoperative concept of “failure to rescue”

- $n =$ number of operated patients
- $a =$ number of postoperative adverse events
- $d =$ number of deaths
- $a =$ number of postoperative adverse events
- $f =$ number of deaths in those that develop an adverse occurrence (failure to rescue)
- $AOR =$ adverse occurrence rate = $a/n$
- $FR =$ failure rate = $f / a$
- $DR =$ postoperative death rate = $d/n$

Silber JH et al. Medical Care 1992 30: 615-29
Postoperative concept: Vulnerable period with second risk stratification

Patient’s co-morbidity

Aggressiveness of surgery

Second risk stratification

Postoperative complications

Postoperative rescue

Postoperative mortality

EFFECTIVE RESCUE IS FEASIBLE IN NON-ICU PATIENTS!

- Communication (rounds/ handover)
- Nurse/bed ratio
- EBM
- Specific treatment
- Pathway / triage
- Discharge criteria
- Controlling
- Education

Timely recognition of complication

Effective management

Eichenberger AS EJA 2011
Postoperative: Vulnerable period / second risk stratification

**Fast track**

ASA 3-5; major surgery

- Yes → 
  - Yes → 
  - No → Walder score ≥12
    - Yes → Discharge to ward by PACU nurse
    - No → Discharge to ward by PACU physician
- No → Discharge to ICU by PACU physician

**Second risk stratification, Complication(s)**

- Yes → 
  - No → 
  - Yes → 
    - Yes → Discharge to ward by PACU physician
    - No → Discharge to ward by PACU physician
- No → 
  - Yes → Discharge to ward by PACU physician
  - No → Discharge to ward by PACU physician

**Successful treatment**

- No → Discharge to ICU by PACU physician

**Slow track**

Walder score ≥12 + Walder score ≥12, + pH >7.33, + pO₂ >7.5 (no O2), + glucose <10 mmol/l, + lactat <2 mmol/l
# Results

**Risk stratification (triage criteria)**

**Discharge criteria**

**Rounds (diagnostic and therapeutic intervention)**

**Handover**

## Mortality

<table>
<thead>
<tr>
<th>In-hospital mortality (number; %)</th>
<th>Before</th>
<th>After</th>
<th>unadjusted Odds ratio (95% CI)</th>
<th>adjusted Odds ratio (95% CI)</th>
<th>unadjusted P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA 1-2</td>
<td>8 (0.28)</td>
<td>1 (0.03)</td>
<td>0.11 (0.01-0.85)</td>
<td>0.13 (0.01-1.22)</td>
<td>0.07</td>
</tr>
<tr>
<td>ASA 3-5</td>
<td>60 (5.4)</td>
<td>38 (3.2)</td>
<td>0.58 (0.37-0.91)</td>
<td>0.41 (0.24-0.68)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Overall</td>
<td>68 (1.7)</td>
<td>39 (0.9)</td>
<td>0.53 (0.34-0.80)</td>
<td>0.36 (0.22-0.59)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Adjusted in multivariate regression analysis for age, gender type of surgery, type of anaesthesia, emergency status and interaction with age and type of anaesthesia*
**Postoperative PDMS**

**Second risk stratification – Low risk patient**

**Fast track (< 2 H)**

**Discharge criteria**

**Documentaton**

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### Walder Score

<table>
<thead>
<tr>
<th>Critères</th>
<th>Score d’entrée</th>
<th>Score de sortie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Respiration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capable de respirer et tousser librement</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Respiration limitée ou dyspnée</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Apnée</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2. SpO2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SpO2 &gt; 92% à l’air ambiant</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>SpO2 &gt; 90% sous oxygène</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SpO2 &lt; 90% malgré oxygène</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3. Circulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA systolique ± 20 % valeur préopératoire</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>PA systolique ± 20-50 % valeur préopératoire</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PA systolique ± 50 % valeur préopératoire</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4. Conscience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complètement réveillé</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Réveillable à l’appel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Aucun réveil à la stimulation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5. État confusionnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Suspension d’état confusionnel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>État confusionnel</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6. Activité motrice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capable de mobiliser ses quatre membres</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Capable de mobiliser ses deux membres</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Capable de mobiliser un membre</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>7. Température</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.0° - 38.5°</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>35.5° - &lt;36.0° et &gt;38.5° - 39.0°</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>&lt;35.5 et &gt;39.0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
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</table>

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**Aim:**

Effectiveness

Safety

**Vital signs**
Second risk stratification – Low risk patient

Postoperative PDMS

**Wisdom:** Drawing upon past experiences and knowledge that reinforce an intimate level of understanding that explains both the “what” and “why”. So for this example, this may manifest as an earlier recognition of a pneumothorax with more expeditious and appropriate treatment.

**Knowledge:** Processed information that is structured, organized, and put into action. In this example, narrowing the differential diagnosis (Ddx) based on outside information and knowing what new information to look for (e.g. decreased breath sounds).

**Information:** Data with context.

**Data:** Input without context.

Complications = adverse events

Early identification

Decision making

Intervention

Documentation

Postoperative PDMS

Monitoring data (trends – SSPI 24 h)
Blood gas analysis
Blood analyses, RX
Interoperable with hospital IT system
Directed nurse-physician communication based on objective facts (validated scores) (independent of nurse)

Rule: No documentation = no identification = wrong (fatal) decision making

Slow track (>12 H; every 12 h a round with a specialized physician)
Second risk stratification – High risk patient

Slow track (>12 H; every 12 h a round with a specialized physician)

Clinical documentation

Diagnosis (with menu)

Problem description

Proposed management

Weighted list of problems (Clavien)

**Clavien Classification**

Classification of Surgical Complications

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade I</td>
<td>Any deviation from the normal postoperative course without the need for pharmacological treatment or surgical, endoscopic, and radiological interventions</td>
</tr>
<tr>
<td>Grade II</td>
<td>Requiring pharmacological treatment with drugs other than those allowed for grade I complications</td>
</tr>
<tr>
<td>Grade III</td>
<td>Requiring surgical, endoscopic or radiological intervention</td>
</tr>
<tr>
<td>Grade IVa</td>
<td>Blood transfusions and total parenteral nutrition are also included</td>
</tr>
<tr>
<td>Grade IVb</td>
<td>Blood transfusions and total parenteral nutrition are also included</td>
</tr>
<tr>
<td>Grade V</td>
<td>Death of a patient</td>
</tr>
</tbody>
</table>

Suffix "d": If the patient suffers from a complication at the time of discharge (see examples in Table 2), the suffix "d" (for "disability") is added to the respective grade of complication. This label indicates the need for a follow-up to fully evaluate the complication.

*Brain hemorrhage, ischemic stroke, subarachnoidal bleeding, but excluding transient ischemic attacks. CNS, central nervous system; IC, intermediate care; ICU, intensive care unit.

Second risk stratification – High risk patient

Slow track (>12 H; every 12 h a round with a specialized physician)

Administrative documentation

NEMS – Nine Equivalents of nursing manpower use score

<table>
<thead>
<tr>
<th>Catégories IMC</th>
<th>1A</th>
<th>1B</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEMS &gt;30pts et SAS &gt;5 ou RASS &gt;2</td>
<td>NEMS 21–30pts et SAS=5 ou RASS≤2</td>
<td>NEMS 13–20pts et SAS=5 ou RASS≤2</td>
<td>NEMS &lt; 13pts et SAS=5 ou RASS≤2</td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
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<tr>
<td>Charge en soins</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
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</table>

* Cette catégorisation des malades fait l'objet d'une adaptation spécifique pour les particularités des patients pédiatriques et néonatologiques.

SAPS II – Simplified Acute Physiology Score

Intensive Care Med 1997; 23:760-5

Le Gall JR et al. JAMA 1993; 270:2957-63
Perioperative PDMS
Postoperative Outcome Data Collection
Baseline consideration for PACU-IMC

Primary aims
- The PDMS is the **communication instrument in PACU-IMC** (nurse/physician, between shifts)
  - using internal **validated process indicators (scores)** associated with outcome
  - and has access to **external data** (para-clincial exams) via hospital-wide PDMS (DPI)
  - and allows informed **decision making** (actually without red flags)

- The PDMD allows simple documentation for patients with **minor illness** and **critical illness**
  - and allows **communication with wards** via hospital-wide PDMS (DPI)

Secondary aims
- Feedback to intra-operative and pre-operative staff allowing definition of best clinical practice and standardization (education) to avoid complications (for quality improvement)
- Efficiency improvement (higher utilization %)
- Instrument for DRGs (for money)
- ICU compatibility (Metavision© = ICU tested)
- Instrument for clinical outcome research [including ICD-10, inhospital mortality (merging other data base)]
Perioperative PDMS: Communication instrument in PACU-IMC
Perioperative PDMS: Communication instrument in PACU-IMC
Communication with wards via hospital-wide PDMS (DPI)

Low risk patient

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>16/01/2014</td>
<td>10:24</td>
<td>General - Surveillance du patient</td>
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</table>
Communication with wards via hospital-wide PDMS (DPI)

High risk patient
Perioperative PDMS
Postoperative Outcome Data Collection

Limitations

PDMS is too slow or needs often a restart (barrier of adoption and discomfort).

PDMS is actually not a clinical decision support system
(avoidance of dangerous situation related to drug interaction, electrolytes)

PDMS is not combined with a medical prescription e-system.

PDMS does not reduce alarms, because there is no system that prioritizes disparate alarms.

PDMS does not replace the communication with the patient (if there is any),
but it gives a good base for discussion.

PDMS does not change the highly variable patient flow,
but it is a help for triage with minimal documentation.

PDMS does not replace training and education in postoperative medicine,
but is an instrument of bedside teaching.

PDMS does not reduce unjustified prolonged nights stays, or too short stays
but will identify over- and under-treatment.
General conclusions

First patient-centred, clinical concept and testing, and than PDMS (patient safety concept is the base of documentation quality).

Concept of secondary, postoperative risk stratification (avoidance of rescue failure) was the base for postoperative PDMS.

Adapted, high quality documentation instead of high quantity documentation for all.

Concept of fast and slow postoperative track patients with low and high quantity documentation. But, all patients with a discharge score (discharge ticket).

Documentation based on valid, interrater-independent instruments of assessment.

Inclusion of a modest number of institutional instruments of assessment only.
Merci !

What is not measured cannot be managed, but what is measured must still be managed.

Sara Singer
Stephen M. Shortell

JAMA 2011; 306:758-9