Nurse Led Spontaneous Awakening Trial (SAT) protocol on mechanical ventilated patients in Coronary Care Unit

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Agenda

- Describe the process towards setting up the Nurse led Spontaneous Awakening Trial protocol (SAT) in Coronary Care Unit (CCU)
- Examine the outcome post Nurse led SAT implementation
- Lewin’s change theory application
SINGAPORE (As of 2015)

TOTAL POPULATION: 5,530,000
National University Hospital (NUH)

- Tertiary hospital, clinical training and research centre
- Affiliated with local university (NUS)
- ~ 1225 beds
- 5 ICUs & 2 High Dependency (HD) Units (2016)
Background

- Continuous sedation infusion is commonly necessary for mechanical ventilated patients to reduce anxiety and agitation.

- Sedation is associated with risks including delirium, prolonged mechanical ventilator days:
  - Increase risk of ventilated associated infection
  - Longer intensive care unit (ICU) / hospital stays

Critical care, 2013
Background

• Studies shown that implementing sedation protocol and nurse led SAT protocol improves sedation practices in ICU

• **Advantages of nurse led protocol**
  – Improve patient care outcomes and contain cost
  – Quality care leads to nursing job satisfaction
  – Nursing empowerment
  – Healthy work environment
  – Increase retention rates
  – Increased patient satisfaction

Critical care, 2013
NUH CCU

18 bedded unit
- 8 intensive care
- 10 high dependency

• Mechanical ventilated patients
  - Out of hospital collapse
  - Acute myocardial infarction
  - Acute pulmonary edema
  - Post surgery patients
CCU Sedation guideline (2010)

Titration of Commonly Used Sedation Agents in CCU

- **Midazolam** should be administered at 0.05mg/kg over 5 minutes as a bolus & at an initial dose of 0.1mg/kg/hr (infusion).
  - Adjustments to the dose should also be made in 10-20% increments or decrements every 10 minutes.
  - Max dose for IV Midazolam (cardiac patients) is 10mg/hr.
  - **Point to note:** Elderly patients, hepatic or renal dysfunction and obese patients are at higher risk of prolonged sedation due to greater volume of distribution.
  - If the anticipated duration of sedation is between 24-72hrs (medium-term sedation) then Propofol is preferred to Midazolam because of the unnecessary accumulation and extended sedation that can occur with this drug.
  - Prolonged usage of Midazolam (>48hours) can result in unpredictable awakening and prolong time to extubation

- **Propofol** should be administered at 0.3mg to 0.6mg/kg over 5 minutes as a bolus & continue at 0.3mg to 3mg/kg/hr (infusion).
  - Adjustments to the dose should be made in 10-20% increments or decrements every 10 minutes.
  - Max dose for IV Propofol (cardiac patients) is 100mg/hr.
  - **Point to note:** Patients with impaired myocardial function, intravascular volume depletion and abnormally low vascular tone (i.e. sepsis) are at risk of hypotension on Propofol.
  - If the anticipated duration of sedation is less than 24hrs (short term sedation), then either Propofol or Midazolam can be used.
  - Onset of action for IV Midazolam: 1-5 mins; IV Propofol: 9-51 secs (average 30 seconds).

**Daily sedation cessation in the morning (upon taking over from the nightshift staffs)**

- Intravenous sedative medications should routinely be stopped except in the following circumstances:
  - Patient expected to demise within 24hrs
  - Patients who are on neuromuscular blockade (to stop the neuromuscular blockade first)
  - On high O2 demand (FiO2 60% and above)
  - Patients having seizures
  - On specific orders by doctors to continue sedation

**Pre-planned sedation cessation at 0715hrs for selected patients**

- Doctors should identify and inform nurses of patients who are stable and likely to be extubated the next day
- In these patients, nurses will stop sedation at 0715hrs (or as per order)
- Staff nurses will also stop NG feeding at 0600hrs; in anticipation of extubation
- In the event whereby patient is not fit for extubation, to resume the sedation infusion rate at half the previous rate

- **General**
- **No clear direction of which sedative should be use**
- **No clear weaning protocol**
Objectives

• To revise current CCU sedation guideline and formulation of Nurse led SAT protocol

• To improve sedation practices in CCU

• To empower CCU nurses the ability to perform daily weaning of sedation
# Timeline – Phase I
Revision of Sedation guideline and formulation of SAT protocol

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<table>
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<tbody>
<tr>
<td>Mar 2013</td>
<td>Recognize the need to review current CCU Sedation guideline</td>
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<td>Apr 2013</td>
<td>Discussion with stake holders (Clinical director and Nurse manager of CCU)</td>
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<tr>
<td>Apr - Jul 2013</td>
<td>Formulation of new CCU sedation guideline and SAT protocol</td>
</tr>
<tr>
<td>Jun – Aug 2013</td>
<td>Roadshow to CCU physician and nurses on new CCU sedation guideline</td>
</tr>
<tr>
<td>Sep 2013</td>
<td>Implementation of new CCU sedation guideline</td>
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</table>
CCU Sedation guideline (2013)

- Clear direction on which sedative to use
- Clear flowchart to facilitate understanding
Roadshow to CCU physician and nurses

CCU guideline on Anaglesia and Sedation

Which patient for SAT/SBT

How to do SAT

What is Spontaneous Awakening Trial (SAT)

ABCD approach:
- refers to Awakening and Breathing Coordination, Delirium and Exercise and has shown to improve outcome
- ABC refers to the coupling daily spontaneous awakening trial (SAT) with spontaneous breathing trial (SBT) with sedation protocol
### Timeline – Phase II
Implementation of Nurse led SAT protocol

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>Nov 2013</td>
<td>Roadshow to CCU nurses on Nurse led SAT protocol</td>
</tr>
<tr>
<td>Dec 2013</td>
<td>Implementation of Nurse led SAT protocol</td>
</tr>
<tr>
<td>Jun 2014</td>
<td>Post implementation Audit</td>
</tr>
<tr>
<td>Aug 2014</td>
<td>Roadshow to CCU physician and nurses on CCU sedation guideline and nurses led SAT protocol</td>
</tr>
<tr>
<td>Jan 2015</td>
<td>Data collection</td>
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</tbody>
</table>
Daily Spontaneous Awakening Trial (SAT) and Spontaneous Breathing Trial (SBT)

Daily SAT – Nurse driven (0700hrs)

**Aim:** Daily weaning off sedation to assess patient neurological status

- Nurses must determine if it is safe to discontinue sedation
- Wean and discontinue sedation by 0700hrs
- If patient:
  - Expected to die within 24 hour
  - On neuromuscular blockade
  - On hypothermic protocol
  - Having seizures
  - Alcohol withdrawal
  - RASS > 2
  - High ventilatory support (FiO2 > 0.8, PEEP >10)
  - Have new onset of myocardial ischemic event in the past 24 hours (evidence by new ischemic changes on ECG)
- Proceed to perform SAT
- Nurses to assess if patient tolerated interruption of sedation
- Any of the following instances:
  - SpO2 < 88% for 5 minutes or longer
  - Respiration rates > 35 breaths per minutes for 5 minutes or longer
  - New onset of arrhythmia
  - Hemodynamic instability
    - Heart rate increase 20 or more beats per minute or less than 55 beats per minutes
    - Sudden onset of Hypertension or Hypotension
  - 2 or more of the following symptoms of respiratory distress
    - Use of accessory muscles
    - Abdominal paradox
    - Diaphoresis
    - Dyspnea

**SAT failed**
- Re-assess in 24 hours.
- Restart sedation if necessary at half previous rate and adjust accordingly
- Unsafe to discontinue sedation.

**SAT passed**
- No
- Yes
- Proceed to SBT (RT driven)
- Refer to RT SBT protocol
Data Collection

• Retrospective data collection (Jan 2013 to Dec 2014)
• Summary and analysis using EXCEL and SPSS Version 19

Outcomes:
• Compliance to sedation protocol
• Compliance to Nurse led SAT
• Length of intubation
• Length of CCU stay
• Incidence of Ventilator associated pneumonia
Ventilated Cases in CCU (2013 – 2014)

- 2013: 71 cases
- 2014: 58 cases
Compliance to Sedation protocol

- 1st half 2013: Midazolam 22, Propofol 15
- 2nd half 2013: Midazolam 3, Propofol 31
- 2014: Midazolam 10, Propofol 48
Compliance to Sedation protocol

<table>
<thead>
<tr>
<th></th>
<th>Midazolam</th>
<th>Propofol</th>
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<tbody>
<tr>
<td>1st half 2013</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>2nd half 2013</td>
<td>3</td>
<td>31</td>
</tr>
<tr>
<td>2014</td>
<td>10</td>
<td>48</td>
</tr>
</tbody>
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Compliance to SAT

- 2013: 88%
- 1st half of 2014: 68%
- 2nd half of 2014: 86%
- 1st half of 2015: 86%
Nurses' perception of SAT protocol

- Too complex: 23
- Lack of confidence to perform nurse-led assessment: 18
- Lack of opportunities to perform Nurse-led SAT: 5
Incidence of Ventilated associated pneumonia in CCU (2013 - 2014)

![Bar graph showing incidence of ventilated associated pneumonia in CCU from 2013 to 2014. The graph indicates 5 cases in 2013 and 2 cases in 2014.]
## Duration of CCU stay (days)

<table>
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<tr>
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<th>Pre SAT</th>
<th>Post SAT</th>
<th>Sig</th>
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<tr>
<td></td>
<td>7.4 +/- 0.8</td>
<td>7.2 +/- 0.9</td>
<td>p=0.981</td>
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## Length of Intubation (days)

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<tr>
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<th>Pre SAT</th>
<th>Post SAT</th>
<th>Sig</th>
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<tbody>
<tr>
<td></td>
<td>2.54</td>
<td>3</td>
<td>p=0.389</td>
</tr>
<tr>
<td>Authors (Year)</td>
<td>Design (Number)</td>
<td>Time to randomly assign</td>
<td>Main inclusion</td>
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<tr>
<td>Mehta et al. [37] (2012)</td>
<td>Multicenter RCT open-label (423)</td>
<td>1 to 4 days</td>
<td>Ventilated &gt;48 hours</td>
</tr>
<tr>
<td>Jakob et al. [27] (2012)</td>
<td>Multicenter two RCTs Double-blind (998, 2 studies)</td>
<td>48 hours of sedation</td>
<td>Ventilated &gt;48 hours</td>
</tr>
<tr>
<td>Strøm et al. [14] (2010)</td>
<td>Single-center Unblinded RCT (140 but 113 analyzed)</td>
<td>24 hours after intubation</td>
<td>Ventilated &gt;24 hours</td>
</tr>
<tr>
<td>Treggiari et al. [33] (2009)</td>
<td>Single-center Open-label RCT (129)</td>
<td>Up to 3 days</td>
<td>Ventilated &gt;12 hours</td>
</tr>
<tr>
<td>Skrobić et al. [31] (2010)</td>
<td>Single-center Pre and post (572 and 561)</td>
<td>24 hours after ICU admission</td>
<td>Admitted &gt;24 hours</td>
</tr>
<tr>
<td>Carson et al. [25] (2006)</td>
<td>2-center RCT Open-label (132) over 56 months</td>
<td>1.5 days on average after ventilation</td>
<td>Ventilated &gt;48 hours and lorazepam &gt;10 mg/hour</td>
</tr>
<tr>
<td>Kress et al. [34] (2000)</td>
<td>Single-center RCT unblinded (128)</td>
<td>Ventilated patients</td>
<td>Ventilated &gt;48 hours and sedated</td>
</tr>
<tr>
<td>Brook et al. [30] (1999)</td>
<td>Single-center RCT unblinded (321)</td>
<td>Ventilated in ICU &gt;24 hours</td>
<td>Ventilated &gt;24 hours</td>
</tr>
</tbody>
</table>
Key to success

- **Formulation of protocol**
  - Stakeholders involvement and garner support
  - Multidisciplinary team approach
  - Create buy in from those involved
  - Communicate, communicate and communicate
Lewin’s Change Theory

- **Change** (Implement the desired change)
- **Unfreeze** (Prepare the desired change)
- **Refreeze** (Solidifying the desired change)

**Driving forces**
- Training, education
- Collaboration with multidisciplinary teams

**Restraining forces**
- Workload and resource constraint
- Lack of access to equipment and resources
- Staff resistance to change

**Monitor compliance with outcome**
- Discuss and share data with staff

Make education of protocol as part of orientation
Conclusion

• Protocols are created with the aim to improves sedation practices, its implementation in real clinical remains a challenge

• Changes in practice always create emotional responses
• Resistance to change must be addressed to be able to progress
• Involving everyone in the process from the start enables resistances to examine and constructively addressed
• Change is only sustainable if everyone involved psychologically own the new ways of doing
References

Acknowledgement

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Thank you for your attention