Physical Restraint for Management of Agitation in the ICU

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CIHR New Investigator

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Adjunct Scientist, Institute for Clinical Evaluative Sciences; West Park Healthcare Centre
NO DISCLOSURES
Physical Restraint

**Definition:**

any physical or mechanical device attached or adjacent to a patient’s body

...... that he/she cannot easily remove,

...... which restricts freedom of movement or normal access to one’s body
LEGISLATION and GUIDELINES
Physical restraint can be applied to prevent serious bodily harm.

Hospitals must have a policy.

The policy must encourage alternative methods.

Staff should receive training on alternative methods.

Only a physician or person specified by regulation can order.

Standing orders are prohibited.
Recommendations: Level of Evidence C

- **least restrictive** but **safest** environment
- **maintain dignity** and **comfort**
- only in **clinically appropriate situations**: **NOT** as routine component
- **risk of untoward treatment interference** **MUST** outweigh all risk
- assess if **treatment of existing problem** obviates need
- **alternatives** should be considered
- **least invasive** restraining option
- **rationale** must be **documented**
- orders limited to **24-hr period**
- potential to **discontinue/reduce** considered at least every 8 hrs
- monitor for **complications at least every 4 hrs**
- analgesics, sedatives, neuroleptics **NOT** overused as chemical restraint
PREVALENCE
International physical restraint use

- **France** (De Jonghe et al. 2013)
  - 82% of 130 ICUs: PR used *at least once* during MV
  - 62% of ICUs: PR when applied used for >50% of MV duration
  - 29% of ICUs: PR used in >50% of awake, calm and cooperative patients

- **US vs Norway** (Martin et al 2005)
  - Norway: 0% though higher acuity, more sedated
    - higher N:P ratio (1:1 for ventilated patients)
  - US: 39% - Unplanned device removal: 7 US vs 0 Norway

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**Physical restraint use in intensive care units across Europe: The PRICE study**

Julie Benbenbishty,*,Sheila Adam, Ruth Endacott

- Prospective point prevalence survey
- 34 ICUs, 9 countries, 669 patients
- PR prevalence in individual ICUs: 0 to 100%
- Overall **33% patients restrained**
  - More likely to be MV, sedated, larger ICUs, lower daytime N:P ratio
In CANADA

- **I-CAN-SLEAP**
  - 51 ICUs across Canada - observational study
  - 374/711 (53%) patients restrained

- **The SLEAP trial**
  - 16 tertiary ICUs – 14 Canada/ 2 US
  - protocolized sedation plus daily sedation interruption vs protocolized sedation alone
  - 328/430 (76%) patients had restraints applied at least once during ICU admission

Luk et al. Crit Care 2014
Mehta et al. JAMA 2012
Predictors of restraint use
Predictors of physical restraint use in Canadian intensive care units

Elena Luk†, Barbara Sneyers‡, Louise Rose†, Marc M Perreault§, David R Williamson§, Sangeeta Mehta¶, Deborah J Cook*, Stephanie C Lapinsky** and Lisa Burry†

**CAN-SLEAP:** 51 ICUs: 711 patients **53%** restrained
- mean **4.1 days** (SD 4.0), range **1-26** days

**Restraint use**

<table>
<thead>
<tr>
<th></th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ daily benzodiazepine dose</td>
<td>1.1</td>
<td>1.0 - 1.1</td>
</tr>
<tr>
<td>↑ daily opioid dose</td>
<td>1.1</td>
<td>1.0 – 1.1</td>
</tr>
<tr>
<td>Antipsychotic use</td>
<td>3.1</td>
<td>1.7 – 5.5</td>
</tr>
<tr>
<td>SAS &gt;4</td>
<td>3.7</td>
<td>1.5 – 9.3</td>
</tr>
<tr>
<td>Both continuous &amp; bolus sedatives</td>
<td>2.7</td>
<td>1.4 – 5.4</td>
</tr>
<tr>
<td>University-affiliated ICUs</td>
<td>0.3</td>
<td>0.2 – 0.6</td>
</tr>
</tbody>
</table>

**More days of PR**
- ↑ benzo dose, daily sedation interruption, antipsychotic drugs, accidental device removal

**Patient characteristics NOT associated with PR use**
- age, gender, APACHE II, admission diagnosis, substance use, psychiatric diagnosis
## Secondary analysis of SLEAP trial 328 (76%) patients restrained

<table>
<thead>
<tr>
<th></th>
<th>Univariate HR 95% CI</th>
<th>Multivariable HR 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, 10 yr increments</td>
<td>1.06 (0.93, 1.21)</td>
<td>1.01 (1.00, 1.03)</td>
</tr>
<tr>
<td>Males</td>
<td>1.07 (0.76, 1.49)</td>
<td>1.49 (0.71, 3.13)</td>
</tr>
<tr>
<td>Admission category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>medical</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>surgical/trauma</td>
<td>1.39 (1.02, 1.90)</td>
<td>1.46 (0.80, 2.67)</td>
</tr>
<tr>
<td>APACHE II score, 5 point increments</td>
<td>0.83 (0.70, 0.99)</td>
<td>1.02 (0.99, 1.06)</td>
</tr>
<tr>
<td>Current smoker</td>
<td>1.64 (0.99, 2.71)</td>
<td>1.86 (0.92, 3.75)</td>
</tr>
<tr>
<td>History of alcohol use (≥2 drinks per day)</td>
<td>0.27 (0.10, 0.76)</td>
<td>0.22 (0.08, 0.58)</td>
</tr>
<tr>
<td>History of any neurological condition</td>
<td>1.71 (1.08, 2.72)</td>
<td>0.63 (0.37, 1.08)</td>
</tr>
<tr>
<td>History of psychiatric condition</td>
<td>1.47 (1.11, 2.00)</td>
<td>1.04 (0.60, 1.78)</td>
</tr>
<tr>
<td>Sepsis</td>
<td>0.70 (0.42, 1.16)</td>
<td>0.76 (0.20, 2.84)</td>
</tr>
<tr>
<td>Randomization group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>protocol only</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>daily interruption</td>
<td>0.78 (0.52, 1.17)</td>
<td>0.49 (0.22, 1.06)</td>
</tr>
<tr>
<td>Total benzodiazepine dose before restraint</td>
<td>1.00 (1.00, 1.00)</td>
<td>1.00 (1.00, 1.01)</td>
</tr>
<tr>
<td>Total opioid dose before restraint</td>
<td>1.00 (1.00, 1.00)</td>
<td>1.00 (1.00, 1.00)</td>
</tr>
<tr>
<td>Unplanned extubation/Device removal before restraint</td>
<td>3.92 (0.48, 32.04)</td>
<td>4.04 (0.29, 56.16)</td>
</tr>
<tr>
<td>Antipsychotic before restraint</td>
<td>0.69 (0.42, 1.13)</td>
<td>1.22 (0.49, 3.05)</td>
</tr>
<tr>
<td>Delirium before restraint</td>
<td>1.62 (0.97, 2.69)</td>
<td>1.42 (0.59, 3.39)</td>
</tr>
</tbody>
</table>
Nurses’ decisions & beliefs about physical restraint
Critical care nurses’ decisions regarding physical restraints in two Canadian ICUs: A prospective observational study

141 patients in 2 ICUs
Prospective observational study

Average duration of PR
1.8 (1.0) days

Most common reason for PR
• Agitation 43%
• Precautionary 17%
• Restlessness 17%
• Altered mentation 7%

Behaviours indicative of agitation
• Pulling at lines 34%
• Pulling at ETT 32%
• Climbing over bedrails 12%
• Thrashing 11%
• Striking staff 10%

Alternative measures used
• Reorientation 27%
• Sedation 21%
• Causes 20%
• Analgesia 18%
• Family/friends 10%
• Antipsychotics 2%

Reasons for discontinuation
• Calm & cooperative 75%
• Family/friend at bedside 7%
• Unrousable/sedated 7%
<table>
<thead>
<tr>
<th>Statement</th>
<th>AGREE</th>
<th>DISAGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>By using PR, sedation can be more safely</td>
<td>58%</td>
<td>15%</td>
</tr>
<tr>
<td>Preferable to use PR than to sedatives</td>
<td>52%</td>
<td>16%</td>
</tr>
<tr>
<td>Use of PR allows for other duties to be completed</td>
<td>36%</td>
<td>51%</td>
</tr>
<tr>
<td>Getting a colleague to hold pt’s hand is preferable to PR</td>
<td>47%</td>
<td>23%</td>
</tr>
<tr>
<td>Families do not appear to mind PR as know for pt safety</td>
<td>77%</td>
<td>0%</td>
</tr>
<tr>
<td>I do not believe in the use of PR in the ICU</td>
<td>0%</td>
<td>89%</td>
</tr>
</tbody>
</table>
Consequences associated with physical restraint
PATIENT INITIATED DEVICE REMOVAL
Identified 50 studies 1950 to 2011

Unplanned extubation rates
0.5 to 35.8/100 ventilated patients
0.1 to 4.2/100 intubated days

% restrained at time of unplanned extubation
25% to 87%
median 67% IQR 42% to 74%
Physical restraint in the ICU: does it prevent device removal?


3,256 nursing shifts
120 patients
3 ICUs

Approximately 1,371 (43%) nursing shifts
Significant restraint (Posey vest) on 521 (16%) shifts
Only 5 patients never restrained

<table>
<thead>
<tr>
<th># of events</th>
<th>Unrestrained</th>
<th>Restrained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>59 (69%)</td>
<td>27 (31%)</td>
</tr>
<tr>
<td>Self extubation</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>CVP removal</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>NG removal</td>
<td>32</td>
<td>15</td>
</tr>
<tr>
<td>Peripheral/arterial line removal</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Drain</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

44 AEs occurred when patients had SAS of 1-4

26 AEs occurred during PR and 60 when PR not applied (P<0.02)

Concluded PR had a protective effect against any AE (OR=0.27; CI 0.15-0.49) AND major AE (OR=0.04; CI 0.01-0.37)
PSYCHOLOGICAL CONSEQUENCES
Single centre: 98 patients
Measured anxiety, depression and PTS symptoms in outpatient clinic after hospital discharge

Findings. Just under half the sample population (48%) had symptoms of anxiety, more than a quarter had symptoms of depression (28%), and 32% had symptoms of PTS. Furthermore, it was elicited that 58% of the sample had combined anxiety and depressive symptoms severe enough to have a ‘possible clinical disorder’. An unexpected finding of this study was that patients who had memory of physical restraints in the ICU were six times more likely to develop symptoms of PTS than those with no memory of physical restraint.

24% of participants had memory of physical restraint
PR memory was associated with PTS symptoms:
OR 6.05 95% CI 2.23 to 16.23
### TABLE 2. Variables Associated With Delirium, Multivariate Analysis (226 Delirium vs 163 No Delirium)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 40</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>41–65</td>
<td>0.92</td>
<td>0.92</td>
</tr>
<tr>
<td>66–80</td>
<td>0.91</td>
<td>0.91</td>
</tr>
<tr>
<td>&gt; 80</td>
<td>0.85</td>
<td>0.85</td>
</tr>
<tr>
<td>Acute Physiology and Chronic Health Evaluation II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 19</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>19–24</td>
<td>0.94</td>
<td>0.63, 1.42</td>
</tr>
<tr>
<td>24–29</td>
<td>0.98</td>
<td>0.63, 1.55</td>
</tr>
<tr>
<td>&gt; 29</td>
<td>0.64</td>
<td>0.38, 1.09</td>
</tr>
<tr>
<td>Tobacco</td>
<td>1.40</td>
<td>0.96, 2.06</td>
</tr>
<tr>
<td>Alcohol (two or more drinks per day)</td>
<td>1.18</td>
<td>0.69, 1.99</td>
</tr>
<tr>
<td>Neurologic condition²</td>
<td>0.86</td>
<td>0.52, 1.41</td>
</tr>
<tr>
<td>Cardiac disease⁰</td>
<td>1.33</td>
<td>0.64, 2.76</td>
</tr>
<tr>
<td>Randomization group⁰</td>
<td>0.94</td>
<td>0.68, 1.29</td>
</tr>
<tr>
<td>Coma⁴</td>
<td>0.55</td>
<td>0.25, 1.22</td>
</tr>
<tr>
<td>Renal replacement</td>
<td>1.05</td>
<td>0.63, 1.73</td>
</tr>
<tr>
<td>Physical restraint⁹</td>
<td>1.87</td>
<td>1.33, 2.63</td>
</tr>
<tr>
<td>Total midazolam (1 mg increase)⁹</td>
<td>0.998</td>
<td>0.997, 1.00</td>
</tr>
<tr>
<td>Total fentanyl (0.1 mg increase)⁹</td>
<td>1.00</td>
<td>1.00, 1.00</td>
</tr>
<tr>
<td>Antipsychotic use in ICU</td>
<td>1.67</td>
<td>1.01, 2.77</td>
</tr>
</tbody>
</table>

Severity of illness
Hx smoking
Antipsychotic before delirium
Alternatives and Minimization

Optimal tooth brushing position

pin down arms
**Environmental** | **Therapy** | **Communication**
--- | --- | ---
Alter environmental stimuli | Manage pain, hypoxemia, evaluate ventilator settings | Maximize communication
Keep objects necessary for daily living close at hand | Maximize activities of daily living | Provide communication aids
Decrease bed rail use if pt is climbing over them | Eliminate bothersome treatments | Provide reality links & reorientation cues
Use more frequent or constant supervision | Remove catheters | Involve pt in care planning
Increase caregiver supervision ratio | Review medications for contributors to delirium or anxiety | Use anxiety reduction techniques
Use one-to one supervision | Encourage physical exertion, exercise, mobility | Involve family & others
Secondary analysis of RCT to evaluate the effect of a CDSS on referral to a geriatrician and reducing exposure to:

- inappropriate anticholinergics
- physical restraint
- urinary catheters

All patients transferred to ICU (n = 60)
A non-pharmacologic approach to decrease restraint use

Kari Johnson, Valerie Curry, Alison Steubing, Shelly Diana, Andrea McCray, Amanda McFarren, Alisa Domb

22 bed TICU
56/77 (73%) of nurses consented

Intervention
Power-point of non-pharmacological interventions and alternatives
Therapeutic alternative device instruction protocol
  • Handheld devices can twist & squeeze
  • Activity lap belts
  • Soft dolls/stuffed animals

Pre: mean (SD) 314 (35) restraint occurrences/1000 patient days
Post: mean (SD) 237 (56)
P = 0.008
Before/after study
32 nurses (100%)
Education and RDW
Incidence of PR
37% (before) vs 18% (after)
P=0.02
Conclusions

- Physical restraint common in critically ill patients
- Most common rationale for use is safety and prevention of device removal
  - Though frequently ineffective
- Use of physical restraint lacks a scientific evidence basis
- Physical restraint may cause harm
- Restraint minimization is possible
Tie your mother down?

Thank-you!
louise.rose@utoronto.ca

patients tied down, even though they seem to be perfectly at rest, or are even deeply comatose or even paralysed? These authors show that 29% of the participating ICUs would appear to tie down 50% of ICU patients despite these patients being in an awake, calm, and cooperative state; 81% of participating centers would appear to adapt the tightness of the PR to the patient’s condition. Almost 80% of participating ICUs stated that they do not believe that the use of PR in mechanically ventilated patients could be discontinued. Moreover, in only 56% of the ICUs was the reason for using PR explained to the relatives, possibly leading to conflicts and disputes with the ICU team. This state of affairs seems hardly acceptable in