TRAUMA PRACTICE GUIDELINES
Knowing them and using them are two different things

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Injury 2013.
Overview

• Background: definition and development
• Traumatic Brain Injury
• Brain Trauma Foundation Guidelines
• Impact of implementation
• Implementation challenges
• Summary
What is a Clinical Practice Guideline?

Definition:

- “Systematically developed statement to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances”

How are Clinical Practice Guidelines Used?

- Tools to assist in decision making
- In the improvement of healthcare quality at a clinical level
- In the development of policies regarding allocation of resources for efficient healthcare delivery
How are Clinical Practice Guidelines Developed?

- Summary of research
- Multidisciplinary team including stakeholders
- Evidence -based recommendations
- Considerations:
  - Validity and reliability of research
  - Clinical applicability
Implementation and Impact

• Most clinicians agree that guidelines are:
  – Helpful sources of advice
  – Good educational tools
  – Are intended to improve quality

• Some concern however that:
  – Guidelines are intended to cut costs primarily
  – Guidelines are too rigid or impractical to apply to individual patients
  – Guidelines reduce clinician autonomy

Farquhar, Kofa & Slutsky. MJA. 2002.
The Eastern Association for the Surgery of Trauma

Resources

EAST Practice Management Guidelines  Mobile version available →

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Traumatic Brain Injury
Local Experience

- Mortality from severe TBI in Australasia varies from 17.2% up to 19.6%
- This has improved from figures of around 33% in the early 1990’s.
- Brain injury is the largest single cause of death in patients surviving to hospital.
- In Australia: severe TBI 1000 patients/year, 60% die or are left severely disabled.
- In Victoria, approximately 2500 major trauma patients per year.
  - In hospital mortality is approximately 11%, with TBI accounting for 75% of these.

Myburgh et al. 2008. J Trauma. (64)854-862
Treatment Guidelines
Brain Trauma Foundation

Guidelines for the Management of Severe Traumatic Brain Injury

- 1995 1st Edition
- 2000 2nd Edition
- 2007 3rd Edition
  - Published in Journal of Neurotrauma (24) Supp1 2007.
Guideline Summary

- Guidelines regarding the following aspects of care of patients with TBI:
  - Blood pressure and oxygenation
  - Hyperosmolar therapy
  - Prophylactic hypothermia
  - Infection prophylaxis
  - DVT prophylaxis
  - Indications for ICP monitoring
  - ICP Monitoring technology
Guideline Summary

- Guidelines regarding the following aspects of care of patients with TBI: (cont)
  - ICP thresholds
  - CPP thresholds
  - Brain oxygen monitoring and thresholds
  - Anesthetics, analgesics and sedatives
  - Nutrition
  - Anti-seizure prophylaxis
  - Hyperventilation
  - Steroids
# Management of Intracranial Hypertension

First tier management of intracranial hypertension is medical therapy:

## Intubation and ventilation: RSI
- **PCO$_2$ aim:** 35-40mmHg.
- **PO$_2$ aim:** >94%
- Avoidance of high inspiratory pressures - low PEEP (5cmH$_2$O, tidal vol <8ml/kg)

## Blood pressure:
- Aim for CPP of >60mmHg
- MAP >80mmHg (assuming ICP 20mmHg when not measured)
- Avoid hypovolemia
- NS saline, Blood and FFP

## Sedation:
- Deep sedation for ICP control
- Fentanyl and Midazolam
- Propofol if required (limited to 200mg/hr or more*)

## Monitoring:
- Arterial line
- Central line
- ICP monitor
Management of Intracranial Hypertension

First tire management of intracranial hypertension is medical therapy:

Monitoring:
- Arterial line
- Central line
- ICP monitor

Target: <20mmHg

GCS <9 and abnormal CT
- GCS <9 and normal CT with
  - Age >40yrs
  - Motor score <6*
  - SBP<90mmHg

Patient requires intubation and deep sedation for extra-cranial trauma
Impact of Implementation

- A number of studies have shown that the management of TBI in accordance with the TBI Guidelines results in improved outcomes:
  - Mortality
  - Functional Outcome Scores
  - Length of Hospital Stay
  - Costs

2004
Management of Brain-Injured Patients by an Evidence-Based Medicine Protocol Improves Outcomes and Decreases Hospital Charges
Saman M. Fahidy, MD, Arthur L. Trech, MD, Maureen A. Walker, MSN, RN, and Doreene D. Watts, PhD, RN for the IRIC Neurotrauma Task Force

2001
The Impact on Outcomes in a Community Hospital Setting of Using the AANS Traumatic Brain Injury Guidelines
Sylvain Palmer, MD, FACS, Mary Kay Bader, RN, MSN, Ashar Qureshi, MD, DrPh, Jacques Palmer, MD, Thomas Shayer, MD, Marcello Borzotta, MD, and Connie Stalcup, RN, MSN
### Table 1: Comparison of Groups by Year for TBI Patients

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Demographics</strong></td>
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<tr>
<td>Age (mean)</td>
<td>33.8</td>
<td>33.9</td>
<td>35.6</td>
<td>NS</td>
</tr>
<tr>
<td>Alcohol level (mean)</td>
<td>119</td>
<td>176</td>
<td>77</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Gender (% male)</td>
<td>73.5</td>
<td>70.7</td>
<td>77.3</td>
<td>NS</td>
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<tr>
<td><strong>Injury severity</strong></td>
<td></td>
<td></td>
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<tr>
<td>Initial GCS score (mean)</td>
<td>4.0</td>
<td>3.5</td>
<td>3.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Injury Severity Score (mean)</td>
<td>25.2</td>
<td>24.3</td>
<td>24.0</td>
<td>NS</td>
</tr>
<tr>
<td>Maximum head AIS score (mean)</td>
<td>4.0</td>
<td>3.9</td>
<td>3.6</td>
<td>NS</td>
</tr>
<tr>
<td>Mortality (% who died)</td>
<td>17.8</td>
<td>18.6*</td>
<td>13.8†</td>
<td>0.047</td>
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<tr>
<td><strong>Length of stay and charges</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>ICU days (mean)</td>
<td>9.7</td>
<td>8.4*</td>
<td>7.9</td>
<td>0.021</td>
</tr>
<tr>
<td>Hospital days (mean)</td>
<td>21.2</td>
<td>16.7</td>
<td>15.8</td>
<td>0.001</td>
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<tr>
<td>Total charges (mean per patient)</td>
<td>$36,9944</td>
<td>$30,244</td>
<td>$28,429</td>
<td>0.002</td>
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<tr>
<td><strong>Disability scores</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Glasgow Outcome Scale (w/good recovery or moderate disability)</td>
<td>43.3</td>
<td>50.3*</td>
<td>61.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Rancho Los Amigos score (% appropriate at discharge)</td>
<td>43.9</td>
<td>44.0</td>
<td>56.6</td>
<td>0.004</td>
</tr>
</tbody>
</table>

* Individual group did not differ significantly from 1991–94.  
Cost Savings

Using a Cost-Benefit Analysis to Estimate Outcomes of a Clinical Treatment Guideline: Testing the Brain Trauma Foundation Guidelines for the Treatment of Severe Traumatic Brain Injury

Mark Faul, PhD, Marlena M. Wald, MLS, MPH, Wesley Rutland-Brown, MPH, Ernest E. Sullivent, MD, and Richard W. Sattin, MD

2007

- Publications: 1995-2006
- Pre-implementation v’s post-implementation of TBI Guidelines
Cost Savings

Table 3 Overall Cost Savings and Lives Saved Resulting From Adoption of BTF Guidelines—Costs per Person

<table>
<thead>
<tr>
<th></th>
<th>Deaths</th>
<th>Direct Medical Costs</th>
<th>Rehabilitation Costs</th>
<th>Societal Costs</th>
<th>Implementation Costs</th>
<th>Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTF adoption</td>
<td>3,466</td>
<td>$49,607</td>
<td>$2,751</td>
<td>$165,876</td>
<td>$2,618</td>
<td>$220,853</td>
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<tr>
<td>Current state</td>
<td>7,073</td>
<td>$60,887</td>
<td>$4,618</td>
<td>$330,827</td>
<td>$0</td>
<td>$396,331</td>
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<tr>
<td>Difference</td>
<td>3,606</td>
<td>$11,280</td>
<td>$1,866</td>
<td>$164,951</td>
<td>($2,618)</td>
<td>$175,479</td>
</tr>
</tbody>
</table>

Calculated medical costs probabilities are subject to rounding errors.

- 3,606 deaths saved
- US$175,479.00 per patient
Implementation

• First published 1995
  – Endorsed by American Association of Neurologic Surgeons, WHO Neurotrauma Committee and NY State Department of Health
  – Distributed to all neurosurgeons in the USA
• Surveys of management of patients with severe TBI in
  – 2000 Valadka et al 2001
  – 2006 Hesdorffer et al 2007
Implementation

Adherence to guidelines: 2000: 33%; 2006: 65%

Hesdorffer & Ghajar J Trauma 2007.
Implementation

• Why did it take 11 years for these improvements to occur?
  – Lack of awareness
  – Lack familiarity
  – Lack of agreement

• What prompted change?
  – Publications showing benefit of implementation of guidelines
    > Saves lives
    > Improves outcomes
    > Reduces costs
Summary

• Clinical Practice guidelines are evidence-based guidelines to improve patient outcomes
• Guidelines for the management of severe traumatic brain injury were first developed and distributed widely throughout the United States in 1995
• Despite the effort of ensuring updated evidence, and proven benefits in mortality, morbidity and costs, implementation took 11 years
• Reasons cited include lack of familiarity and agreement
• Studies showing improved outcomes associated with the adoption of TBI guidelines have probably contributed to their increased implementation
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