

Traumatologia cranica
Aneurismi intracranici

NEURO UPDATE TORINO

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Linea guida BTF (IV edizione)

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**U.O. Neurochirurgia
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I Edition, 1995

II Edition, 2000



Guidelines for the Management of Severe Traumatic Brain Injury

III Edition, 2007

IV Edition, 2016



[illegible]

TABLE 1. CRITERIA FOR CLASSIFICATION OF EVIDENCE

<i>Class of evidence</i>	<i>Study design</i>	<i>Quality criteria</i>
I	Good quality randomized controlled trial (RCT)	Adequate random assignment method Allocation concealment Groups similar at baseline Outcome assessors blinded Adequate sample size Intention-to-treat analysis Follow-up rate 85% No differential loss to follow-up Maintenance of comparable groups
II	Moderate quality RCT	Violation of one or more of the criteria for a good quality RCT ^a
II	Good quality cohort	Blind or independent assessment in a prospective study, or use of reliable ^b data in a retrospective study Non-biased selection Follow-up rate 85% Adequate sample size Statistical analysis of potential confounders ^c
II	Good quality case-control	Accurate ascertainment of cases Nonbiased selection of cases/controls with exclusion criteria applied equally to both Adequate response rate Appropriate attention to potential confounding variables
III	Poor quality RCT	Major violations of the criteria for a good or moderate quality RCT ^a

METHODS

III	Moderate or poor quality cohort	Violation of one or more criteria for a good quality cohort ^a
III	Moderate or poor quality case- control	Violation of one or more criteria for a good quality case- control ^a
III	Case Series, Databases or Registries	

Used for evidence

**189
publications**

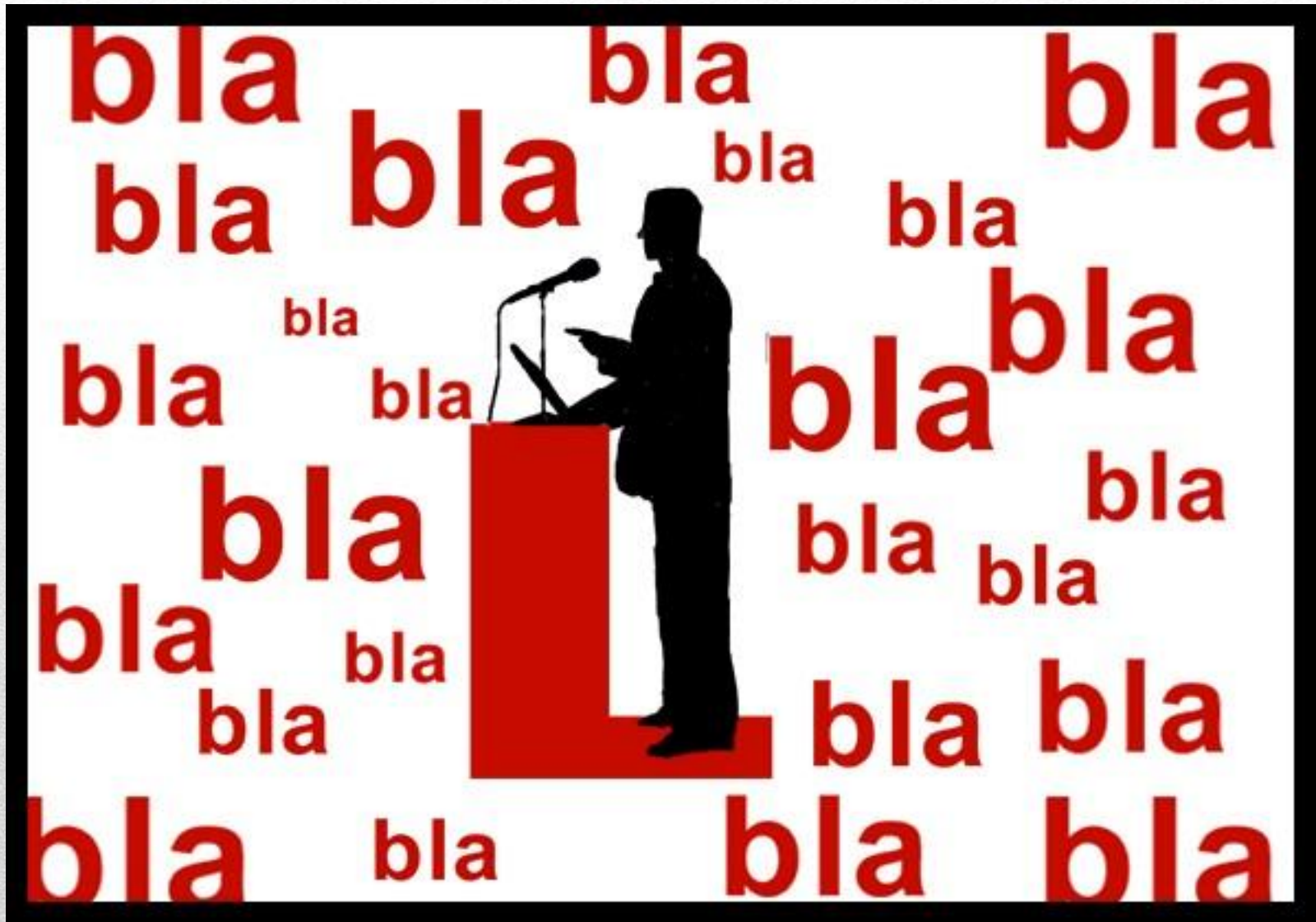
5 Class 1

46 Class 2

136 Class 3

2 meta-analyses

- ❑ **Class 1** good-quality randomized trials.
 - ❑ **Class 2** moderate-quality RCTs and good-quality cohort or case-control studies
 - ❑ **Class 3** low-quality RCTs, moderate- to low-quality cohort or case control studies, case series and other non-comparative designs
-



Level of Recommendation

Level I

Level IIa

Level IIb

Level III

*Quality of body
evidence*

1. Class I-II-III
 2. Consistency of the results
 3. Whether the evidence provided is direct or indirect
 4. Precision of the evidence
-

Level of Recommendation

Quality of body evidence

Class

Level I

high-quality

Class I

Level II A

moderate quality

Class II

Level II B

low-quality

Class II

Level III

low-quality

Class III

Level of Recommendation

Quality of body evidence

Level I

high-quality

1

Level II A

moderate quality

4

Level II B

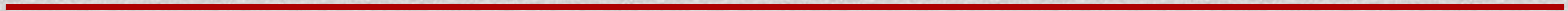
low-quality

8

Level III

low-quality

6



Lack of good-quality randomized trials in TBI



- *Expensive*
 - *Better to invest moneys on prevention*
 - *Outcome results are same in the last at twenty years*
 - *A social problem for low middle income countries*
-

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Major Changes from 3^o to 4^o Edition

■ Part I : Treatments

Decompressive craniectomy	New Topic
CSF drainage	New Topic
Hyperosmolar Therapy	Focused on comparative effectiveness of different hyperosmolar agents
Nutrition	New recommendations

Major Changes from 3^o to 4^o Edition

■ Part I : Treatments

Infection prophylaxis	Added evidences
Deep Vein Thrombosis prophylaxis	Indirect evidence used

Major Changes from 3^o to 4^o Edition

- **Part II : Monitoring**

ICP	Scope and question
Advance Cerebral Monitoring	Reflect to several types of monitoring

Major Changes from 3^o to 4^o Edition

◆ Part III : Thresholds

ICP	
CPP	
Blood pressure	
Advance Cerebral Monitoring	

Decompressive Craniectomy

Level II A moderate-quality body of evidence

- ◆ DAI: bifrontal DC is **not recommended** to improve outcomes with ICP elevation to values >20 mm Hg for more than 15 minutes within a 1-hour period that are refractory to first-tier therapies (DECRA)
 - ◆ A large frontotemporoparietal DC (not less than 12 x 15 cm or 15 cm diameter) is **recommended**
-

CSF drainage

Level III a low-quality body of evidence

- An EVD system zeroed at the midbrain with **continuous drainage** of CSF may be considered to lower ICP burden more effectively than intermittent use.
 - Use of CSF drainage to lower ICP in patients with an initial GCS <6 during the first 12 hours after injury may be considered
-

Hyperosmolar therapy

hypertonic saline VS hyperosmotic agent

there was **insufficient evidence** about effects on clinical outcomes to support a specific recommendation, or to support use of any specific hyperosmolar agent, for patients with severe traumatic brain injury.

Nutrition

Level II A

- Feeding patients to attain basal caloric replacement at least by the **fifth day** and, **at most, by the seventh** day post-injury is recommended to decrease mortality.

Level II B

- Transgastric jejunal feeding is recommended to reduce the incidence of ventilator-associated pneumonia.
-

Infection prophylaxis

Level II A

- Early tracheostomy is recommended to reduce mechanical ventilation days when the overall benefit is felt to outweigh the complications associated with such a procedure. However, there is **no evidence that early tracheostomy reduces mortality or the rate of nosocomial pneumonia**
- The use of **povidone-iodine (PI)** oral care is **not recommended** to reduce ventilator-associated pneumonia and may cause an increased risk of acute respiratory distress syndrome

Level III

- Antimicrobial-impregnated catheters may be considered to prevent catheter-related infections during EVD
-

Deep venous thrombosis prophylaxis

Level III

- Low molecular weight heparin (LMWH) or low-dose unfractionated heparin may be used in combination with mechanical prophylaxis. However, there is an increased risk for expansion of intracranial hemorrhage.
-

Hyperventilation

Level II B

- Prolonged prophylactic hyperventilation with partial pressure of carbon dioxide in arterial blood (PaCO₂) of 25 mm Hg or less is not recommended.

Recommendations from the Prior (3rd) Edition Not Supported by Evidence Meeting Current Standards

- Hyperventilation is recommended as a temporizing measure for the reduction of elevated intracranial pressure (ICP).
- Hyperventilation should be avoided during the first 24 hours after injury when cerebral blood flow (CBF) is often critically reduced.
- If hyperventilation is used, jugular venous oxygen saturation (SjO₂) or brain tissue O₂ partial pressure (BtpO₂) measurements are recommended to monitor oxygen delivery.

ICP -CPP

Level II B

- Management of severe TBI patients using information from ICP monitoring and CPP is recommended to reduce in-hospital and 2-week post-injury mortality.

~~WHO
MONITORING~~

ICP

Recommendations from the Prior (3rd) Edition Not Supported by Evidence Meeting Current Standards

1. ICP should be monitored in all salvageable patients with a severe traumatic brain injury (TBI) (GCS 3-8 after resuscitation) and an abnormal computed tomography (CT) scan.
2. ICP monitoring is indicated in patients with severe TBI with a normal CT scan if two or more of the following features are noted at admission: age over 40 years, unilateral or bilateral motor posturing, or systolic blood pressure (BP) <90 mm Hg

ADVANCE CEREBRAL MONITORING

Level III

- Jugular bulb monitoring of arteriovenous oxygen content difference (AVDO₂), as a source of information for management decisions, may be considered to reduce mortality and improve outcomes at 3 and 6 months post-injury
-

BLOOD PRESSURE THRESHOULD

Level III

- Maintaining SBP at ≥ 100 mm Hg for patients 50 to 69 years old or at ≥ 110 mm Hg or above for patients 15 to 49 or over 70 years old may be considered to decrease mortality and improve outcomes
-

ICP THRESHOLD

Level II B

Treating ICP above 22 mm Hg is recommended because values above this level are associated with increased mortality.

Level III

A combination of ICP values and clinical and brain CT findings may be used to make management decisions.

CPP THRESHOLD

Level II B

The recommended target cerebral perfusion pressure (CPP) value for survival and favorable outcomes is **between 60 and 70 mm Hg**. Whether 60 or 70 mm Hg is the minimum optimal CPP threshold and may depend upon the patient autoregulatory status

Level III

Avoiding aggressive attempts to maintain CPP above 70 mm Hg with fluids and pressors may be considered because of the risk of adult respiratory failure

ADVANCE CEREBRAL MONITORING *(JUGULAR BULB MONITORING OF ARTERIOVENOUS OXYGEN)*

Level III

Jugular venous saturation of $<50\%$ may be a threshold to avoid in order to reduce mortality and improve outcomes.

Conclusion

Level I

1

Level II A

4

Level II B

8

Recommendation

- Steroids
 - DC
 - Nutrition
 - Infection Prophylaxis
 - Seizure Prophylaxis
 - Hypothermia Prophylaxis
 - Ventilation therapy
 - Sedative
 - Nutrition
 - ICP monitoring - threshold
 - CPP monitoring - threshold
-

Conclusion

Recommendation

Level III 6

- CSF drainage
 - Infection Prophylaxis
 - TVP
 - AVDO₂
 - Nutrition
 - Blood pressure threshold
-

Conclusion

Decision making

- Brain
- Experience

R^x PRESCRIPTION

NAME _____ AGE _____
ADDRESS _____ DATE _____

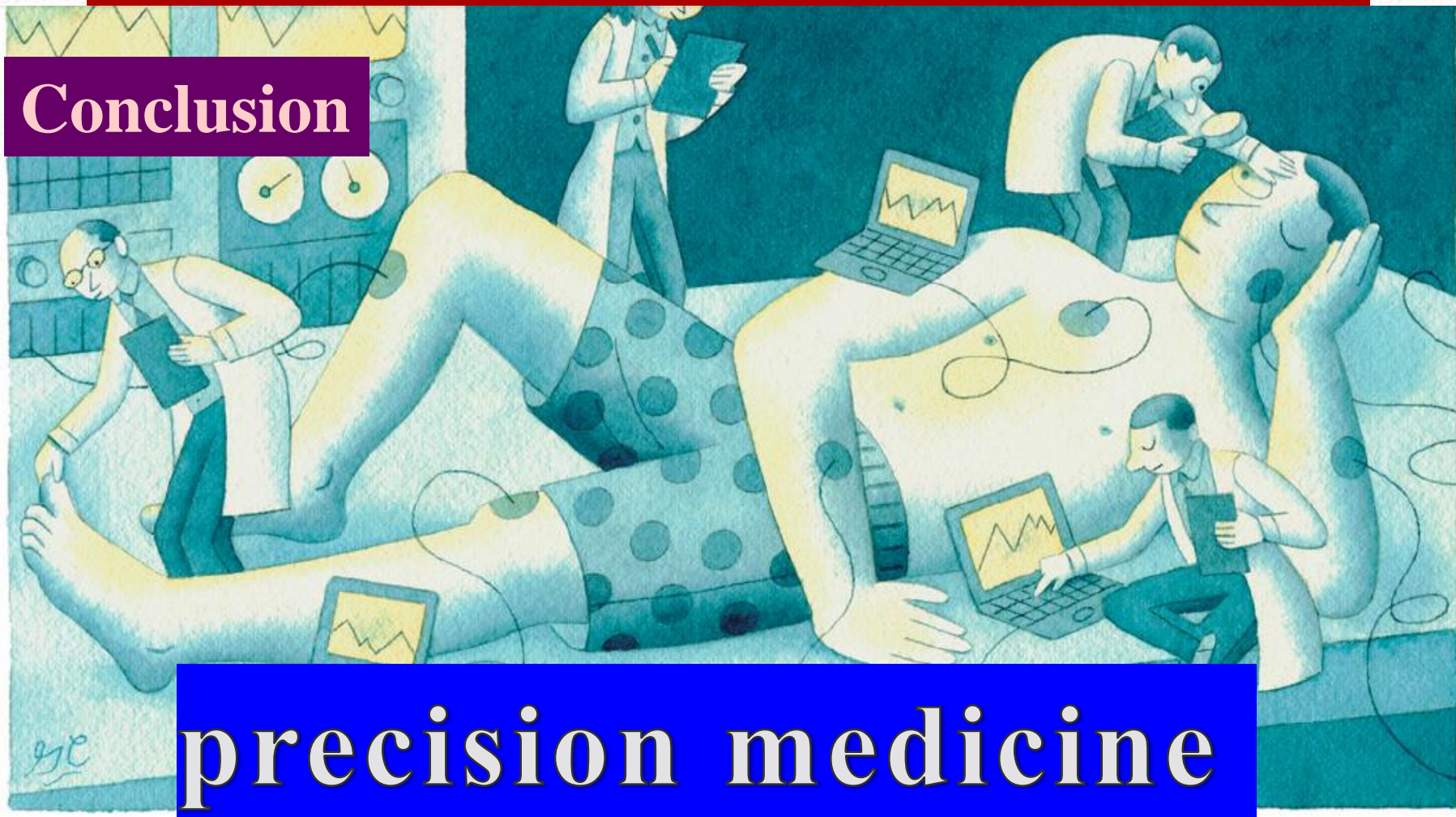
• Brain

• Experience

☐ LABEL
REFILL 0 1 2 4 5 PRN

Health

Conclusion



precision medicine

Time for one-person trials

Precision medicine requires a different type of clinical trial that focuses on individual, not average, responses to therapy, says **Nicholas J. Schork**.

Conclusion

clinical experience

patient values

Living Guidelines
model

best available research
information
