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Evidence Based Approaches to Improving the Course of Recovery following Brain Injury

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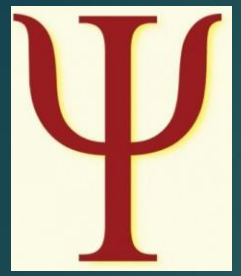
EAST TENNESSEE STATE UNIVERSITY

12TH ANNUAL INTERMOUNTAIN BRAIN INJURY CONFERENCE




American
Speech-Language-
Hearing
Association


LSU

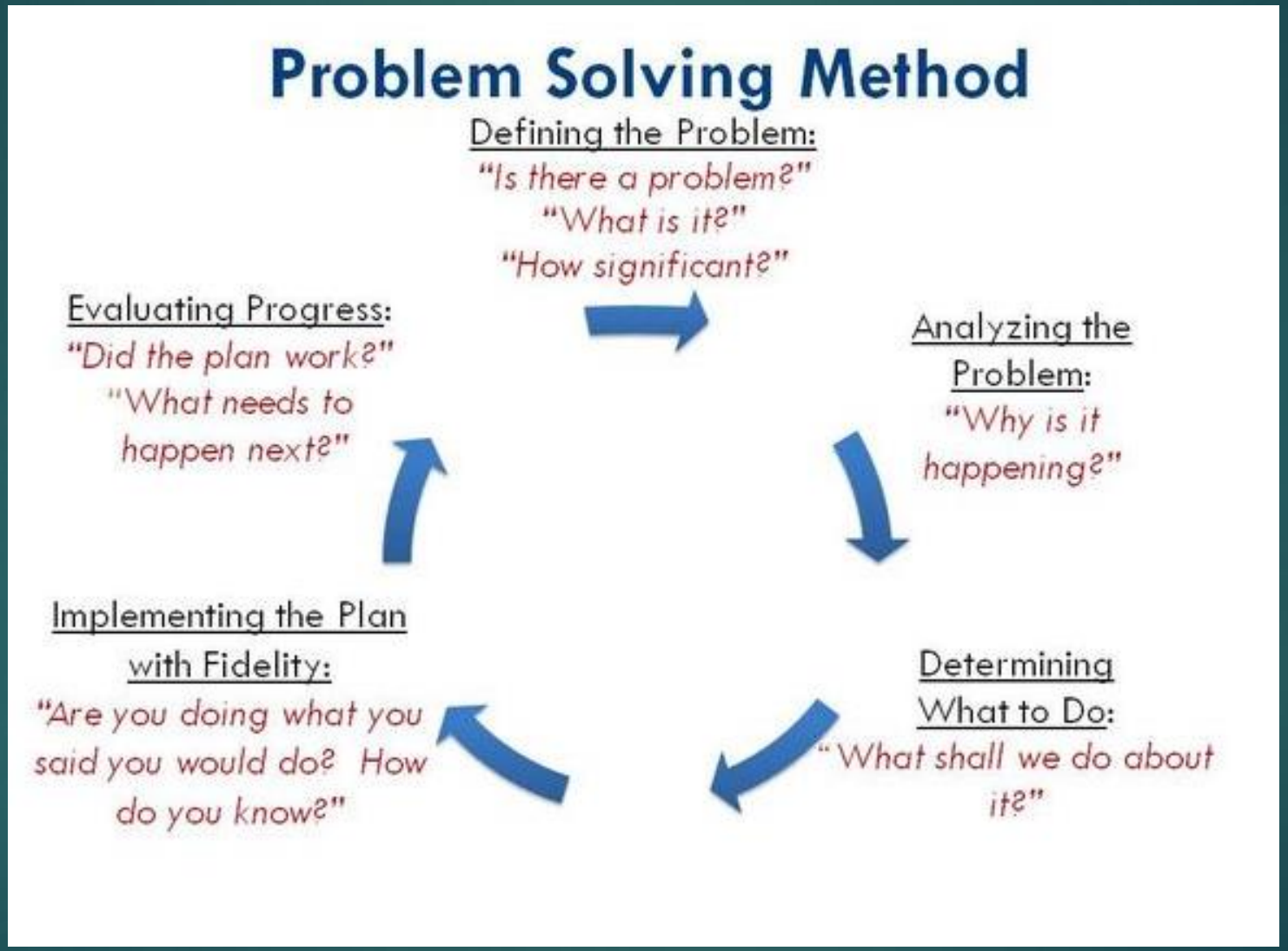
Who am I?


BUCCANEERS


S
L
P

Outline/Objectives

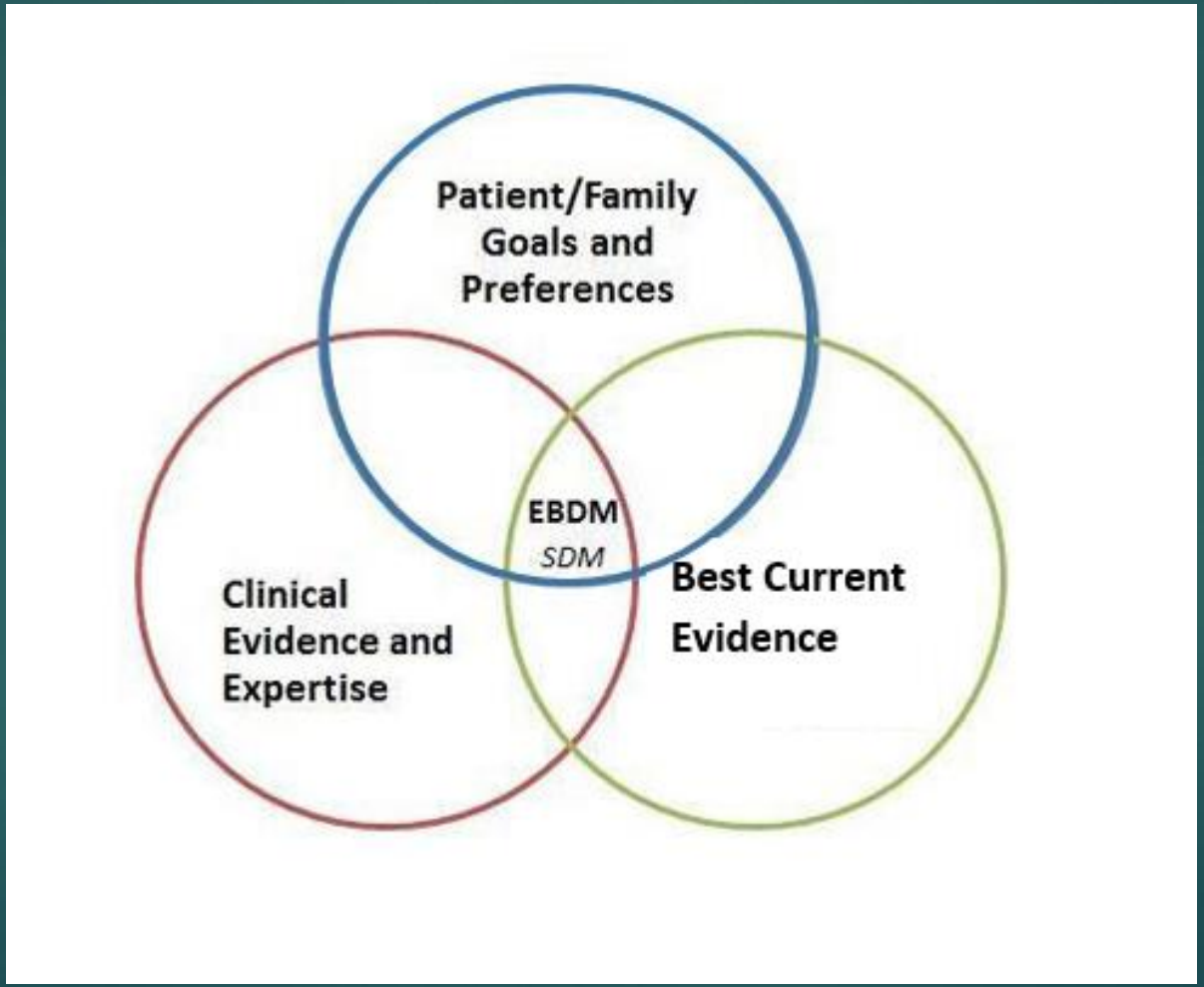
- Define the steps associated with implementation of evidence based practice.
- Describe barriers and solutions to implementation of evidence based practice in various work environments.
- Describe elements of evidence based practice as it relates to all phases of recovery from a brain injury.


Problem Solving Method
Defining the Problem:
"Is there a problem?"
"What is it?"
"How significant?"
Analyzing the Problem:
"Why is it happening?"
Determining What to Do:
"What shall we do about it?"
Implementing the Plan with Fidelity:
"Are you doing what you said you would do? How do you know?"
Evaluating Progress:
"Did the plan work?"
"What needs to happen next?"

Evidence Based Practice

- "Evidence-based practice is the process of combining the best available research evidence with your knowledge and skill to make collaborative, patient-or population-centered decisions within the context of a given healthcare situation." (Howlett, Roge, & Shelton, 2014)

Evidence Based Shared Decision Making



Adapted from Cincinnati Children's

Steps to Completing EBP (American Speech-Language-Hearing Association (ASHA), n.d.)

- **Step 1: Frame your Clinical Question**
  - Need to consider all parts of the PICO

P: Population

I: Intervention

C: Comparison

O: Outcome

Etiology
Are P *who* I *compared with those who* C *at greater risk for developing* O *?*

Prediction
For P*, how does* I *compared with* C *predict (or influence) future* O *?*

Prevention
In P*, is* I *better than* C *in preventing* O *?*

Diagnosis
When assessing P*, is* I *more accurate than* C *for diagnosing* O *?*

Intervention
When working with P*, does* I *or* C *result in better* O *?*

Management
Do P *who receive* I *compared with* C *report greater (or fewer)* O *?*

(Orlikoff, Schiavetti, & Metz, 2015)

Steps to Completing EBP (ASHA, n.d.)

- **Step 1: Frame your clinical question**

P: Population

I: Intervention

C: Comparison

O: Outcome

- Do patients with severe expressive aphasia improve functional communication if treatment is initiated within 3 weeks of insult compared to greater than 3 weeks post insult?

Steps to Completing EBP (ASHA, n.d.)

- **Step 1: Frame your clinical question**

P: Population

I: Intervention

C: Comparison

O: Outcome

- Do patients who have sustained a TBI demonstrate faster improvement in Glasgow Coma Scores when they are intubated prior to arriving at the hosptial than those who are intubated later?

Steps to Completing EBP (ASHA, n.d.)

- **Step 2: Find the Evidence**
  - Literature search
  - Professional organization
  - Talk with other professionals
  - Things to remember:
    - Just because it is published in a peer reviewed journal does not ensure quality science
    - Must determine if the source is trustworthy (reliability and validity)
    - Peer reviewed journals are much less likely to report "negative" or "null" results (Nippold, 2012)

Steps to Completing EBP

- **Step 3: Assess the Evidence**
  - **Consider the following:**
    - Relevance
    - Theoretical basis
    - Outcomes
    - Credibility
    - Research design

Steps to Completing EBP

- **Step 3: Assess the Evidence**

TABLE 5.2 An Example of a "Levels of Evidence" Hierarchy for Rating Treatment Efficacy Studies

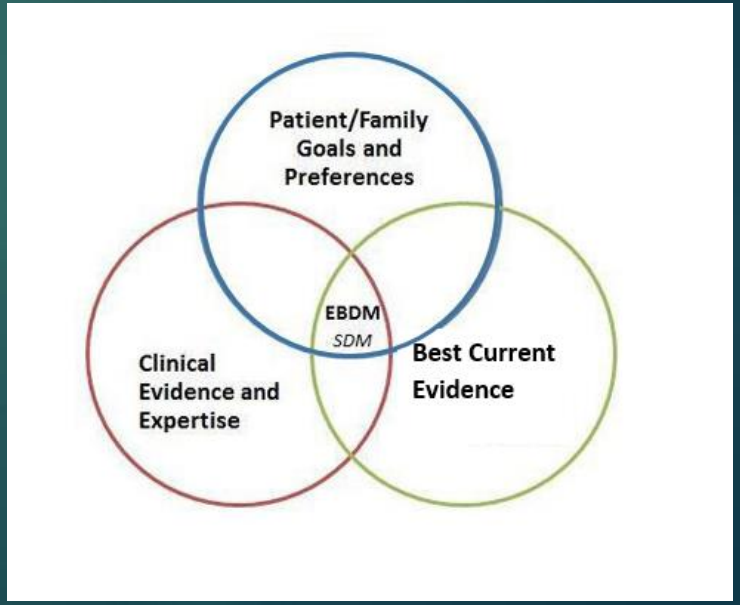
Level	Credibility	Description
I	Strongest	Systematic reviews and well-designed meta-analyses of several randomized controlled clinical studies
II	Strong	Well-designed randomized controlled clinical studies
III	Moderate	Well-designed nonrandomized quasi-experimental studies
IV	Limited	Controlled noninterventional descriptive studies, including correlational and case control studies
V	Weak	Uncontrolled noninterventional studies, including case reports
VI	Weakest	Expert opinion of respected authorities

Source: Based on information from ASHA (2004), Cox (2005), Lass and Pannbacker (2008), and Robey (2004b).

(Orlikoff, Schiavetti, Metz, 2015)

Steps to Completing EBP (ASHA, n.d.)

- **Step 4: Make the Clinical Decision**
  - Synthesize the literature with the patient's perspective and your clinical expertise
  - Apply the evidence and assess its impact



The EBP Trifecta

- Best available research
- Clinical expertise
- Patient views and perspectives

The EBP Trifecta

- Best available research
- Clinical expertise
  - Clinical interview and case history
  - Prior use and understanding of therapeutic approaches
  - Critical thinking/appraisal of research

The EBP Trifecta

- Best available research
- Clinical expertise
- Patient views/perspectives
  - Cultural considerations
  - PLOF and goals for treatment
  - Assessment of intervention
  - Available resources

Hulme (2010)

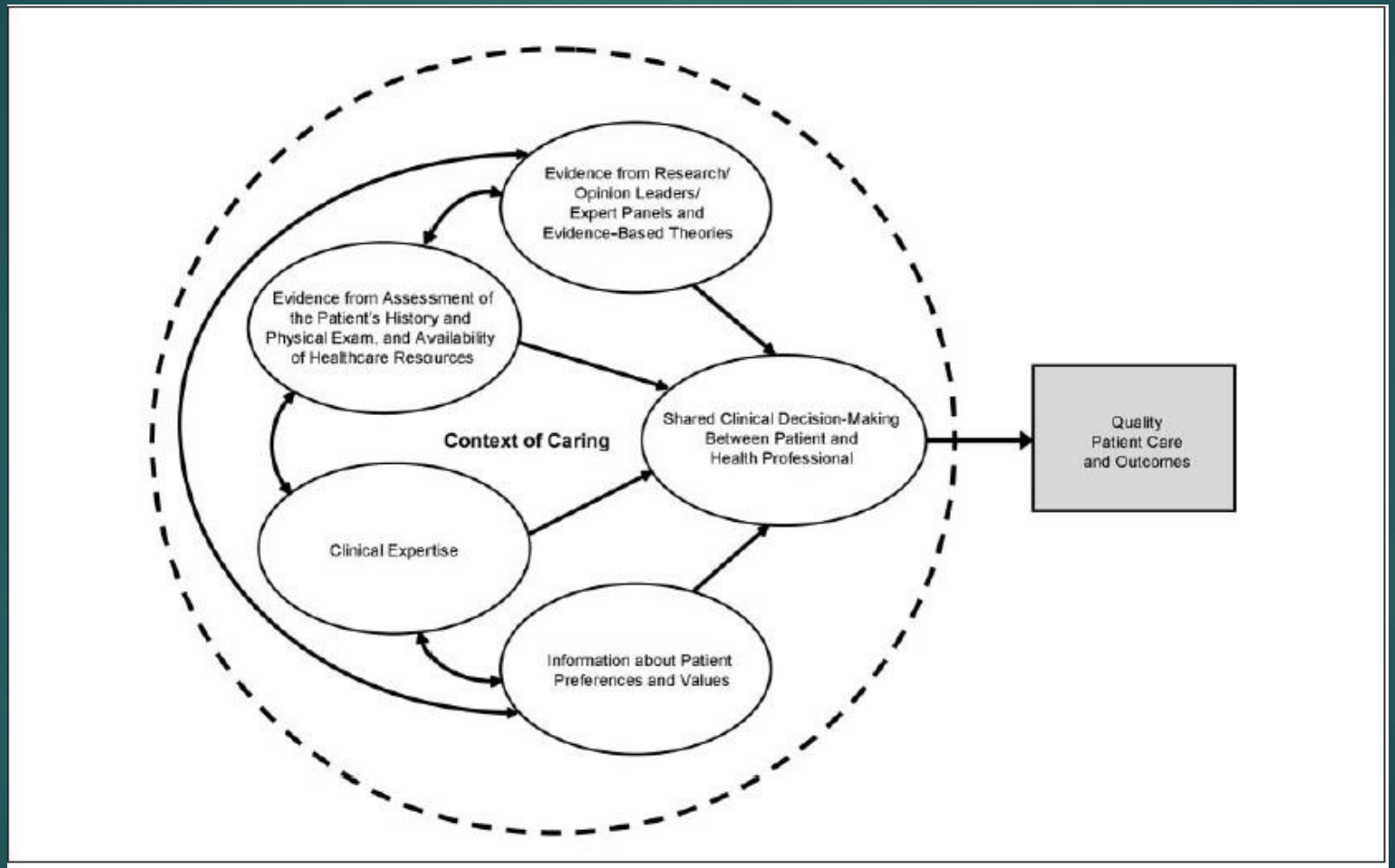


Figure 1. The components of evidence-based practice
Source: From Melnyk and Fineout-Overholt (2005). Copyright Lippincott Williams & Wilkins. Adapted with permission.

What Does The Evidence Say…About EBP?

Dysart & Tomlin (2002)

Factors Related to Evidence Based Practice Among U.S. Occupational Therapy Clinicians

Investigated the availability of resources, time, skills, and support needed to implement EBP among members of the American Occupational Therapy Association (AOTA).

Dysart & Tomlin (2002)

- Findings
  - 57% had implemented at least one new EBP technique in the past year
  - More seasoned OTs (15+ years) reported less endorsement that research could be translated into clinical care
  - 45% "strongly disagree" that they were given time during work to engage in EBP research
  - 42% reported feeling "neutral" when asked if more therapists should incorporate research into their practice

Stokke, Olsen, Espehaug, & Nortvedt (2014)

Evidence based practice and implementation among nurses: A cross sectional study

Explored the correlation between beliefs about

EBP and clinical implementation among nurses

Stokke et al.,(2014)

- Findings
  - 86% believed that EBP can improve clinical practice and 78% report that EBP results in the best clinical care

However…. In the past 8 weeks

- 40% reported that they had read about or appraised an EB technique
- 53% had discussed an EB technique with a colleague
- 90% reported that they had not critically evaluated their own practice

Barriers to Implementation

- Research is inaccessible
- Lack of support from superiors
- Difficulty reading/analyzing and understanding research
- High cost of continuing education
- Lack of time
- No current evidence relating to your clinical question
- Inability to change how things are done

Barriers to Implementation

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Research is Inaccessible

- What can you do?
  - Join an association
  - Web search for free articles (google scholar, PubMed)
  - Clinical practice guidelines (CPG)
  - Find a friend
  - Share resources with co-workers
  - Other resources
    - Guideline.gov

Barriers to Implementation

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Lack of Support from Superiors

- How can we convince superiors of the importance of EBP and allowing time/funds for it?
  - Outcomes that Matter
    - The term "outcomes" often used to describe the direct measure of disease process or recovery
    - Howlett et al., (2014) suggest there are other less traditional outcome measures that are equally important? "What about other measures that patients and providers care about such as a patient's functional abilities and the cost of care"
  - EBP Improves "Outcomes That Matter"
    - Reduces costs (Jayakumar, 2016)(Neubauer, M.A. as cited in Kolodziej, M.A., 2011)
    - Improves patient outcomes (Heater et al., 1988 and Thomas et al., 1999 as cited in Leufer & Cleary-Holdforth, 2009).
      - value-based reimbursement

Barriers to Implementation

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- **Difficulty reading/analyzing and understanding research**
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Difficulty Reading/Analyzing and Understanding Research

- Online resources
  - Duke Medical Center Library Tutorial
    - http://guides.mclibrary.duke.edu/ebmtutorial
  - Evidence Based Medicine Toolbox
    - https://ebm-tools.knowledgetranslation.net/worksheet
  - Center for Evidence Based Medicine
    - https://www.cebm.net/2014/06/critical-appraisal/
  - "How to Read a Paper"
    - http://www.bmj.com/about-bmj/resources-readers/publications/how-read-paper

Difficulty Reading/Analyzing and Understanding Research

- Canadian Medical Association Journal
  - http://www.bmj.com/content/315/7104/364
- AGREE II Instrument
  - https://www.agreetrust.org/wp-content/uploads/2017/12/AGREE-II-Users-Manual-and-23-item-Instrument-2009-Update-2017.pdf
- Professional Organizations

Barriers to Implementation

- Research is inaccessible
- Lack of support from superiors
- Difficulty reading/analyzing and understanding research
- **Lack of time**
- **High cost of continuing education**
- **No current evidence relating to your clinical question**
- **Inability to change how things are done**

Practice Guidelines

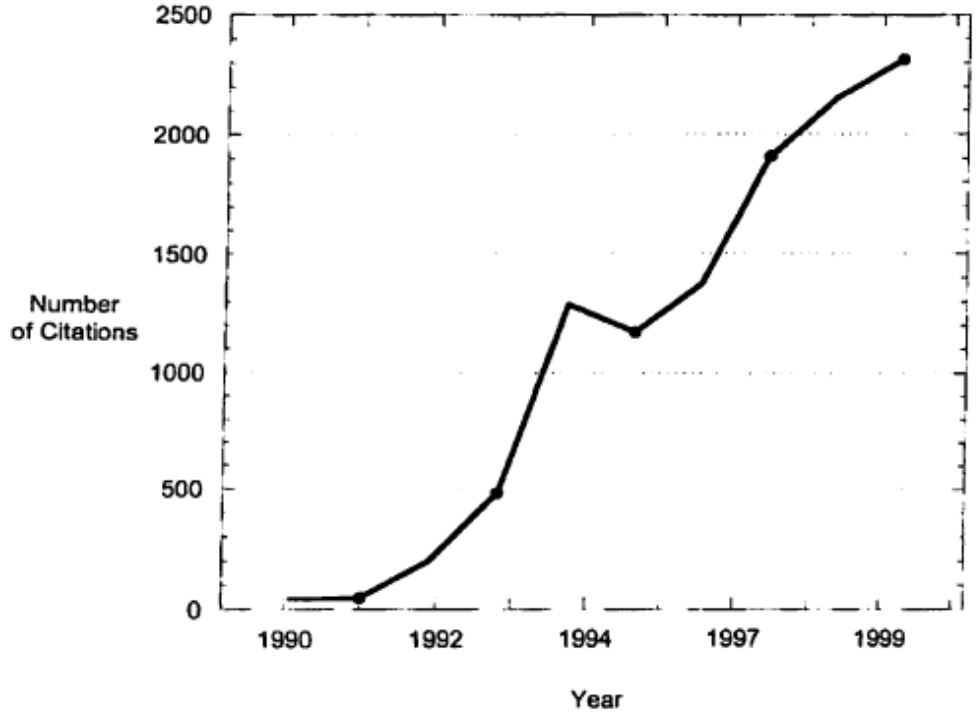
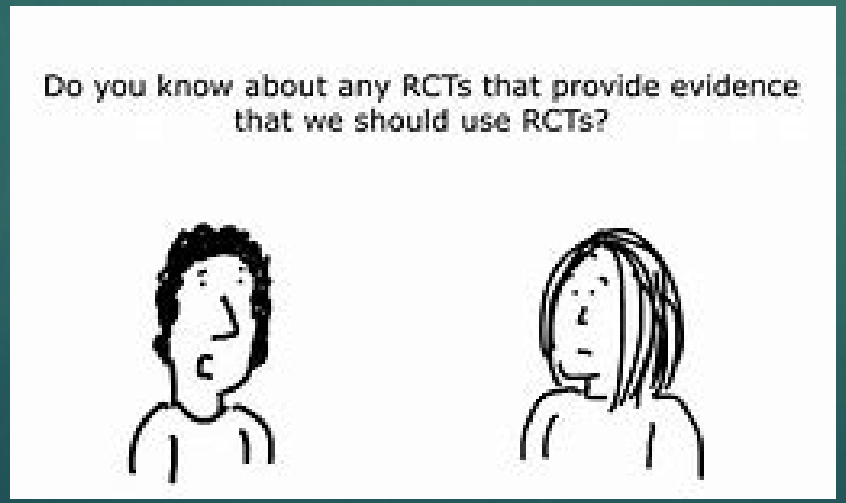


Figure 1. The number of citations in PubMed under the heading of "practice guidelines" from 1990 through 1999.

(Yorkston et al., 2001)

Final Thoughts

- Benefits of EBP far outweigh the costs
- Small adjustments in schedule can create a career-long learning habit
- Advocate for use of EBP in your workplace



Evidence Throughout the Course of TBI Recovery

Meet Mark

- Mark is a 57 year old male. He sustained a traumatic brain injury following a motor vehicle accident. He was not wearing a seat belt and was thrown through the front windshield after hitting the car in front of him. Emergency crews arrived on the scene approximately 15 minutes after the accident. Mark was unconscious. He had blood on his face but did not appear to have an open head wound. He had a Glasgow Coma Scale (GCS) score of 6, indicating a severe TBI. His breathing was shallow and O_2 saturation was 79%. He was hypotensive.

Pre-Hospital Management

- ~50% of those who die as a result of a TBI do so within the first 2 hours (DeWall, 2010)

- Emergency crews find Mark unresponsive. C-Spine precautions are implemented and they immediately start assessing the ABCs.
  - Airway
  - Breathing
  - Circulation

Pre-Hospital Management

Consideration	Evidence
Oxygen	• O2 < 80-90% results in significantly worse outcomes • Routine or prophylactic hyperventilation should not be used with TBI (Knuth et al., 2005)
Field Intubation	• Decreases mortality, more positive neurologic outcome at 6 months (Winchell & Hoyt, 1997; Bernard et al., 2010). • Pre-hospital intubation is recommended for patients with GCS score of <9 (Knuth et al., 2005)
Blood Pressure and Cerebral Blood Flow	• Significant predictor of mortality (Knuth et al., 2005; Zammit & Knight, 2013) • Possible solutions (Haddad & Arabi, 2012) - Fluid resuscitation (saline) is preferred method - Vasopressors - No significant difference between normal and concentrated saline (National Institutes of Health, 2009)

Hospital Management (Wood & Boucher, n.d.)

- After being intubated in the ambulance and transported to a Level I or II Trauma Center, Mark is cared for using the Advanced Trauma Life Support Protocol (American College of Surgeons, n.d.)

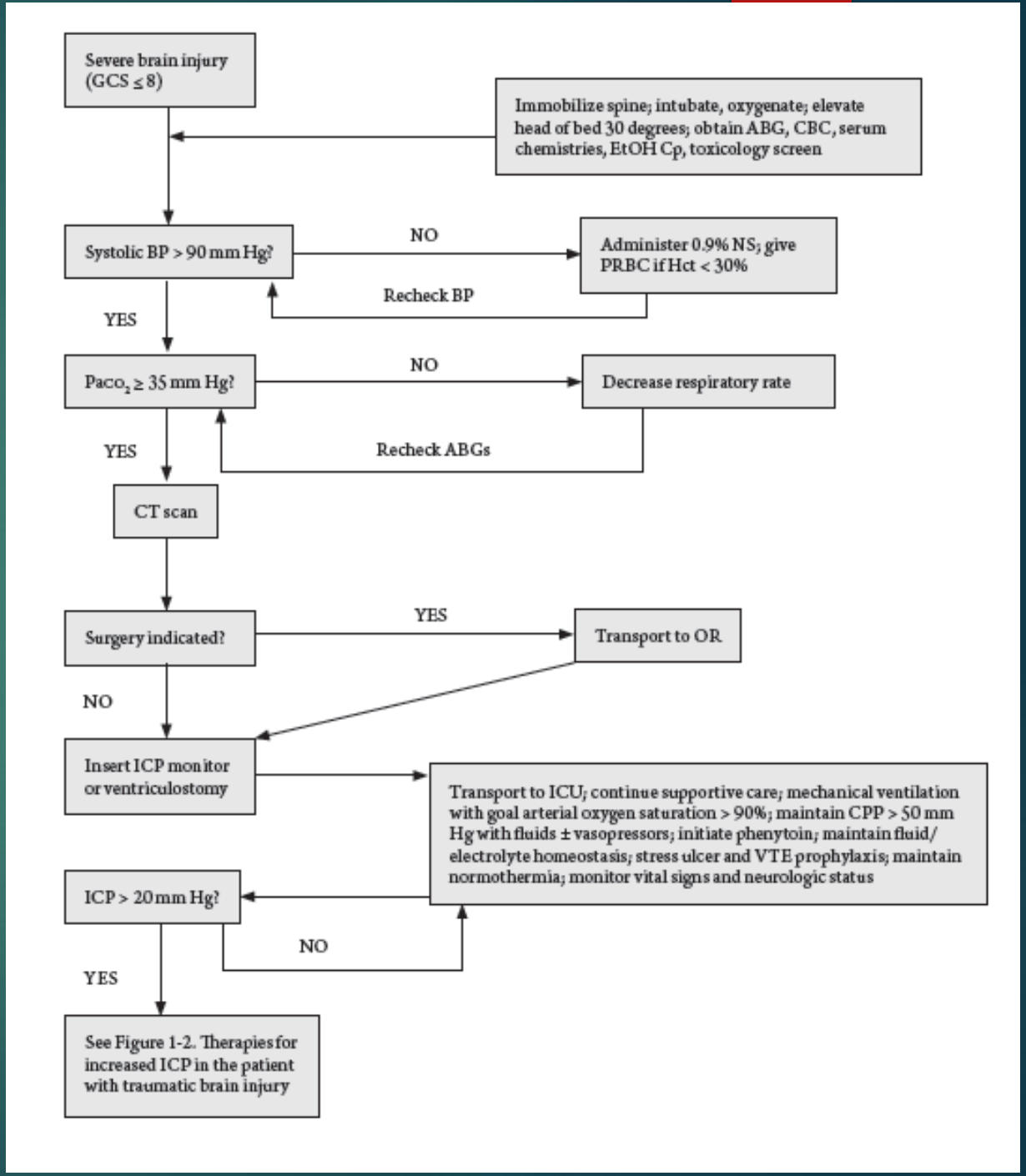
- After stabilization, the team should follow Brain Treatment Foundation (BTF) guidelines for management. These have been found to result in better outcomes and are more cost effective

Acute Hospital Management

Consideration	Evidence
Intracranial Pressure (ICP)/Cerebral Perfusion Pressure (CPP)	• Monitoring indicated with GCS score 3-8 or abnormal CT scan (Wood & Boucher, n.d. ; Haddad & Arabi, 2012) • Poorer outcomes with ICP >20 mm Hg or CPP < 50 mm Hg; although don't want to artificially increase CPP past 70 mm Hg (Wood & Boucher, n.d.) • Ketamine significantly decreases ICP without altering brain regulatory function (Albanese et al., 1997)
Ventilator Settings	• Ventilator settings should be adjusted to maintain a pulse oximetry of 90% or greater • Low tidal volume and moderate positive end-expiratory pressure reduce risk of ventilator-associated lung injury (Haddad & Arabi, 2012)
Cerebrospinal Fluid (CSF) Drain; Intermittent vs. Continuous	• External ventricular drain (EVD)effective to reduce ICP. Continuous drain > intermittent (Nwachuku et al., 2014; Lescot et al., 2012).
Enteral Feeding	• Early introduction is essential for best outcomes (Haddad & Arabi, 2012) • Reduces risk for pressure sores, prevents breakdown of protein and fat stores (Dhandapani et al., 2014; Cook, Peppard, & Magnuson,2008) • BTF recommends return to full caloric intake within 7-days (Cook et al., 2008)

Algorithm for Acute Management of TBI

(Wood & Boucher, n.d.)



Sub-Acute Hospital Management

Consideration	Evidence
Coma Stimulation	• 5x/day for 20 minutes > 2x/day for 50 minutes (Megha et al., 2013) • Stimulation should begin early; Multi-modal stimulation more beneficial than unimodal; Stimulation more beneficial if stimuli is personalized (Padilla & Domina, 2016)
Medication	• "Although insufficient evidence exists to establish guidelines for optimal pharmocotherapy, medications may be used to support recovery" • Psychostimulants, anti-depressants, anti-convulsants, anti-parkinsons (Talsky et al., 2010)
ICU/Hospital Rehab	• Mobilization within 24 hours improves long-term physical ability (Hellweg, 2012) • Early mobilization resulted in a shorter stay at the hospital and did not result in increased complications (Klein et al., 2015) • Intensity, frequency and duration of services necessary to exploit neural plasticity is greater for TBI than following a CVA (Ashley, 2012)

Discharge Planning

Consideration	Evidence
Discharge Location	• Highly specialized rehab leads to better results following TBI (Ashley, 2012) • Evidence for improved community integration for those who received therapy after d/c from the hospital (Mellick, Gerhard, & Whiteneck, 2003) • More intensive rehabilitation resultes in more rapid progress and reduced length of stay (Shiel et al., 2001; Zhu, Poon, Chan, & Chan, 2007) • Caregivers often report feeling ill-prepared to care for a loved one after a TBI (Moore et al., 2017)
Factors Influencing D/C Location	• Age was a strong predictor of d/c to a skilled nursing facility (Malec Mandrekar, Brown, & Moessner, 2009) • Cognitive function and TBI severity were predictive of d/c location, physical status was not (Van Baalen & Stam, 2009) • Younger age and male gender were predictive of receipt of more intense post-acute rehabilitation (Schumacher et al., 2016)

Rehabilitation

- While there is strong evidence for the efficacy of intense inpatient rehabilitation, many studies on specific interventions have limited support (Cullen et al., 2007)
- Mark received coma stimulation 5x a day for 20 minutes, 6 days a week. He has been in the hospital for 3 weeks. He has been extubated but still has a PEG tube. He has been receiving PT/OT/ST 3x a week. His GCS score has improved to a 14 and he is ready to discharge from the hospital.
- What is the next step?

Inpatient Rehabilitation

Consideration	Evidence
Rehabilitation	• Overall lack of clinical consensus re: rehabilitation procedures and efficacy (Cullen et al., 2007) • Significant variability in outcomes across rehabilitation hospitals (Dahdah et al., 2014) • Early and intensive interdisciplinary rehabilitation improved long-term outcomes and decreased total cost of care (Eapen, Allred, O'Rourke, & Cifu, 2015). • Greater effort in sessions and more complex activities resulted in better outcomes; total number of minutes was not predictive (Horn et al., 2015)
Nutrition (Costello, Lithander, Gruen, & Williams, 2014)	• Nutrition based interventions have significant potential to impact recovery and was identified as a priority research area by the BTF • Energy requirements increase by 87-200% following TBI • Malnutrition is significantly associated with poorer outcomes (Dhandapani et al., 2007) • Things to consider * Timing of feeding – early feeding reduced LOS and mortality * Route of administration – no change in LOS based on feeding administration; mixed results re: overall outcomes and mortality * Types of nutrients – probiotics decreased ICU LOS; zinc supplementation improved GCS; high protein formula enriched with glutamine and omega-3 fatty acids reduced LOS

What Now?

- People with moderate-severe TBI often experience high post-injury unemployment, decreased participation in previously enjoyed activities, and social isolation (Brown et al., 2011).

- Mark received inpatient rehabilitation for 12 weeks. His PEG tube was removed and he made great progress. He is now ready to discharge home. His wife and children want to know what they/he can do to maximize quality of life and independence as well as maintain the gains he has made.

Following Discharge

Consideration	Evidence
What To Do After Discharge Home	• Day-treatment programs showed positive effects on daily life functioning and community integration (Geursten, Van Heugten, Martina, Geurts, 2015) • Participation in a support group had positive outcomes for patients as well as caregivers (Backhaus, Ibarra, Parrott, & Malec2016; Damianakis, Tough, Marziali, & Dawson , 2016) • On-the job training, counseling and utilization of job placement service can improve return to work rates (Mount Sinai Medical Center, n.d.) • Returning to work, remaining engaged in social and recreational activities, family support and time since injury are related to self-reported improved quality of life (Thomas, 2008). • Presence of psychiatric symptoms and greater cognitive deficits are associated with poorer functional outcomes long after the TBI (Huang et al., 2010)

Summary

- Following discharge from inpatient rehab, Mark returned home with his wife. He joined a TBI survivor support group, went to counseling to address his depression, and maintained engagement with his social support network. He was unable to return to his previous career, but found fulfillment working at a local children's camp. Now 10 years post injury he reports high levels of life satisfaction and is grateful for all of the (evidence based) care he received along the way.

- Why do I need to know all of this?

Questions?

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