Family Medicine Science Update 2019

Trauma Rehabilitation

October 23, 2019

Rani Lindberg, MD
Daniel Bercher, PhD
Not all injuries are visible.
Vision and Mission

• Enable every Arkansan who has sustained a disabling traumatic injury
  • Access to the comprehensive rehabilitation care
  • Reintegration into the community
• Increase awareness of the rehabilitation and lifelong care needs of survivors of traumatic injuries
• Evaluate existing programs
• Educate healthcare professionals
• Identify vital resources for trauma survivors
Purpose

• Call Center access for instant triage and consultation
  • Trauma rehabilitation survivors and families
  • Healthcare providers

• Enhance quality of life and increase access to resources
  • Patients & Families
  • Rural providers
  • Telemedicine

• Promote health care cost savings through
  • Efficient emergency services utilization
  • Evidence-based health care delivery
Our Mantra:

• Increase access to medical information
• Improved care for traumatically injured Arkansans
• Decrease ED visits
• Improve Quality of Life through Community Integration
Mentor State Grant

• TBI Advisory Board/Survivor Engagement
• Underserved Populations
• Waiver and Trust Funds
Why we care

TRAUMATIC BRAIN INJURY (TBI)
• #1 Cause of Disability in U.S.
• Nationwide 1.7 million
• Approximately 300 new survivors each year in Arkansas*
• Over 8,000 survivors in Arkansas*

*Moderate to Severe TBIs

SPINAL CORD INJURY (SCI)
• Nationwide 12,000 New Survivors of SCI yearly
• Approximately 200 new injuries every year
• Approximately 2,520 SCI Survivors in Arkansas
Traumatic Brain Injuries

- 113.4 million TBIs in Emergency Departments – 2013
- 33.4 million Hospitalizations - 2013
- 2.6 million Deaths – 2013

https://www.cdc.gov/mmwr/volumes/66/ss/ss6609a1.htm?s_cid=ss6609a1_w (accessed on 10/23/2018)

- 556,000 TBIs in Emergency Departments - 2015

Annual TBI Mortality Costs (2010)

U.S.
- 61,354 Deaths
- Medical
  - Average $9,008
  - Total $552.7 million
- Work Loss
  - Average $576,645
  - Total $35.4 billion
- Combined
  - Average $585,654
  - Total $35.9 billion

Arkansas
- 719 Deaths
- Medical
  - Average $7,465
  - Total $5.4 million
- Work Loss
  - Average $696,202
  - Total $500.6 million
- Combined
  - Average $703,667
  - Total $505.9 million

www.cdc.gov/injury/wisqars accessed 10/23/2018
US Annual TBI Cost of Nonfatal Injuries (2010)

- 340,293 Hospitalizations
- Medical
  - Average $79,190
  - Total $26.9 billion
- Work Loss
  - Average $179,137
  - Total $61.0 billion
- Combined
  - Average $258,326
  - Total $87.9 billion

TBIs per county (n = 1415)

Moderate to Severe TBI Survivors 2018

Arkansas
## Traumatic Brain Injury Registry - Annual Referrals by Discharge Disposition/Destination*

**for Year: 2018**

**Total # of Referrals: 409**

<table>
<thead>
<tr>
<th>Disposition/Destination</th>
<th># of Referrals</th>
<th>% of Total</th>
<th>% Change from prior year</th>
<th>Vent at intake</th>
<th>Vent at discharge**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Another Acute Care Facility</td>
<td>8</td>
<td>1.96%</td>
<td>-1.47%</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Deceased</td>
<td>93</td>
<td>22.74%</td>
<td>5.62%</td>
<td>78</td>
<td>NR</td>
</tr>
<tr>
<td>Home, dependent Care</td>
<td>14</td>
<td>3.42%</td>
<td>2.69%</td>
<td>13</td>
<td>NR</td>
</tr>
<tr>
<td>Home, Independent Care</td>
<td>53</td>
<td>12.96%</td>
<td>8.07%</td>
<td>31</td>
<td>2</td>
</tr>
<tr>
<td>Home, Self Care</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Home, With Home Health Services</td>
<td>9</td>
<td>2.2%</td>
<td>0.73%</td>
<td>6</td>
<td>NR</td>
</tr>
<tr>
<td>Hospice Care</td>
<td>29</td>
<td>7.09%</td>
<td>1.22%</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Inpatient Psychiatric Care</td>
<td>1</td>
<td>0.24%</td>
<td>0%</td>
<td>1</td>
<td>NR</td>
</tr>
<tr>
<td>Inpatient Rehabilitation Care</td>
<td>109</td>
<td>26.65%</td>
<td>-1.47%</td>
<td>87</td>
<td>3</td>
</tr>
<tr>
<td>Law Enforcement</td>
<td>1</td>
<td>0.24%</td>
<td>-0.49%</td>
<td>1</td>
<td>NR</td>
</tr>
<tr>
<td>Long Term Acute Care</td>
<td>54</td>
<td>13.2%</td>
<td>1.47%</td>
<td>45</td>
<td>18</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>1.22%</td>
<td>0.24%</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Residential Facility With Skilled Care</td>
<td>32</td>
<td>7.82%</td>
<td>-0.98%</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Residential Facility Without Skilled Care</td>
<td>1</td>
<td>0.24%</td>
<td>0.24%</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0%</td>
<td>0%</td>
<td>NR</td>
<td>NR</td>
</tr>
</tbody>
</table>

**Total Vent Status**

294 | 30

* Vent status on registry is presented as a single checkbox rather than yes/no, which may affect accuracy.
** In many cases, the patients recorded with vents at intake vs. those at discharge are not the same patient.
Arkansas TBI Disposition/Destination 2018

- Inpatient Rehabilitation Care: 26.65%
- Long Term Acute Care: 22.74%
- Home, Independent Care: 13.20%
- Residential Facility With Skilled Care: 12.96%
- Hospice Care: 7.82%
- Home, dependent Care: 7.09%
- Home, With Home Health Services: 7.09%
- Another Acute Care Facility: 4.42%
- Other: 2.20%
- Inpatient Psychiatric Care: 1.96%
- Law Enforcement: 1.96%
- Residential Facility Without Skilled Care: 1.22%
- Home, Self Care: 1.22%
- Unknown: 0.24%
- Deceased: 0%

- Inpatient Rehabilitation Care: 100%
Moderate/Severe TBI Discharge Disposition

• In rank order, most go home, rehabilitation, then subacute care

CDC CNIS (n=15,646)

NTDS (n=52,012)

NSCOT (n=1286)

• 48.7% of Moderate to Severe TBI Coloradons had significant disability 1 year post-injury

Arch Phys Med Rehab 2011; 92; 721-729

Arch Phys Med Rehab 2004; 85 (4 Suppl 2) S73-81
<table>
<thead>
<tr>
<th>DIAGNOSIS</th>
<th>N</th>
<th>TOTAL POST-ACUTE CARE COSTS</th>
<th>MEAN POST-ACUTE CARE COSTS</th>
<th>N</th>
<th>TOTAL POST-ACUTE CARE COSTS</th>
<th>MEAN POST-ACUTE CARE COSTS</th>
<th>READMISSION PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBI</td>
<td>97</td>
<td>$3,608,992</td>
<td>$37,206</td>
<td>121</td>
<td>$1,295,940</td>
<td>$10,890</td>
<td>44.5%</td>
</tr>
<tr>
<td>SCI</td>
<td>79</td>
<td>$3,759,357</td>
<td>$47,587</td>
<td>68</td>
<td>$538,225</td>
<td>$8,410</td>
<td>53.7%</td>
</tr>
<tr>
<td>TAL</td>
<td>5</td>
<td>$289,709</td>
<td>$57,942</td>
<td>9</td>
<td>$55,129</td>
<td>$6,126</td>
<td>35.7%</td>
</tr>
<tr>
<td>TOTALS</td>
<td>181</td>
<td>$7,658,059</td>
<td>$42,310</td>
<td>198</td>
<td>$1,889,295</td>
<td>$9,840</td>
<td>47.8%</td>
</tr>
</tbody>
</table>

*Patients <65 years of age.*

Re-hospitalization

• High Probability of readmission rates to acute care within 1 year

• First year average re-hospitalizations 1.37 times (N=951)

• Most common health conditions
  • Urinary system
  • Respiratory system
  • Skin

• Average stay 15.5 day


*Medicaid numbers
Mild Traumatic Brain Injuries
(the other silent epidemic)

• Represent 75% of all TBIs (16-25% not seen!!!)
• Incidence of approximately 1,200 TBIs annually in Arkansas
• Not tracked by Trauma System or TBI Registry

<table>
<thead>
<tr>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Structural Imaging</td>
<td>Normal or Abnormal Imaging</td>
<td>Normal or abnormal Imaging</td>
</tr>
<tr>
<td>LOC = 0-30 min</td>
<td>LOC &gt; 30 min&lt;24 hr</td>
<td>LOC &gt; 24 hr</td>
</tr>
<tr>
<td>AOC = from moment to 24 hr</td>
<td>AOC &gt; 24 hr severity (other)</td>
<td></td>
</tr>
<tr>
<td>PTA = 0-1 day</td>
<td>PTA &gt; 1 and &lt; 7 days</td>
<td>PTA &gt; 7 days</td>
</tr>
<tr>
<td>GCS = 13-15</td>
<td>GCS = 9-12</td>
<td>GCS = 3-8</td>
</tr>
</tbody>
</table>

AOC = Alteration of Consciousness
PTA = Posttraumatic Amnesia

Brain Injury Assoc. of America, 2016
TBI Survivor Return to Work

- 10-40% Employment Post Injury
- 1600 TBIs
- 160 to 640 employed

**Estimate of all Ark. TBIs**
- Moderate to Severe: 1200
- Mild: 400

**TBI Employment (Best Case)**
- Employed: 640
- Unemployed: 960

Brain Injury Assoc. of America, 2016
## Why TBIs vs SCIs?

<table>
<thead>
<tr>
<th></th>
<th>TBIs</th>
<th>SCIs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registry</td>
<td>Yes</td>
<td>Any spinal cord disability</td>
</tr>
<tr>
<td>Supportive Agency</td>
<td>IDHI-Trauma Rehab.</td>
<td>Arkansas Spinal Cord Commission (ASCC) &amp; IDHI-Trauma Rehab</td>
</tr>
<tr>
<td>Case Management</td>
<td>None</td>
<td>15 managers in 10 field offices</td>
</tr>
<tr>
<td>Mandatory Reporting</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>24 hour Call Center</td>
<td>TRIUMPH</td>
<td>TRIUMPH</td>
</tr>
<tr>
<td>Resource Assistance</td>
<td>IDHI-Trauma Rehab. &amp; ASCC Websites</td>
<td>IDHI-Trauma Rehab. &amp; ASCC Websites</td>
</tr>
<tr>
<td>Advisory Board</td>
<td>Not officially sanctioned</td>
<td>Ark. Spinal Cord Commission</td>
</tr>
</tbody>
</table>
TBI Rural & Mental Health Issues

• Readmission rate of 43.9% in Arkansas
• Mental disorders including psychosis, depression, dementia, and organic nervous system
• Chronic diseases

TBI Mental Health & Substance Abuse

• High Prevalence
  • Substance abuse 34%
  • Depression 11.1%

TBI Older Adults & Unintentional Falls

• Adults 75 years +
  • 361,738
  • Highest rate of all TBI age groups (2,232/100,000) except 15-24 & 25-34 years

https://www.cdc.gov/mmwr/volumes/66/ss/ss6609a1.htm?s_cid=ss6609a1_e#T3_down
accessed 10/23/2018
Incarcerated or Formerly Incarcerated TBIs

- Increased risk of suicide
- Unintentional injuries
- Unintentional falls

TBI Intimate Partner Violence

• Under-reported intimate partner violence
• Domestic violence shelters
• 60% had TBIs

TBI Caregivers

• Literature Review
  • Caregiver life changes and appraisal
  • Depressive symptoms, Coping, Well-being, Caregiver burden
  • Social problem-solving abilities, Community integration
  • Family assessment, Health-related quality of life, Alcohol use, Advocacy
  • Skill application, intentions, knowledge about TBI
  • Level of informed, Anxiety and other common psychiatric problems
  • Functional status after TBI, Balance, Composite outcome
  • Conversational skills, Self-esteem

What Can We Do

- **Education**
  - Patient
  - Professional

- **Easy 24 hr Access**
  - TRIUMPH CALL CENTER
    - Patient
    - Professional
Initial Program began in February, 2014.

Ultimate goal to become the “go to” website for
- Healthcare Professionals
- Survivors
- Families/Support network

Upon hospital discharge
- Planners can locate appropriate resources for patients based upon
  - Location
  - Changing Conditions
Education for Healthcare Professionals

• Clinical Management Guidelines
• Educational Webinars
• Continuing Education
Education for Healthcare Professionals

http://pmr.uams.edu/clinics-physicians/telemedicine/
More HCP Education

https://learnondemand.org

Dr. Thomas Kiser
Dr. Rani Lindberg
• FREE CEUs
• Interactive content
• Videos
TBI Survivor Outreach

• Newsletter
• Regional Events
• Follow-up
  • Calls
  • Home Visits
• Telemedicine
• TRIUMPH Call Center

HOME ACTIVITIES WITH THERAPEUTIC BENEFITS

Many brain injury survivors report having a “loss of self” or purpose once they return home. It is important to practice home management skills to continue the benefits of therapy. Aside from exercise routines, therapists may prescribe daily activities for survivors to complete in the home environment. Because they require “dual-tasking” (where a physical task is coupled with a cognitive task), these daily chores or to-do’s can be therapeutic.

For example, unloading the dishwasher not only works on cleaning the kitchen, but also on memory, sequencing, planning, processing, all higher executive skills required in the “outside world.” From a mobility standpoint, that very task is working on negotiating around obstacles, gait, balance, reaching, and strength.

It would be a good idea to think of each room in the home as a therapeutic area. For instance, think about all the physical and mental steps doing laundry requires—carrying the clothes basket, sorting clothes, deciding the water amount and temperature, loading and unloading the machine, folding, and putting the clothes away. It may be a somewhat boring chore, and it may take all day. However, at the end of this task the survivor has not only helped around the home, but they have worked on making improvements in their balance, coordination, walking, memory, safety and judgement.
TRIUMPH Call Center: What Can We Do

- **Education**
  - Patient
  - Professional

- **Easy 24 hr Access**
  - TRIUMPH CALL CENTER
    - Patient
    - Professional
TRIUMPH Call Center

- 24 hour Assistance
- Individuals living with SCI or TBI
- Health care Professionals
- Families
TRIUMPH Call Center

- Health Care Professionals
  - Home Health Care givers
  - Family Practice Offices
  - Emergency Rooms
  - Care Management
  - General Questions
  - Referrals

- Patients & Families
  - Medical information
  - Medication refills
  - Appointments
  - Resources
    - Transportation
    - Medical Equipment
    - Clinics
TRIUMPH Call Center

- Common Medical Calls
  - Bladder
  - Bowel
  - Abdominal
  - Spasticity
  - Autonomic Dysreflexia
  - Medication questions
Outreach

• TBI & SCI patients/follow-ups
• Level 1-4 Trauma Centers
• PCPs
• Rehab facilities
Telehealth and Telemedicine Technology Components

Clinical/Non-Clinical Carts

Desktop Unit

Room System

mHealth (Mobile Health)
TBI Patients and Teleclinic Locations
Summary

- Education
  - Patient
  - Professional

- Easy 24 hr Access
  - TRIUMPH CALL CENTER
    - Patient
    - Professional
True Story

- July 1, 2017
  - 2:00 am
- Pedestrian hit by a car
The Injuries

- Bilateral pneumothoraces
- Near amputation right arm
- Laceration
- Skull fracture
- Serious blood loss
The Trauma System

• 9-1-1
• Central EMS
• Fayetteville Fire Dept
• Washington Regional
• Baptist Health Rehabilitation Institute
18 month later...
What does this have to do with you?

- Rani Lindberg, MD
  - Associate Professor
  - Board Certified in Physical Medicine
  - Board Certified in Rehabilitation & Brain Injury Medicine
  - Physical Medicine and Rehabilitation Residency Director
Spinal Cord Injury Patient in the ED:

- Spastic paraplegic Spinal cord injury patient presents to the emergency room with fever, GI disturbance, tachycardia, and fever

- **Differential diagnosis:** Infection, autonomic dysreflexia, medication effect

- **Work up included:**
  - Abdominal Xray: Constipation. Symptoms unresolved after disimpaction
  - UTI: negative UA and Ucx
  - CT head: Negative
Baclofen withdrawal

• PM&R consultation via TRIUMPH
  • Work up reviewed
  • Medications reviewed; notable for baclofen which the patient had not refilled
  • Recommendations for treatment of baclofen withdrawal instituted
<table>
<thead>
<tr>
<th>Baclofen Withdrawal</th>
<th>Autonomic Dysreflexia</th>
<th>Sepsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>Headache</td>
<td>Confusion</td>
</tr>
<tr>
<td>Confusion</td>
<td>Lightheadedness</td>
<td>Disorientation</td>
</tr>
<tr>
<td>Disorientation</td>
<td>Flushing of skin</td>
<td>Shortness of breath</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>Sweating</td>
<td>Tachycardia</td>
</tr>
<tr>
<td>Lightheadedness</td>
<td>Tachycardia</td>
<td>Fever/Chills</td>
</tr>
<tr>
<td>Nausea</td>
<td>Profuse sweating</td>
<td>Nausea/Vomiting</td>
</tr>
<tr>
<td>Myalgia</td>
<td></td>
<td>Pain/discomfort</td>
</tr>
</tbody>
</table>
Facility patients: Anoxic Brain Injury

• 33 yo gentleman who was found unconscious in hotel room while on vacation in the Philippines. Transferred to UAMS once medically stable for flight.

• Due to low functional level and disorder of consciousness, discharged to long term care and did not receive PM&R consultation or rehabilitation efforts
Anoxic Brain Injury continued

• Location: Springdale, AR

• Mom contacted TRIUMPH for brain injury resources

• Telemedicine appointment arranged with facility and patient seen at bedside over teleconference.

• Medication management for disorder of consciousness

• Spasticity management recommends to help with ROM, pain control, skin management
TBI follow up

• 77yo RHD man with a TBI following assault in October 2018. He has a R hemi and aphasia as a result of the trauma.

• Location: White Hall, AR

• Active problems:
  • Headache management
  • Neuropathic pain and spasticity management
  • Mood management
  • Therapy/Mobility management
TRIUMPH Call Center: Why use it?

• **Rehab**: Resources for support groups, educational information, disability law, rehabilitation programs, etc

• **Medical issues specific to the SCI and TBI patients:**
  • Neurogenic bowel and bladder
  • Autonomic dysreflexia
  • Wounds
  • Restless/agitation
  • Disorder of Consciousness/Neurostimulation
  • Spasticity management
  • Headache management after trauma
  • PM&R follow up or new patient evaluation
Contact Information

• 855-767-6983

• dlbercher@uams.edu

• Web sites:
  • atrp.arkansas.gov/
  • pmr.uams.edu/telemedicine

• Triumph @Triumphuams

• Triumph Uams
References


• https://www.cdc.gov/mmwr/volumes/66/ss/ss6609a1.htm?s_cid=ss6609a1_w Accessed on 10/23/2018

• www.cdc.gov/injury/wisqars accessed 10/23/2018


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