AMBULANCE TRANSPORT PATTERNS FOR ND PEDIATRIC PATIENTS WITH HEAD TRAUMA

North Dakota EMSC Advisory Committee Meeting
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Presented by: Kyle Muus, PhD, and Dmitri Poltavski, PhD

Where: Grand Forks, ND
When: Established over 20 years ago

Focused on Access, Financing & Quality Through:
- Health services research
- Health policy
- Education
- State & community health services development
- Information Resource

How: Through partnerships
BACKGROUND & SIGNIFICANCE

- Trauma is the leading cause of death and disability in children and young adults.¹
- Head injury is the most prevalent category of pediatric trauma.²
- Research has shown that in children sustaining multiple injuries, 80% are diagnosed with head trauma as opposed to only 50% of adults.³
- Approximately 10% of head injuries in children are serious enough to require extensive therapeutic interventions with the remaining 90% being mild.³

BACKGROUND/SIGNIFICANCE (Cont.)

- Greater response times have been linked to increased mortality for all age groups.⁹
- Rural patients with severe injuries were 7 times more likely to die en-route, if the response time was >30 minutes.¹⁰
- Pre-hospital times twice as long for rural patients than those in urban areas.¹¹
- MVC study found that 53% of elderly and 48% of pediatric patients with ISS>15 were transported to and received care in non-trauma center hospitals.¹²
TRAUMATIC BRAIN INJURY (TBI)

- rapid acceleration & deceleration, including tearing of nerve fibers, bruising of the brain tissue, brain stem injuries and swelling; or, when an external physical force hits the brain, producing an altered state of consciousness, resulting in impaired cognitive abilities, physical/behavioral/emotional functioning, language and/or memory (CDC, 1999)

METHODS

- ND ambulance data for years 1995-2000

Patient Selection Criteria

- Age: 0-19 years
- Body Location of Injury: Head, face, and/or neck
- GCS: 3-12
- Home Base of Responding Ambulance: Rural
ISSUES ADDRESSED

• Patient Demographics
• Ambulance Run Attributes
• Seasonal Variation of Injury Occurrence
• MVCs – Patient Demographics, Mechanism of Injury, Contributing Factors
• Ambulance Transport Destinations:
  ‘Appropriate’ (Trauma-Designated) vs. ‘Inappropriate’ (Not Trauma-Designated)
• Significant Predictors of Inappropriate Transport

History: Effective July 1, 1997. General Authority: NDCC 23-01.2-01
Law Implemented: NDCC 23-01.2-01

33-38-01-05. Local EMS transport plans.

“(EMS) shall develop local…plans for the transport of major trauma patients by appropriate means to the nearest designated trauma center. (EMS) may bypass the nearest designated trauma center for a higher level trauma center provided that it does not result in an additional 30 minutes or more of transport time…”

Source: ND Century Code
FIGURE 1. GENDER

MALE, 93, 62%

FEMALE, 57, 38%

FIGURE 2. AGE DISTRIBUTION

%
FIGURE 3. ETHNICITY

- Caucasian, 112, 74%
- Native American, 32, 21%
- Other, 7, 5%

FIGURE 4. GCS DISTRIBUTION

GCS 3 4 5 6 7 8 9 10 11 12

% 30.5 4.6 2.8 7.9 5.3 3.3 6.6 9.3 13.2 16
FIGURE 7. TYPE OF CALL (Dispatch)

MOTOR VEHICLE CRASH, 70, 46%

FALL, 21, 14%

OTHER, 60, 40%
FIGURE 8. CPR PERFORMED?

YES, 23, 15%

NO, 128, 85%

FIGURE 9. MILES TO SCENE

Mean=9.4; Median=5; Mode=1; SD=11.7
FIGURE 10. TIME AT SCENE

Mean = 12.9; Median = 12; Mode = 5; SD = 7.9

FIGURE 11. MILES TO DESTINATION

Mean = 19.1; Median = 11; Mode = 1; SD = 20.8
MOTOR VEHICLE CRASHES

FIGURE 12. MVCs (N=70): Gender

- Male, 65.7%
- Female, 34.3%
FIGURE 13. MVCs (N=70): AGE

FIGURE 14. MVCs (N=70): Ethnicity
FIGURE 15. MVCs (N=70): Mechanism of Injury

- Occupant Death in Same MV: 20%
- Intrusion 12”+: 28.6%
- Ejection: 45.7%
- Deformity 20”+: 47.1%
- Rollover: 51.4%
- Speed 40mph+: 65.7%

FIGURE 16. MVCs (N=70): Contributing Factors

- Delay in EMS Access: 5.7%
- Extrication > 15min: 10%
- Weather: 12.9%
- Alcohol*: 61.8%
- No Seat Belt: 86.5%

*among those aged 14-19
FIGURE 17. MVCs (N=70):
Seating Position

TRANSPORT DESTINATIONS
FIGURE 18. Transported to a Designated Trauma Center?

- YES, 122, 81%
- NO, 29, 19%

FIGURE 19. ETHNICITY WITHIN TRANSPORT CATEGORY

- 'APPROPRIATE’ (N=122):
  - 14.8% Non-Native
  - 85.2% Native

- 'INAPPROPRIATE’ (N=29):
  - 48.3% Non-Native
  - 51.7% Native
FIGURE 20. TRANSPORT TYPE WITHIN ETHNIC CATEGORY

Native American (N=119)
- Non-Native: 87.4%
- Native: 43.6%

LOGISTIC REGRESSION: SIGNIFICANT PREDICTORS

- AMBULANCE TRANSPORT
- Winter
- Miles to Scene
- Miles From Scene to Nearest Trauma Center
CONCLUSIONS

• Increased distance to the nearest trauma center was associated with increased likelihood of inappropriate transport
• Increased occurrence of inappropriate transport during winter months
• Increased occurrence of inappropriate transport when patient was Native American -- a function of remoteness of Reservations in ND and non-designation trauma center status of the local hospitals

RECOMMENDATIONS

Increased Statewide Efforts to:
• educate health care facility administrators, providers and the public about trauma center designations and their role in promoting quality patient care and safety
• encourage trauma-designated facilities to maintain their status
• encourage non-designated facilities to become designated
• promote the importance and use of trauma transport guidelines and pediatric equipment/treatment guidelines for ensuring quality patient care and safety in prehospital setting
**Improved EMS Data Collection/Analysis**

**~Benefits~**

- Assist in assessing injury prevention needs at the county and community level
- Assess the EMS care needs for the vulnerable: children and elders
- Provides implications for EMS education and curriculum development/configuration
- Reduced paperwork for providers and DEHS
- Provides opportunities for improved quality assurance/improvement efforts
- Assess the appropriateness of trauma treatment/transport patterns
- Provides valuable information for Federal and State grant proposals
- Improves opportunities for linking EMS care to hospital patient outcomes
- Serves as documentation of the value of EMS to society

**REFERENCES**

For more information, contact:

Center for Rural Health
School of Medicine & Health Sciences
Grand Forks, ND 58202-9037
701-777-3848
http://www.medicine.nodak.edu/crh