Rural Trauma Challenges in Alaska

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KEYWORDS

• Winter trauma • Snowboarding trauma • Snowmobile trauma • Rural trauma
• Arctic trauma

KEY POINTS

- Rural trauma in Alaska during the winter months requires a coordinated highly skilled approach for rescue, recovery, resuscitation, and transport to tertiary care centers. Injuries vary by sport and trauma.
- Early assessment and resuscitation rely on minimizing delays.
- Prehospital care is initiated by first responder and rescue teams, with advanced medical care by critical care transport teams.

SIGNIFICANCE OF TRAUMA IN ALASKA

Traumatic injury is the fifth leading cause of death in the United States and the leading cause of death and disability among individuals age 1 to 44.[1] Traumatic injury results in more than $400 billion each year in medical costs and lost productivity with more than 29 million individuals treated each year in emergency departments.[2] Improving outcomes for trauma victims in rural settings presents unique challenges to health care providers and health care systems throughout the United States. Alaska adds 586,412 square miles, rapidly changing weather conditions, geographic barriers, and extreme sports to the routine difficulties faced by other rural communities, creating a setting that promises an unprecedented platform for emergency rescue, transport, and resuscitation. In 2011, the US Census Bureau estimated the population of Alaska at 722,718 with approximately 40% of the population residing in Anchorage, the state's largest city.[3] The 3 largest hospitals are located in Anchorage and most serious trauma would be transported to one of these medical centers. There are 31 health care facilities throughout the state, including 11 community hospitals, 13 critical access hospitals, and 7 specialty or military facilities. More than 25% of Alaskans live in communities of fewer than 1000 people. Seventy-five percent of Alaskan communities are unconnected by a road to a hospital. Health care systems are faced with

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the challenges of meeting the needs of the dispersed population of this vast rural state while overcoming geographic barriers, providing service across mountain ranges, volcanoes, and encountering extreme weather conditions, as well as communication challenges owing to lack of cell and radio coverage.

Patient outcomes are directly related to the time elapsed between traumatic injury and properly delivered definitive care. Although fewer motor vehicle accidents occur in rural areas, more than two-thirds of the deaths related to motor vehicle trauma occur on rural roads.[4] Improved mortality and morbidity is related to rapid field assessment and immediate transport to an appropriate health care facility.[5] A coordinated model for assessment and triage to an appropriate facility is an essential component for the achievement of optimal patient outcomes.[6] The vast wilderness, geography, weather, and limited health care facilities in Alaska present unprecedented challenges for emergency responders and the health care system. Local response to rural trauma in Alaska is coordinated through a knowledgeable dispatch system often using specialized and highly trained rescue teams in addition to advanced life support personnel who may travel to the site of the trauma by helicopter, fixed wing airplane, or Lear jet. The ability to place qualified health care providers at the scene can be inhibited by visibility, unsettled weather patterns, geography, and available, appropriate runways requiring additional equipment and traversing difficult terrain. If aircraft are unable to land close to the scene, transport time will be increased, affecting the patient's outcome.[7] The medical crew travels with survival packs, including cold weather gear and arctic outerwear, ready-to-eat meals (commonly referred to as MREs) emergency medical equipment, snow shoes for post-holing, and crampons for the icy conditions found on glaciers and in the mountainous areas of Alaska. Highly trained rescue teams often facilitate reaching the victim or victims and provide additional support, safety, and security for the medical team.

RANGE OF INJURY

Rural trauma in Alaska ranges from minor musculoskeletal injuries associated with hiking, snow-shoeing, snow-boarding and skiing to severe hypothermia and asphyxiation often seen in victims of avalanches. Motor vehicle accidents also include injuries sustained in snow machine and all-terrain vehicle accidents. Alcohol is a common denominator in many of these accidents during the long dark winter months in Alaska, complicating the resuscitative efforts and mortality rates. The patient's access to appropriate care, the time that it takes to rescue a victim from the scene of an accident or trauma, and the circumstances surrounding transport to tertiary care may impact the patient's outcome more significantly than that initial injury itself.

SKIING AND SNOWBOARDING

Alpine skiing, cross-country skiing, and snowboarding are popular winter activities throughout Alaska. Although there are only a few designated ski resorts with chair lifts and ski patrol staff, many individuals enjoy the sports in unchartered terrain and on ungroomed trails. Experience and the level of the individual's ability are often correlated with the risk for injury.[8] The most common type of traumatic injury associated with alpine skiing, snowboarding, and cross-country skiing is extremity trauma. The physical forces that produce injury in this population include acceleration/deceleration (the body making contact with another object while both are in motion), shearing, tearing, distraction, rotation, flexion, compression, and penetration. Skiers are more likely to suffer lower-extremity trauma and snowboarders are more likely to sustain upper-extremity trauma.[9] High-speed impacts with another individual or a stationary