Native American - Rural Preventable Mortality and Protocol Compliance Study

RURAL TRAUMA GRANT # BRH 1J0010-01-0

SUBMITTED BY:

CRITICAL ILLNESS AND TRAUMA FOUNDATION, INC.
BIG TIMBER, MONTANA

Thomas J. Esposito, M.D., MPH - Co-Principal Investigator
James Upchurch, M.D. - Co-Principal Investigator

Nels D. Sanddal - Project Director
Joseph D. Hansen - Project Manager

JANUARY 31, 1995

ACKNOWLEDGMENTS

This document was supported by grant number BRH 1J0010-01-0 the Health Resources and Services Administration, Bureau of Health Resources Development, Division of Trauma and Emergency Medical Systems. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Division of Trauma and Emergency Medical Systems.

Numerous individuals and agencies contributed time and expertise to this project, including:

Principal Investigators

Thomas J. Esposito, M.D., MPH
Assistant Director
Loyola Shock Trauma Institute
Maywood, Illinois

James Upchurch, M.D.
Prehospital Medical Director
Billings Area Indian Health Services
Crow Agency, Montana

Critical Illness and Trauma Foundation - Project Staff

Nels D. Sanddal, President/CEO
Project Director

Joseph D. Hansen, Executive Director/CFO
Project Manager

Barbara Bergstrom, RN, CEN
Clinical Abstract Specialist

Cookie Agnew
Data Entry Specialist

Expert Review Panel Members

Thomas J. Esposito, M.D., MPH
James Upchurch, M.D.
Ken Mueller, M.D.
John Middleton, M.D., FACS
Dorothy Bradbury, M.D., FACEP

John Bleicher, RN, REMT-P
Nancy S. Rahm, RN
Ann Williams, M.D., FACS
Ron Scott, REMT-P
Nels D. Sanddal, REMT-B

Montana Department of Justice

Division of Forensic Science
Gary Dale, M.D., State Medical Examiner

Highway Traffic Safety Division
Albert E. Goke, Administrator

Montana Department of Health and Environmental Sciences

Bureau of Records and Statistics
Sam H. Sperry, Chief

Emergency Medical Services Bureau
Drew E. Dawson, Chief

Montana/Wyoming Foundation for Medical Care

Janice Connors, Executive Director

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EXECUTIVE SUMMARY

All trauma deaths involving Native Americans, injured in Montana between October 1, 1989-September 30, 1992, in which sufficient data from all sources could be gathered to determine preventability and appropriateness of care were examined.

The death certificates of 214 Native American fatalities (ICD•9•E 800-999) had been acquired from previous studies. These death certificates served as the initial data source for this study. A total of 90 cases were excluded, 50 were excluded as non-mechanical trauma, 21 as suicides not surviving to the hospital and 19 due to lack of sufficient information from which to determine preventability or appropriateness of care.

The remaining 124 trauma deaths were included in the study. For each case, records including autopsy reports, coroners reports, hospital charts, prehospital run sheets, traffic safety and law enforcement reports were requested from appropriate sources. Of the 124 trauma deaths included, 80 occurred in the prehospital phase of care and 44 occurred in the hospital.

Analyses of these records were conducted by a multi-disciplinary panel using a combined autopsy and clinical chart review method and consensus rule review process. Results showed an overall preventable death rate of 9%. One preventable death occurred in the prehospital phase. The preventable death rate was 23% for hospital deaths. The appropriateness of care rendered was analyzed irrespective of preventability. The rate of inappropriate care was 31% for all deaths reviewed, <1% in the prehospital phase and 64% for those fatalities who survived to the hospital.

Delays in discovery, inappropriate utilization of resources and prevalence of inadequate or missing documentation were also examined. Delay in discovery was a factor in 21% of cases, resources were judged to be used inappropriately in 20% and inadequate documentation was noted in 48% of cases reviewed.

Data from this study were compared with previously reported data on the general population of Montana. Strategies were employed to assure the reliability and validity of comparisons between the two studies. The results of this comparative analysis showed that Native American trauma fatalities had a lower mean age than the general population. Those comparisons also showed an increased prevalence and higher quantities of alcohol present in the decedents.

The gross preventable death and inappropriate care rates were lower among Native Americans. However, these differences failed to reach statistical significance. The reason for any perceived differences could not be absolutely determined.

These findings suggest a rural preventable death rate among Native Americans in Montana from trauma which is statistically similar to that of the general population in the state. The findings also suggest continued efforts to establish a comprehensive, inclusive trauma care system should improve outcomes for all Montanans, without regard to race.

PROJECT NARRATIVE

;ACKGROUND

/lontana, like many other rural states, is in the early implementation stages of developing a tandardized system of trauma care. The death rate from injury in Montana is significantly higher for ıll age groups (72/100,000)[1] than the national norm (55/100,000)[2] and dramatically higher in certain ıge groups and among Native Americans (150/100,000)[3]. These figures, until recently, have not :aused alarm in either the general population or the medical community. They have tended to be lismissed as deaths resulting from geographic or sociologic phenomena that are thought of as 'accidents" or not preventable. It has been widely assumed that people die from injury in Montana because their injuries occur in remote locations and that the rate of death is influenced by the lifestyles and occupations of the population. Little credence has been given to the hypothesis that the increased death rate may be directly attributable to deficiencies in medical care. Therefore, until recently, little emphasis has been placed on developing an organized trauma care system.

Between June 1990, and September 30, 1993, the Critical Illness and Trauma Foundation, Inc., (CIT) conducted two rural preventable mortality studies in Montana. The combined results of these studies provided a reliable assessment of the level and quality of care for trauma patients across the entire state of Montana over a one-year period, prior to trauma system implementation. The results of these combined data documented an overall rate of preventable death of 13%, and an overall rate of inappropriate care of 32%, statewide. The rate of preventable mortality for those surviving to the hospital was 27% with an associated 68% rate of inappropriate care.

During the collection and analysis of these data, it was determined that the etiology and rates of inappropriate care appeared different among Native Americans. However, the sample size for this sub-population was insufficient to make direct comparisons to the population at large. This project sought to expand the population size by increasing the study period to three years and further compared these findings with Montana's general population.

RESEARCH DESIGN

Hypothesis

Differences exist in the etiology and rates of preventable mortality and inappropriate care for Native Americans trauma deaths and Montana's general population.

Project Goal and Objectives

The specific written goal for the project was: *"To retrieve, analyze and report two additional years of data (three successive years) for all Native American deaths in Montana occurring as a result of trauma."*

Six specific objectives were identified to support the completion of this goal, they were:

- Data coding and preliminary computer entry — Add all information on each new case to an existing data base.
- Chart preparation for review — Abstract and provide blinded information on each case to specially selected and trained expert review panel.
- Case review panel activities — Select and train panel members, conduct case review meetings.
- Final data entry and analysis — Enter expert panel determinations and findings to data base and conduct statistical analyses.
- Reporting and publication — Complete required and extramural reporting and publication.
- Grants Management — Meet administrative requirements of the grant.

Specific Methods

Study Area Demographics

Native Americans represent Montana's most prevalent minority, making up 6% of the total population (47,679/799,065), according to the 1990 census. There are seven reservations within the state's boundaries. These are: Blackfeet, Crow, Flathead, Fort Belknap, Fort Peck, Northern Cheyenne, and Rocky Boys. Sixty-three (63) percent of the Native Americans in Montana reside on one of these reservations. The remainder of the population is unevenly dispersed across the state with many Native Americans residing in the larger communities.

While the geographic characteristics of the seven reservations vary considerably from high mountains o vast expanses of prairie, they all share common elements of remoteness and isolation. The mean listance from the central community on each reservation to the nearest proposed Level II trauma facility is 131 miles with a range of 58 to 295. The largest reservation community is <5,000 persons.

The Billings Area Indian Health Services is responsible for the health care needs of the seven reservations in Montana. They operate three hospitals and six clinics on the reservations. Prehospital care is provided predominately by volunteers with 15 basic and 1 advanced life support service providing emergency medical services to the reservations. While every reservation has at least one prehospital service, the response areas are extremely large. There are rotor-wing aeromedical aircraft which respond to six of the reservations. Fixed-wing aeromedical aircraft service each of the reservations and are used for inter-hospital transfers.

Four reservations have no hospitals. The three reservation hospitals range in size from 12 to 34 beds. Two of the hospitals maintain 24-hour a day, physician-staffed emergency departments, the third has physician coverage within ten minutes of notification.

Types of Deaths Included

The following ICD-9 codes were included in this study.

E-CODE	DESCRIPTION
800-807	Railway incidents
810-819	Motor vehicle traffic incidents
820-825	Motor vehicle non-traffic incidents
826-829	Other road vehicle incidents
830-838	Water transportation incidents
840-844	Air transport incidents
846-849	Vehicle incident, not elsewhere classifiable
870-879	Misadventures during surgical care (when initial event was prehospital trauma)
880-888	Unintentional falls
913-915	Injuries caused by mechanical suffocation and foreign bodies
916-923	Other incidents
955-959	Suicide and self-inflicted injury (excluding victims not surviving to the hospital)
960-969	Homicide and injury purposely inflicted by other persons (excluding assault by corrosive or caustic substance, poisoning, hanging or strangulation and drowning)
970-976	Legal intervention (excluding legal intervention by gas)
985-989	Injury undetermined whether unintentionally or purposely inflicted

Major Data Sources

Experience in the previous studies and other research efforts indicated that deficiencies in data sources were to be expected. The following represent the major data sources and elements collected, where available, for each case included in the study.

Death Certificate: Including patient identifier, socio-demographics, times and location of death, autopsy/coroner involvement, primary/contributory causes of death and manner of death (n=214, inclusion n=124).

Ambulance Trip Report: Including prehospital times, mechanism of injury, vital signs, assessment findings, treatments rendered, delays encountered and patient destination (n= 44).

Autopsy Transcriptions: Including co-morbid factors, quantification of injuries, detailed description of injuries, factors identified that contributed to death, toxicology and blood alcohol levels (n= 61).

Hospital Medical Record: Including mode and time of arrival, emergency department assessment findings, vital signs, E.D. treatments rendered, duration of stay in E.D., surgical consultation, transfer or disposition information, surgical intervention, complications, intensive care unit (ICU) stay, ICU complications, disposition or death information and discharge diagnoses (n= 44).

Investigative Report: Including a description of events leading up to incident, description of event, type of vehicle, weapon or other mechanism of injury and where patient was pronounced dead. This information was ascertained from uniform traffic fatality reports, coroner's reports and law enforcement agency investigative summaries (n= 112).

Study Period

Data for this study were collected retrospectively for the period of three years commencing October 1, 1989, adding one year to either side of the original study period.

Sample Size

There were no specific requirements for sample size in the grant award. One hundred twenty-four (124) cases were included in this study.

Data Entry/Retrieval Process

Trauma register software procured by the Montana Department of Health and Environmental Sciences (DHES) was utilized for the study database. CIT had been authorized by DHES to

tilize the software program titled *Hospital Trauma Register*, written by Richard Cales, M.D., or the purpose of completing this study. A Dell 80486/50 MHZ microcomputer was utilized by oundation staff for data entry and analysis during the study. A single CIT staff person abstracted ach chart using a standardized check sheet prior to computer entry. A separate staff person erified all coding information during data entry.

Preventability Criteria

Preventability determination was based on the following objective and subjective criteria: Revised Trauma Score (RTS), Injury Severity Score (ISS) based on the AIS-85 revision of the Abbreviated Injury Scale were calculated. These indices of injury severity were converted to TRISS probability of survival (P_s) values for each case where sufficient data existed to do so. However, the P_s was not routinely provided to review panel members and they were not used as an absolute criteria for preventability determination. The following subjective preventability criteria were used in this study:

Non-Preventable:

1. Anatomic injuries considered to be non-survivable under optimum care (recognized peer review standards utilized).
2. Physiologic state of patient at the time of arrival of first responder may be considered, but non-critical to judgment.
3. Appropriate management using ATLS/PHTLS guidelines (suspect care handled as error).
4. Patient's probability of survival falls below 0.25 or had an ISS above 50.
5. Patient had co-morbid factors that were major contributors causing death.

Potentially Preventable:

1. Anatomic injuries very severe but survivable under optimum care.
2. Patient generally considered unstable and responds minimally to treatment.
3. Generally appropriate ATLS/PHTLS care, suspect care directly or indirectly implicated in patient demise.
4. Patient's probability of survival falls between 0.50 and 0.25 or had an ISS between 20 and 50.

Preventable:

1. Anatomic injuries considered survivable.
2. Patient generally stable; if unstable, patient becomes stable with treatment.
3. Evaluation and management suspect in any way.
4. Patient's probability of survival falls above 0.50 or had an ISS below 20.

Criteria for Inappropriate Care

A determination of the appropriateness of care rendered was made irrespective of the preventability determination, i.e., the care rendered in cases judged non-preventable was evaluated for compliance with accepted standards of the ATLS and PHTLS courses as well as local trauma care protocols where such protocols were present.

Secondary Issues

Utilization of Resources

During the previous studies it became evident that there were additional questions beyond preventability and appropriateness of care that needed to be addressed in subsequent studies. One of these secondary issues was the appropriateness of each response in terms of utilization of resources. During the review of all cases for this study, panel members were asked to gauge each case for resource utilization according to the following criteria.

Inappropriate Utilization of Resources:

1. Prehospital response or treatment that places the rescuer or other personnel in danger.
2. Care of a patient judged to have been a non-preventable death to the detriment of other patients with survivable injuries.
3. Hospital resuscitation > 30 minutes of trauma patients arriving at the ER without signs of life.
4. Elaborate diagnostic testing or surgical interventions of trauma patients without signs of life.

Inadequate or Missing Documentation

Of additional concern during the initial studies was the frequency with which documentation of care was inadequate for panel members to determine what actually transpired during the course of treatment of a particular patient. While the panels had been reluctant to count missing or substandard documentation as inappropriate care, it was felt that the magnitude of the problem should be documented and characterized.

Inadequate documentation was defined as:

1. Missing records
2. Documentation inadequate for continuous quality improvement at any level.

System Delays

It was also felt necessary to examine issues of time more clearly in this study. This included both issues of delay and excess, i.e. delayed EMS response and excessive scene time. Both prehospital and hospital phases of care were examined.

Instances of delay in access to care were also examined in the hospital and prehospital phase. Scene time > 20 minutes was the only strictly defined time interval. Others such as response time, time to OR, time to transfer, etc., were determined as excessive at the discretion of the panel and deferring to knowledge of the geographic environment and local standards of care.

Case Review Process

Case review panel members were chosen for this project based upon their knowledge and expertise of trauma care, their location outside of the study areas, and based upon the need for a balanced representation between prehospital, nursing, emergency department, surgery and forensic disciplines. Ultimately the panel comprised 3 surgeons, 2 emergency department and family practice physicians, 1 pathologist, 2 registered nurse, and 2 prehospital providers.

The first case review meeting was preceded by an orientation and training process to review and reinforce criteria for preventability, appropriateness of care and other issues. Abstracts of each case, were prepared for distribution to the case review panel by CIT staff. All patient and provider identifiers were removed prior to distribution. Two panel members were then provided with an abstract and appropriate portions of accumulated records for each case. One of those two panel members was designated as primary reviewer of the case. Each case was presented to the entire panel by the primary reviewer with added comments provided by the secondary reviewer. An out-of-state trauma surgeon reviewed all cases and served as arbiter and chairman of the panel. An abridged abstract of each case was provided to all panel members prior to the panel meetings. A panel consensus agreement on preventability and appropriateness of care was reached

by majority vote for all cases. Unanimous consensus occurred in the majority of cases (>97%). Minutes of meetings were recorded noting discussion and disposition of each case reviewed.

Data Analysis

Statistical analyses of data was conducted by project staff under the direction of the principal investigators. Analysis included descriptive statistics and other statistical tests as considered appropriate. In addition, specific methodological tests related to mortality outcome studies, i.e., TRISS and the calculation of P_s values, were applied.

Panel Reliability Determination

Forty six (46) cases reviewed in the initial study were included for review by the Native American study panel as a gauge of inter-panel reliability. Data from both studies were also stratified according to factors which have been shown to affect inter-panel reliability allowing characterization of the study populations for each of these factors.

RATIONALE FOR STUDY DESIGN

Prior to the original Rural Preventable Mortality Study, two general methods for determining the rate of preventable trauma mortality had been reported in the literature. Those methods are, blinded clinical chart review and autopsy.[4,5,6] For purposes of the studies conducted in entirely rural settings, the researchers have chosen a combination of the two processes and included any case in which preventability could be determined from any source of data. *All cases for which data were available from any singular or collective source(s) such that preventability was felt to be determinable were included.*

Considerations of chart access and completeness; and availability and variability of autopsy records contributed to the decision to use a multi-method process. Additional discussion on the process, methods and rationale is presented in articles, reports and detailed descriptions of previous research efforts.[7,8]

RESULTS/FINDINGS

ESULTS OF COMPLETION STUDY

here were approximately 951[1] deaths from all causes among Native Americans in Montana uring the study period[9], 214 (23%) of these were related to trauma. Of these 214 trauma-related eaths 90 (42%) were excluded from the study, 50 (56%) of the exclusions were due to the cause f death being non-mechanical trauma, 21 (23%) were suicides not surviving to the hospital and 9 (21%) due to insufficient information available to determine preventability. Therefore, 124 ases, representing 58% of all trauma related deaths, were reviewed and judged for reventability.

Of the 124 study cases, 63 (51%) had no autopsy or an external autopsy only. These were ncluded for review as other information was available and sufficient to determine preventability and appropriateness of care.

Gender distribution was 91 (73%) male and 33 (27%) female. The mean age was 32 with a range of 4-91 and a median age of 27.

Unintentional injuries caused 80% of the deaths reviewed and 20% were intentional. Of the intentional injuries, 77% were homicides and 23% suicides.

Blunt injuries were the cause of 87% of deaths and 13% died of penetrating injuries. Mechanism of injury included: 69 (56%) motor vehicle crashes, 12 (10%) gunshot wounds, 4 (3%) stab wound, 6 (5%) falls, 10 (8%) pedestrians struck by automobile, 7 (6%) pedestrians struck by train, and 4 (3%) involving aircraft. Other causes, primarily related to industrial incidents were implicated in 12 (10%) of deaths.

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[1] Total is approximate due to inherent racial misclassification errors.

Information was obtained on alcohol use in 94 (76%) cases. Of these, alcohol use was associated with 77 cases (58%) and 61% (48/79) of motor vehicle related cases. Fifty-three percent (n=66) of all fatalities studied were legally intoxicated and 57% (45/79) of those who died as a result of motor vehicle incidents (driver, passenger or pedestrian) were legally intoxicated. Legal intoxication in Montana is defined as a blood alcohol concentration (BAC) ≥ .10.

For motor vehicle fatalities, information on use of restraints by the occupant was obtained in 58 of 69 cases, 7% were restrained and 93% unrestrained. Of the motor vehicle incidents, 71% involved one vehicle rollovers and 64% of the decedents were reportedly ejected from the vehicle.

None of the 124 cases was judged frankly preventable, 11 (9%) were judged potentially preventable and the remaining 113 (91%) non-preventable. Table 1.

Table 1: Preventability for All Cases
(N=124)

Preventability	#	%
Frankly Preventable	0	0%
Potentially Preventable	11	9%
Total Preventable	11	9%
Non-Preventable	113	91%

Table 2: Preventability In-Hospital
(n=44)

Preventability	#	%
Frankly Preventable	0	0%
Potentially Preventable	10	23%
Total Preventable	10	23%
Non-Preventable	34	77%

Preventability judgments for in-hospital deaths (n=44) are presented in Table 2. Total preventability in these cases was 23%.

Table 3: Adjusted Rates of Inappropriate Care by Phase

Phase	*Patient Contacts*	*Inappropriate Care*	
		#	%
Prehospital	46*	11	24%
Emergency Dept.	44	23	52%
Post E.D.	16	5	31%

** Excludes those patients declared dead at scene and who received no care.*

The rate of inappropriate care rendered for all deaths regardless of preventability, reviewed in this study was 31% (39/124). The rate of inappropriate care for in-hospital deaths was 64% (28/44).

When expressed as a function of the number of patients treated in a particular phase, the adjusted rates of inappropriate care are 24% for prehospital, 52% for E.D. and 31% for post E.D. and are presented in Table 3.

These adjusted rates were calculated as follows: all 124 cases emanated from the prehospital setting. Of those 78 (63%) received no EMS care. In the remaining 46 cases, prehospital providers rendered inappropriate care in 11 (24%). Of the 44 cases surviving to be treated in the hospital, all received care in the E.D. Inappropriate care was rendered in 23 (52%) of these cases. There were 16 cases treated in the post E.D. phase of care, 5 (31%) of these received some form of inappropriate care.

The most common form of inappropriate care (34%) was associated with management of respiratory problems including airway control and management of chest trauma (Table 4). This trend was demonstrated throughout both the prehospital and emergency department phases of care.

Table 4: Nature of Inappropriate Care by Phase
(n=39)*

PHASE	Airway Tx	C-Spine Tx	Chest Tx	No IV	Inadequate Fluid	No PASG	Fracture Tx	Failure To Recognize Injury	Inappropriate Pressors	No X-Rays	No Peritoneal Lavage	Inappropriate operation	Infection Tx	Head injury management	Ventilatory Support	Other
Prehosp.	7	4					1									1
E.D.	8		12	5	13	3		5	5	2	2					4
Post-ED					2							1	1	1	1	2

* 39 decedents received inappropriate care, in most cases there was more than one error. Multiple errors occurred across phases or in one phase.

Secondary Issues

Of the 124 cases examined, resource utilization was judged inappropriate in 25 (20%). Table 5 summarizes the nature and relative frequency of the inappropriate resource utilization. While the total number of cases in which resources were judged to have been used inappropriately, in several of those cases more than one resource category was inappropriately called upon.

Table 5: Inappropriate Utilization of Resources
(n = 25)

Inappropriate Utilization	#	%
Prehospital Personnel	2	2%
Transportation Resources	7	6%
Resuscitation Effort	16	13%
Diagnostic Resources	4	3%
Surgical Resources	1	1%

Table 6 illustrates the frequency and phase of care in which inadequate documentation was noted.

Table 6: Frequency and Phase of Inadequate Documentation

Phase of care *	#	%
Prehospital	64	80%
Emergency Department	25	57%
Post Emergency Department (OR/PostOp/ICU)	2	13%

* For any one case, inadequate documentation may have occurred in multiple phases of care.

Associated system access delay, either delay in discovery or extended response time, was found in 14 (11%) of prehospital deaths. Excessive scene times (greater than 20 minutes) were found in 8 (18%) of the 44 cases where such data were available.

Table 7 outlines delays in the process of care which prolonged time interval injury to definitive care.

Table 7: Delays in Process of Care

Delay	#
PREHOSPITAL (n=46)	
Delay in EMS Response	6
Excessive Scene Time (> 20 Min.)	8
HOSPITAL (n=44)	
Excessive E.D./X-Ray	9
Delay in Operation	7
Diagnostic Procedure Delay	1
Therapeutic Procedure Delay	6

The physician primarily responsible for the initial care of the patient was able to be identified in 40 of 44 cases treated in the ED. ATLS training status of the physician provider, at the time of the incident, was also obtainable if the provider had either received training, or resided in, Montana. This analysis occurred after, and independent of, panel judgments. In no case was a panel member knowledgeable of care provider identity or training status. Association between ATLS training status and inappropriate care rendered in the ED is noted in Table 8.

Table 8: ATLS Training and Appropriateness of Care*

Training	Care Appropriate		Care Inappropriate	
	#	%	#	%
ATLS	6	30%	14	70%
Non-ATLS	8	42%	11	58%

** Hospital deaths where E.D. care was noted as inappropriate.*

While errors in care appear lower in the non-ATLS group, differences did not reach statistical significance. Physicians not listed as having been ATLS certified tended to be from larger (non-IHS) facilities and, therefore, could have received ATLS certification in another state, or may not have resided in Montana.

Comparison With Caucasian Subjects

Data from the initial studies were sorted by race and limited to Caucasian decedents (n=277). The 47 cases which were excluded as a result of this stratification were all Native Americans and therefore, included by definition in the current Native American study population. The data concerning the Caucasian sample were combined with the findings from the Native American study to serve as a basis for contrast and comparison of care and outcome.

'able 9 compares the results for preventable death. The preventable mortality rate among the Native American population appears to be lower. However, this finding failed to reach statistical ignificance.

Table 9: Preventability for All Cases (N=401)

Preventability	*Native American* #	*Native American* %	*Caucasian - Mont.* #	*Caucasian - Mont.* %
Frankly Preventable	0	0%	5	2%
Potentially Preventable	11	9%	31	11%
Total Preventable	11	9%	36	13%
Non-Preventable	113	91%	241	87%

Preventability for hospital deaths (Table 10) again shows differences between studies, however, none proved to be of statistical significance.

Table 10: Preventability for Deaths Occurring in the Hospital (n=171)

Preventability	*Native American* #	*Native American* %	*Caucasian MT* #	*Caucasian MT* %
Frankly Preventable	0	0%	5	4%
Potentially Preventable	10	23%	29	23%
Total Preventable	10	23%	34	27%
Non-Preventable	34	77%	93	73%

The rates of inappropriate care for prehospital, emergency department, and post E.D. deaths were not statistically different. Table 11 summarizes these findings.

*Table 11: Distribution of Inappropriate Care by Phase of Care (n=176)**

Phase	Native American #	Native American %	Caucasian #	Caucasian %
Prehospital	11	24%	42	45%
Emergency Dept.	23	52%	70	75%
Post E.D.	5	31%	25	27%

* Inappropriate care noted in multiple phases for several cases. Actual # of cases with inappropriate care noted = 94.

The nature of inappropriate care and its distribution was similar in both studies. There is a prevalence of respiratory management errors (airway management and chest injury treatment) occurring in all phases but most frequently in the E.D.

Verification of Inter-panel Reliability

McKenzie, et al[10], have identified certain factors that tend to affect preventable death review panel judgements. The individual and combined study populations have been characterized according to those factors in Table 12.

Table 12: Factors Potentially Affecting Reliability of Preventable Death Judgments

Study / Sample size	ISS	Age				Time to Death				Cause of Death				*Complete Information	
	Mean	<55 #	<55 %	>55 #	>55 %	<48 Hr #	<48 Hr %	>48 Hr #	>48 Hr %	CNS #	CNS %	Other #	Other %	#	%
N.Am./124	36	112	90	12	10	116	94	8	6	36	29	88	71	38	31
Cauc./277	37	191	69	86	31	238	86	39	14	118	43	159	57	42	15

** Indicates cases where all information necessary was available from prehospital, hospital and complete autopsy records.*

For the 46 overlapping cases used to gauge inter-panel reliability, the original panels judged 5 (11%) as potentially preventable. The Native American study panel judged 6 (13%) as potentially preventable. Table 13, reflects these findings.

Table 13: Inter-Panel Agreement

	Frankly Preventable	Potentially Preventable	Non Preventable Care Appropriate	Non Preventable Care Inappropriate
NA Panel	0	6	32	8
Orig Panel	0	5	35	7

Case by case agreement was 91%. Agreement on preventability was 98%. Disregarding preventability judgements, there was 91% agreement on the appropriateness of care between the two panels. The rate of agreement was gauged by Cohen's Kappa statistic. Inter-panel agreement when potentially preventable and frankly preventable determinations were combined was .80. The rate of agreement for appropriateness of care, which potentially preventable as well as non-preventable - care inappropriate, was .79.

CONCLUSIONS

The rates of preventable death and inappropriate care appear lower for the Native American subset population in Montana. While these findings failed to reach statistical significance, the sample size may be insufficient to preclude Type II error. Several differences are noted to exist between the general care available to Native Americans and that available to the general population injured in remote areas of the state. In spite of a small bed size and utilization pattern, two of the three IHS hospital emergency departments serving reservations are staffed by physicians 24 hours a day. The third IHS hospital specifies a ten minute response for the physician from the time of notification. Additionally, IHS requires ATLS certification for all of its emergency physicians. These differences in patterns of care may contribute to the trend towards a lower preventable death and inappropriate care rate. While this premise could not be demonstrated conclusively in this study, these preliminary data support the maintenance of these policies and practices.

Several other characteristics in the types and patterns of injury deaths were noted among the decedent population in this study but were beyond the scope and confines of this research. These included the appearances of a higher rate of internal autopsies (49% vs 26%), a higher percentage of lethal injuries in the prehospital environment with subsequently no care provided (63% vs 51%), and a tendency toward multiple deaths in the same motor vehicle crash. These issues may deserve additional examination.

The differences in etiology, with injury deaths occurring at a younger age, and the relationship of alcohol as a contributing factor in fatal injuries among Native Americans in Montana, have implications for injury prevention and control strategies.

Although the lethality of injury, when the ISS was calculable was similar to the Caucasian sample at 37 and 36 respectively, the percentage of in field deaths was greater among the Native American sample. This would suggest that, in addition to primary and secondary injury prevention issues,

continued emphasis on the improvement of the prehospital phase of care is necessary, including: mechanisms for more timely discovery; shorter response times by initial medical resources such as First Responders or quick response units; higher levels of training for prehospital providers including definitive airway management and fluid resuscitation capabilities; and vastly improved record keeping.

While there are discrete differences in etiology, and potential differences in current levels of care between the Native American and general populations of Montana, the most promising mechanism for improvement in outcomes is the continued development of a comprehensive and inclusive trauma care system across the state which fully integrates the resources and challenges facing the Native Americans and those persons who provide care to this population. Efforts to initiate primary and secondary prevention programs; improvement in the identification of critical trauma patients; a more structured and efficient response by medical personnel; and streamlining and standardization of patterns of referral to tertiary care centers will benefit all rural Montanans, regardless of race.

Longitudinal examination of the results of implementation of such a system and its impact on the outcomes for this unique population is desirable.

PRODUCTS

An examination of the exclusion records involved in this study was conducted. This work was conducted by Teri L. Sanddal, an undergraduate psychology student from Montana State University. While not directly supported by funding from this grant project, the results of that analysis help to provide a more complete picture of the injury patterns for Native Americans in Montana. In particular, it verifies the occurance of trauma deaths at younger ages and documents the relationship between alcohol use and injury deaths in this population. A copy of that article is appended to this report.

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APPENDIX A: PRODUCTS

Alcohol and Injury Deaths Among
Native Americans in Montana: 1989-1992

Teri L. Sanddal

Montana State University
Critical Illness and Trauma Foundation, Inc.

Alcohol and Injury Deaths Among Native Americans in Montana: 1989-1992

Teri L. Sanddal

Montana State University

Critical Illness and Trauma Foundation, Inc.

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Abstract

Recent data show an increased rate of injury related death among Native Americans (Esposito & Sanddal, in press). In Montana, Native Americans die from injuries at a rate of 150/100,000, twice the rate in Caucasians, 72/100,000, and approaching three times the national injury death rate of 55/100,000. This study is a retrospective examination of the cause, frequency and distribution of injury deaths for Native Americans occurring in Montana from 1989-1992. These data indicate that Native American injury related deaths involve an increased prevalence and higher levels of blood alcohol content among these Native American fatalities in comparison to the total sample of injury fatalities for the study period. Of the 214 Native American unintentional and intentional injury deaths occurring during the study period, blood alcohol concentration (BAC) information was available for 158 (74%) cases. Alcohol was present in 114 (72%) of these cases. When alcohol was present, the mean BAC was .222 with a range of .003 to .810. The high rate of injury death and disproportionate association between alcohol and these fatalities in Native Americans point to the need for culturally specific injury control strategies in this sub populations. Programs which address alcohol abuse, its prevention and treatment should be instituted and targeted at the very young as an integral component of injury prevention and control strategies.

Alcohol and Injury Deaths Among Native Americans in Montana: 1989-1992

The purpose of this research project is to examine the epidemiology of Native American injury deaths as well as the presence and level of blood alcohol concentration at the time of injury or death. The research hypothesis is that there is a difference in the epidemiology of Native American injury deaths that involves an increased prevalence, and higher quantity, of alcohol content which is a contributing or co-morbid factor.

Background

In Montana, injury remains the leading cause of death for all citizens between 1 year and 44 years of age (Montana Vital Statistics, 1992). Montana's Native American injury death rate is 150/100,000, higher than the national rate for this population of 133/100,000 and substantially higher than the rate of 72/100,000 for Montana's general population (Esposito & Sanddal & Upchurch, in press).

Seven federally recognized Native American Reservations exist within the borders of Montana: Blackfeet, Flathead, Crow, Rocky Boys, Northern Cheyenne, Fort Peck, and Fort Belknap. The Billings (MT) Area Indian Health Service (IHS) is responsible for the health care needs of these reservations plus the Wind River Reservation in Wyoming. For the purposes of this study, only deaths occurring in Montana are reported. Montana's total population is 799,065 (1990 Census); Native Americans represent six percent of this figure at 47,679.

From February through June of 1994, the Critical Illness and Trauma Foundation, Inc., (CIT) conducted a Native American Preventable Mortality Study (NAPMS) for the period of October 1, 1989, to September 30, 1992. This represented the most comprehensive examination of preventable trauma deaths for a Native American population ever conducted across an entire state. However, due to limitations in the objective analyses of trauma death preventability by TRISS (Boyd, Tolseon, & Copes, 1987) and other methods, approximately 40% of the deaths involving trauma occurring within this population were excluded from examination. These exclusions represent deaths from non-mechanical trauma, suicides not surviving to the hospital, and cases in which sufficient data were not available from any source to determine preventability.

During the NAPMS project, researchers noted that the prevalence and quantity of alcohol use appeared higher among Native Americans than in the general population. However, this relationship could not be confirmed without examination of those cases excluded in the NAPMS project.

Previous work by Hovet (1994) indicates that a substantial portion of the Native American injury problem often involves etiologies that were excluded from the NAPMS, including drowning, hypothermia, burns, asphyxiation and aspiration. In order to ascertain if alcohol levels were higher for all injuries, regardless of type, intent or medical intervention, records excluded from the NAPMS study were examined to provide a complete picture of the Native American injury deaths in Montana during the study period.

Method

Participants

All deaths occurring in Montana are certified through the completion of a death certificate by either a licensed physician, county coroner, or medical examiner. This occurs whether a Native American death occurs on or off the reservation. These death certificates include a description of the nature of the incident and the cause of death. They are subsequently filed with the Bureau of Records and Vital Statistics (BRVS). BRVS staff verify the nature of the incident and the cause of death and apply appropriate codes for statistical reporting purposes.

Injury deaths coded with the International Classification Disease, (9 ed.) External Cause of Injury (E-Code) from 800-999 (ICD9-E-800-999) involving Native Americans in Montana, and occurring from October 1, 1989, to September 1, 1992, were examined. The data were reviewed to compare the type and mechanism of injury, gender, age, intent, whether death occurred on or off the reservation and the levels of alcohol use. The data were compared to existing figures for the general population in Montana and to other published data.

CIT received all death certificates for deaths involving Native Americans for the period October 1, 1989, to September 30, 1992, with E-codes of 800-999. The resultant sample (N=214) represents all injury related deaths of Native Americans in Montana for this time period.

Equipment

All data were entered into a 486/66 micro computer using dBase V for Windows software. Statistical analysis was completed using SPSS 6 for Windows software.

Procedure

All deaths certificates were reviewed for confirmation of race and ancestry. All death certificates indicating Native American or American Indian in either the race or ancestry fields of the death certificates were included in this study. No standards were imposed relative to percentage of Native American blood or whether an individual was enrolled with a tribe or nation.

Death certificates meeting the criteria for Native American were then assigned a case number and filed with all pertinent data relating to that case, such as death certificate and when available, autopsy report, toxicology analysis and highway patrol report.

All cases were reviewed to determine whether a toxicology screen analysis had been performed. Information on cases that had no report on file at CIT were requested from the Montana Department of Justice, Division of Forensic Science (DSF), Forensic Toxicologist. Likewise, for those cases where an autopsy report was indicated on the death certificate but was not on file at CIT due to exclusion criteria applied in NAPMS, similar requests were made to the DSF, State Medical Examiner.

If the victim died on a primary or secondary highway, mile marker location information garnered from the Montana Highway Patrol Investigative Summaries was reviewed to determine whether the incident was on or off the reservation.

A data dictionary was designed to consistently define each of the 32 fields to be entered and analyzed for each case. Of the 32 fields, 24 were designed to directly correspond to the death certificate as the primary source of information. The remaining eight fields were completed from other sources of information, such as autopsies, fatal crash reports and toxicology screen analysis. A copy of the data dictionary is included as Appendix A.

All fields except one were numerically coded with field lengths from 1-6 digits. The underlying cause of death was an alphabetic field of twenty characters, using standard abbreviations, i.e., MVC for motor vehicle crash, GSW for gun shot wound, etc. All numeric and alphabetic codes were listed in the data dictionary and universally applied. In the case of insufficient data for a certain field, the field was left blank.

Each case was reviewed, abstracted and entered by a single researcher. The information was recorded on a data abstracting form in preparation for computer entry. A copy of the data abstracting form is included as Appendix B.

The data were then subjected to statistical analysis that was predominantly descriptive in nature. Sorting and list generation were completed in dBase V for Windows. More complex statistical analysis was conducted using SPSS 6 for Windows. When comparisons were conducted between the data from this study and those acquired for non-Native Americans, analysis of variance (ANOVA) was conducted in SPSS, significance (alpha) was set at .05.

Results

Death certificates for 214 Native American trauma deaths (ICD-9 E 800-999) were reviewed and examined in this study. Of all the injuries, 132 (60%) occurred on one of the seven reservations. Likewise 112 (52%) of all deaths occurred on a reservation. The difference between reservation injuries and deaths is a result of transportation off the reservation for medical intervention. Figure 1 represents the distribution of injury by reservation.

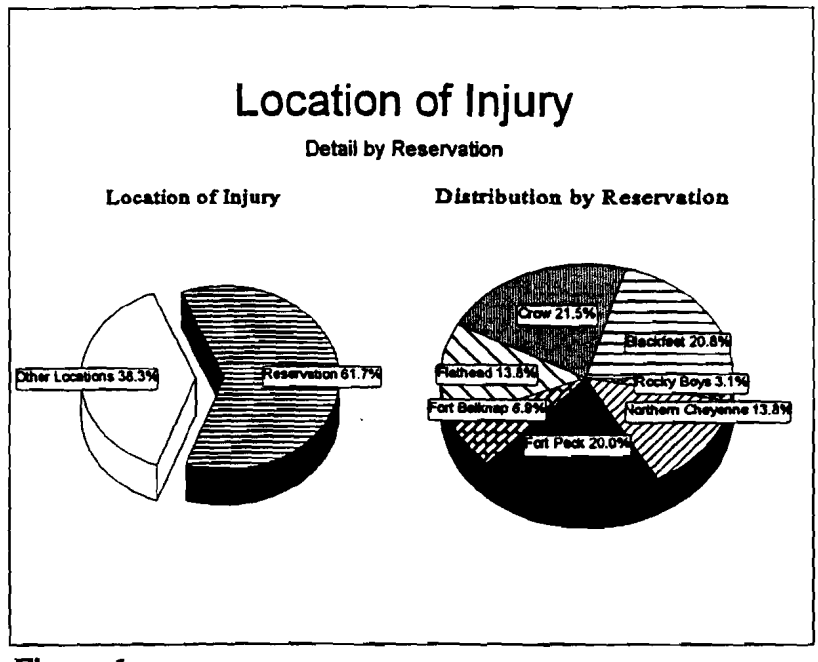

Figure 1

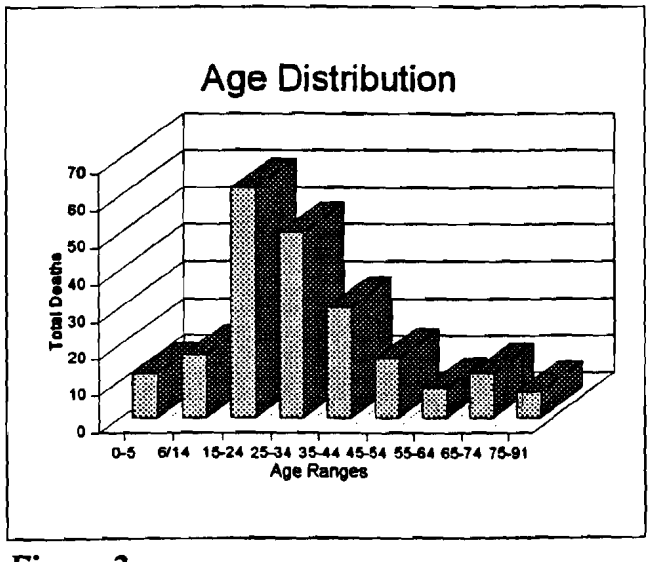

Figure 2

Gender distribution of the deaths was 150 (70%) males and 64 (30%) females.

The mean age was 31.6 and the median was 26.5 years of age, ranging from <1 year to 91 years old. The group 15-44 years old accounted for 142 (66%) of all deaths. The remaining deaths were relatively evenly distributed (Figure 2).

The cause of death was unintentional injury in 142 (66%) of the cases and intentional in 56 (26%) cases. The intentional injuries were 35 suicide (16%) cases, and 21 homicide (10%). Of the remaining 7% of the cases, 8 (4%) were listed as either undetermined or pending investigation and 6 (3%) cases listed as natural, in spite of an underlying etiology of injury. Figure 3 illustrates the distribution of injury death by intent.

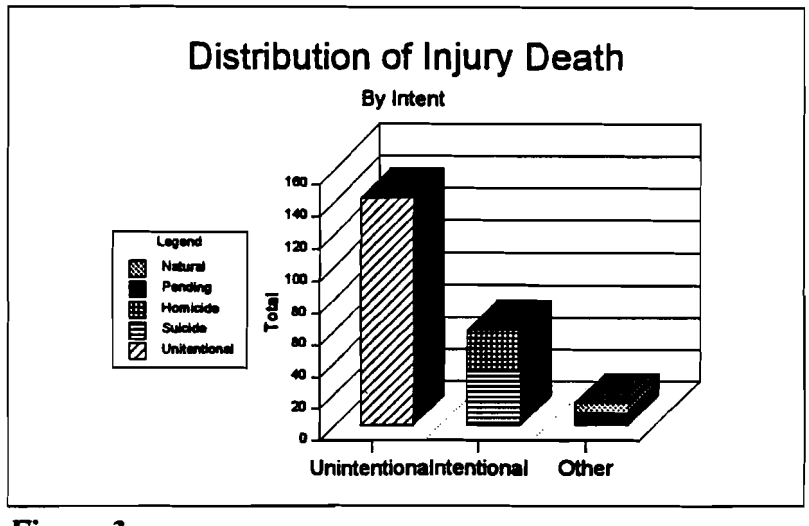

Figure 3

Mechanisms of injury distribution is presented in Figure 4. Motor vehicle incidents were the most common mechanism of injury, being responsible in 92 (43%) cases. Of these 46 decedents (50%) were drivers, 37 (40%) passengers and 9 (9%) were pedestrians. Information on the use of restraints, such as seat belts, child safety seats and helmets, was available on 76 (83%) cases; victims in 5% of the cases , (5%) were restrained at the time of injury.

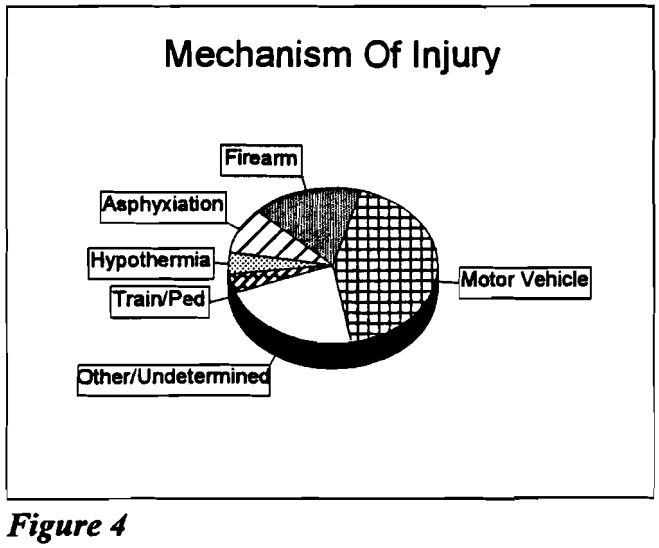

Figure 4

Firearms were listed as the mechanism of injury in 37 (17%) cases, asphyxiation accounted for 21 (10%) of the deaths, hypothermia 10 (5%), train/pedestrian 8 (4%), aircraft 6 (3%), falls 6 (3%), house fires 5 (2%), electrocution 2 (1%), and other/undetermined 28 (13%).

Autopsies were indicated as having been completed for 115 (54%) of the sample. Of these, autopsy reports were available for 98 (85%). The remaining 17 (15%) cases where autopsies were indicated as having been performed were not on file with the DFS, State Medical Examiner, and were not retrievable from other sources.

Location of incident revealed that 98 (46%) of all injuries happened on a primary or secondary highway and 53 (24%) of the injuries happened at home. Location of death was recorded with 122 (57%) of the 214 victims dying at the scene of the injury, 69 (32%) succumbing in emergency departments or hospitals and 23 (11%) dying at a residence (not necessarily their own).

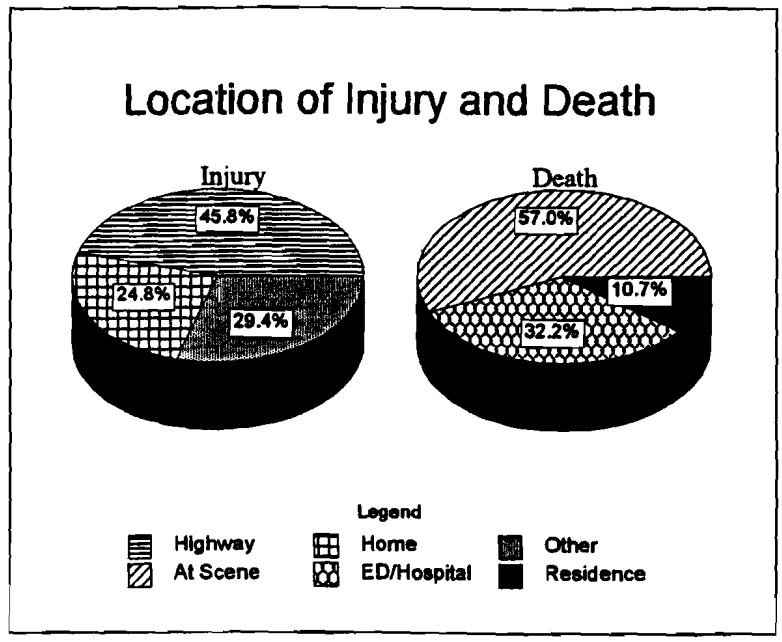

Figure 5

Time of injury was known in 170 of the 214 cases. Sixty-eight (40%) of the cases indicate that the injury occurred between the hours of 12:01 a.m. and 6:00 a.m., 32 (19%) between 6:01 a.m. and noon, 33 (19%) between 12:01 p.m. and 6:00 p.m. and the remaining 37 (22%) of the

Comparison to Non-Native American Data

These data were further compared to data reported previously by CIT for non-Native American injury deaths occurring from the period October 1, 1989, to September 30, 1990. These comparisons confirm that the injury death rate is higher for Native Americans and further that there is unequal age distribution. Although some differences exist between the two samples with the non-Native population meeting mechanical trauma criteria necessary for TRISS analysis, the samples are substantially similar.

Native Americans are dying at younger ages, thereby resulting in significantly more productive years of life lost and a higher cost to society. Table 1 represents the difference in mean and median age. Analysis of variance between the two samples showed the difference in mean age to be significant ($p < .001$)

Race	Mean Age	Median Age	Range
Native American	31.6	26.5	<1-91
Non-Native American	42.9	38.0	3-95

Table 1

In regard to both the mean and median ages, Native Americans are dying ten-thirteen years younger than their non-Native counterparts. Fifty percent of Native Americans dying from injury deaths, lose their lives before the age of 27, as compared with the non-Native median age of 38. Figure 10 (following page) further illustrates the difference in age distribution relating to injury deaths of Native and non-Native Americans.

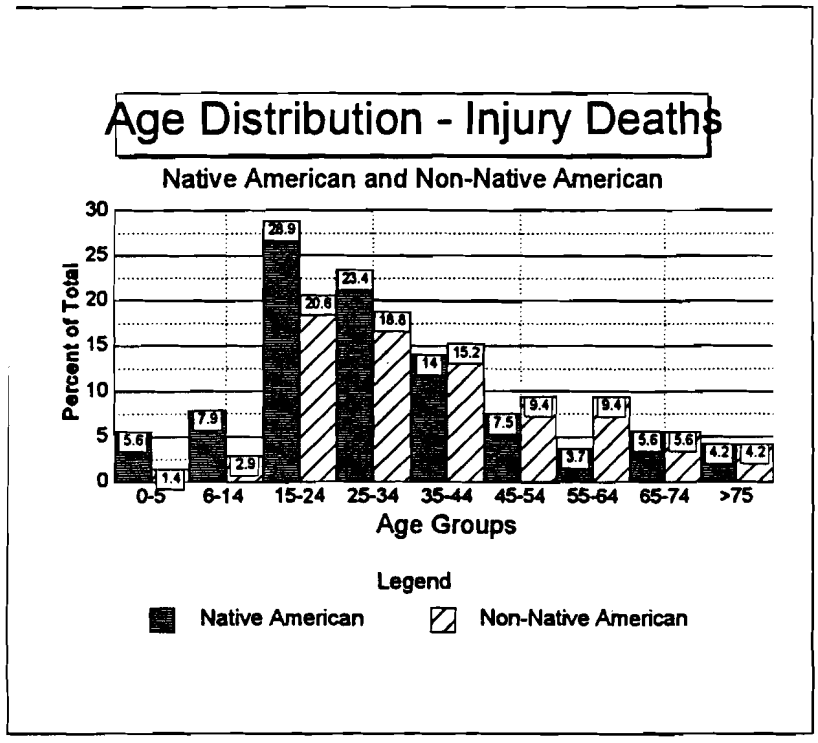

Figure 11

Comparison of the presence and quantity of alcohol in the blood at the time of death revealed that Native Americans exhibited detectable levels of blood alcohol more frequently and at higher levels. Comparisons of alcohol levels were made between the two populations. Alcohol reports were available for 73% (n=158) of the Native Americans and 71% (n=196) of the non-Native Americans. Measurement times varied in both groups with some blood samples being drawn shortly post injury, some drawn hours later but while the patient was still alive and still others drawn post mortem. This variance in measurement times may result in an under reporting of the levels of alcohol in the bloodstream at the time of injury. Table 2 summarizes the rate of alcohol testing in injury death between the two races.

Race	Total Sample	Sample ETOH	Percent Known
N.A.	214	158	73.4
N-N.A.	277	196	70.8

Table 2

Results showed that 28% of the Native Americans and 52% of the non-Natives had a BAC of 0.00. The mean BAC, including those with a BAC of 0.00, was .16 for the Native American as to .09 for the non-Native population. Table 3 represents those findings.

Race	Number 0.00	Percent 0.00	Mean Including 0.00	Standard Deviation
N.A. (n=158)	44	27.8	.1608	.132
N-N.A. (n=196)	101	51.5	.0863	.108

Table 3

Upon examination of both populations and excluding the 0.00 BAC from analysis, the 114 Native Americans with alcohol present had a mean BAC of .222, as compared with the 95 non-Native decedents whose BAC mean was .178. When analysis of variance was applied for the mean alcohol, when alcohol was present, the differences were found to be significant ($p < .001$) Table 4 represents those findings.

Race	Number >0.00	Percent >0.00	Mean When ETOH is Present	Standard Deviation	Range
N.A. (n=158)	114	72.2	.2228	.1015	.003-.810
N-N.A. (n=196)	95	48.5	.1781	.0885	.01-.350

Table 4

Further examination of traffic related deaths where direct comparison between the two populations was possible, were conducted. This grouping of mechanisms which includes motor vehicle (driver and occupant), motorcycle, and pedestrian, showed significant ($p < .001$) differences in the mean alcohol levels between the samples. The mean alcohol level for Native Americans, when alcohol was known (n=55), including 0.00, was .181 for this mechanism of injury. The contrasting sample of non-Native Montanans (n=127) showed a mean alcohol level of .093.

These comparative findings support the original hypothesis.

Discussion

This study is the first comprehensive examination of all injury deaths for Native Americans both on and off the reservation in the State of Montana, building on previous work by May (1986) and CIT (Esposito, Reynolds, Sanddal, & Hansen, 1992). The data from this study support the hypothesis that the etiology of injury deaths is different and that alcohol is a contributing or co-morbid factor to a greater degree in injury deaths among the Native Americans. This is verified by statistically significant differences in decedents' ages and the mean BAC of Native Americans at the time of measurement in comparison with the general population.

Injury related death is considered to be a disease of young males. That fact is supported throughout this report. Young Native American males are dying from injury 2.5 times more often than their female counterparts. IHS reports (Public Health Service, 1993) that the Native American population is increasing. However, for the increase to have a lasting sustainable effect,

particularly in relationship to social and economic issues, the tragic and unnecessary deaths of those with their most productive years ahead must be addressed.

It is hoped that these findings will benefit those who are designing injury prevention and control programs for the Native American population. The findings of this study show a high percentage of the deaths occurring at the scene of injury, thus the victims never arrive at a medical center due, in part, to the severity of their injuries. This underscores the need for injury prevention activities and for continuing emphasis on the prehospital phase of care in an effort to reduce the detrimental effects of injury once it has occurred.

Prevention programs need to provide knowledge and guidance for all ages. Early prevention methods, in particular, need to be designed to teach young Native Americans about the consequences of alcohol use and its relationship to high risk behaviors. These programs need to begin in elementary school since the rate of injury death begins to escalate within that age group and continues into young adulthood. Until recently, injury prevention programs have not been a high priority for health agencies serving this population due to the fact that infectious diseases and infant mortality were the initial priority. That left few resources for injury control and programs concerned about alcohol abuse (May, 1986). Young Native Americans are now living to reach driving age and motor vehicle crashes are now the number one cause of injury death for the group 15-40 years old.

The findings of this study relative to the number of deaths due to traffic related mechanisms involving alcohol coincide with the mortality rates reported by May (1986). His research showed that in 1980, the injury death rate for U.S. Native Americans was 140/100,000.

'raffic related fatalities accounted for 61/100,000 (44%). Of that number 78-85% were thought o have been alcohol related based on autopsy toxicology records from representative counties.

In collecting these data some difficulties were encountered such as records that indicated ı procedure had been ordered, e.g., toxicology analysis, but lacked completion records to verify he results. Data gathering was often complex due to the multitude of local, state and federal ıgencies involved. Direct comparisons with non-Native populations were limited in this research due to the exclusion of non-mechanical trauma from previous preventable mortality projects, although direct comparisons were possible for traffic related deaths.

The completeness of the data gathered exceeded the requirements of the project. Continued analysis of injury deaths could be undertaken with the existing data. Many areas relating to decedent demographics, mechanisms of death, etc., could be more thoroughly examined and reported, largely from data gathered during this project.

It is clear that continued research, coupled with an increased emphasis on injury prevention and control is essential to stem the unnecessary carnage occurring to this population and to promote the survival and prosperity of the Native American people of Montana.

Author's Note

I would like to thank Professor Walter Fleming, Montana State University and the Critical Illness and Trauma Foundation, Inc., for the opportunity to conduct this research project. Additionally, I would offer my appreciation to Nels D. Sanddal, Thomas J. Esposito, Jeri D. Pullum, Joseph D. Hansen, and James C. Upchurch for their assistance in manuscript review and editing.

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Appendices

APPENDIX A

CRITICAL ILLNESS AND TRAUMA FOUNDATION
NATIVE AMERICAN DEATH STUDY
DATA DICTIONARY
FROM DEATH CERTIFICATE

FIELD *[DC ID #]*	TYPE*	WIDTH**	DESCRIPTION
CASENO	N	3	Case Number
SEX *[2]*	N	1	1 = Male 2 = Female
DETHDATE *[3]*	N	6	(MMDDYY)
RACE *[4]*	N	1	1 = White 2 = N.A. 3 = Other
AGE *[5a]*	N	2	(Use 0 for < 1 Yr old)
DEATHCO *[7a]*	N	2	County of Death (01-56 from alpha list)
DEATHLOC *[7b]*	N	1	1 = Hosp. Inpatient 2 = Hosp. E.D. 3 = Residence 4 = Other
MARRIED *[9]*	N	1	1 = Yes 2 = No
STUDENT *[12a]*	N	1	1 = Yes 2 = No
RESCO *[14b]*	N	2	County of Residence (01-56 from alpha list)
EDUC *[16]*	N	2	Education In Years (1 - 16)
CAUSE *[23a]*	N	1	1 = CNS 2 = Hem. 3 = Resp. 4 = Mult. 5 = Other
DCCAUS	A	20	20 Characters (Underlying Cause) (See Page 3 for Standard Abbreviations)
ECODE	N	5	|_|_|_|.|_| (3 Digit Ecode. + 1 Decimal-Don't Round)

INFORMATION FROM DEATH CERTIFICATE

AUTOPSY *[24a]*	N	1	0 = None 1 = Complete/Internal 2 = External	
MANNER *[26]*	N	1	1 = Natural 2 = Accident 3 = Suicide	4 = Pending 5 = Indet. 6 = Homicide
INTENT	N	1	1 = Yes	2 = No
DTHTIME	N	2	Hours - Interval from Injury to Death (<1 = 0 >99 = 99)	
TIMINJ *[27a]*	N	5	Military Time	
INJCO	N	2	01 - 56 Alpha List	
E849 *[27e]*	N	1	0 = Home 1 = Farm 2 = Mine/Quarry 3 = Industrial 4 = Rec/Sport 5 = Street/Highway	6 = Public Bldg. 7 = Institution 8 = Other-Specified 9 = Not Specified
MECH	N	2	1 = M.V. Driver 2 = M.V. Pass. 3 = M.V. - Ped. 4 = Train - Ped. 5 = Aircraft 6 = Fall, sa. ht. 7 = Fall - other	8 = Asphyxiation 9 = House Fire 10 = Hypothermia 11 = Firearm 12 = Electrocution 13 = Other_____
CERTBY *[28a/29a]*	N	1	1 = Physician 2 = Coroner 3 = M.E.	
CERTERR	N	1	1 = Yes 2 = No (If 1describe) _____	

MULTIPLE SOURCE INFORMATION

(Not typically available from Death Certificate)

EMPLOYED	N	1	Currently employed 1 = Yes 2 = No
RESTR	N	1	1 = Yes 2 = No (Appropriately Restrained/helmeted/PFD)
WEAPON	N	1	1 = Body 6 = Drug/Poison 2 = Gun 7 = Fire/Heat 3 = Knife 8 = Rope 4 = Blunt Object 9 = Jump 5 = C.O. O = Other_____
DROWNING	N	1	1 = Bathtub 4 = Ditch/Canal 2 = Swim Pool 5 = River/Stream 3 = Pond/Lake 6 = Other_____
BLPEN	N	1	1 = Blunt 2 = Penetrating
ETOH	N	3	0-999
TOXSCRN	N	1	1 = Yes 2 = No (Completed)
RESDEATH	N	1	1 = Yes 2 = No (Died on Reservation)
RESINJ	N	1	1 = Yes 2 = No (Injury on Reservation)
RESERVA	N	1	1 = Flathead 5 = Northern Cheyenne 2 = Blackfeet 6 = Fork Belknap 3 = Crow 7 = Rocky Boys 4 = Fort Peck
IHS114	N	1	1 = Yes 2 = No 3 = No Care
PCCAER	N	1	1 = Yes 2 = No 3 = No Care

* TYPE, N = Numeric field, A = Alphabetical field
** WIDTH, Maximum field width in alpha or numeric characters
*** BLANK = Unknown

DCCAUS Standard Abbreviations: MVC = Motor Vehicle Crash
GSW = Gunshot Wound
SI = Self-Inflicted

APPENDIX B.

CRITICAL ILLNESS AND TRAUMA FOUNDATION
NATIVE AMERICAN DEATH STUDY
WORKSHEET
FROM DEATH CERTIFICATE

CASENO	|__|__|__|__|__|__|
SEX	|__|
DETHDATE	|__|__|__|__|
RACE	|__|
AGE	|__|__|
DEATHCO	|__|__|
DEATHLOC	|__|
MARRIED	|__|
STUDENT	|__|
RESCO	|__|__|
EDUC	|__|__|
CAUSE	|__|
DCCAUS	|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|__|
ECODE	|__|__|__|.|__|
AUTOPSY	|__|
MANNER	|__|
INTENT	|__|
DTHTIME	|__|__|
TIMINJ	|__|__|__|__|
INJCO	|__|__|
E849	|__| _____
MECH	|__|__| _____
CERTBY	|__|
CERTERR	|__| _____

CRITICAL ILLNESS AND TRAUMA FOUNDATION
NATIVE AMERICAN DEATH STUDY
WORKSHEET
MULTIPLE SOURCE INFORMATION

EMPLOYED	|__|	
RESTR	|__|	
WEAPON	|__|	_____
DROWNING	|__|	_____
BLPEN	|__|	
ETOH	|__|__|__|	
TOXSCRN	|__|	
RESDEATH	|__|	
RESINJ	|__|	
RESVA	|__|	
IHS114	|__|	
PCCAER	|__|	