Motor vehicle traffic-related morbidity and mortality among children ages 1-15

An update from the Vital Statistics Unit

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BRIEF

In 1995 and 1997 the Colorado Behavioral Risk Factor Surveillance System (BRFSS) included questions about seat belt or child safety seat and bicycle helmet use among children under age 16. The prevalence of use varied by age of the child, region of residence, and household income[1]. To complement the accompanying *Brief* prepared by the Survey Research Unit, the Vital Statistics Unit compiled hospital discharge data and death certificate data for years 1994-1996 to describe motor vehicle traffic-related morbidity and mortality among children of the same ages. Three years of data are combined to provide a large enough population on which to complete selected subgroup analyses.

Background

Between 1994 and 1996, the leading cause of death among children ages 1-15 was unintentional injury, with motor vehicle-related injuries accounting for approximately 65 percent of unintentional injury deaths and 26 percent of all deaths (see Table 1). Although information describing motor vehicle-related deaths is easily accessible, these data can only describe a portion of the problem.

Nonfatal motor vehicle-related injuries can incur tremendous medical expenses, result in premature disability, and cause immeasurable human suffering. Therefore, it is important not only to describe the mortality associated with traffic-related injuries, but also the morbidity.

Morbidity data for 1994-1996 were obtained from the Colorado Health and Hospital Association's hospital discharge data and were analyzed for inclusion in this *Brief*. Only motor vehicle traffic-related deaths and hospital discharge records are included in the subgroup analyses presented in Tables 2 and 3.

Definitions

Motor vehicle-related deaths are defined as those for which the underlying cause of death on the death certificate is coded as E810-E825 according to the International Classification of Disease, 9th Revision (ICD-9). Motor vehicle-related deaths can be divided into two categories, motor vehicle *traffic* (E810-E819) and motor vehicle *non-traffic* (E820-E825) deaths.

Motor vehicle traffic-related deaths, which are the focus of this *Brief*, include motor vehicle occupants (including drivers), bicycle or motorcycle riders, or pedestrians. For the described age groups, children were most often passengers rather than drivers of motor vehicles.

A coding system similar to ICD-9 is used in hospital discharge records. Each hospital discharge record can list up to 15 discharge diagnoses coded according to the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM). Motor vehicle traffic-related hospital discharges were defined as those records that had at least one of the diagnoses coded as motor vehicle traffic-related (E810-E819).

Between 1994 and 1996, 158 children ages 1-15 were killed in motor vehicle traffic-related incidents. The children who died were most often male (60 percent), white/non-Hispanic (70 percent), and 13-15 years old (42 percent). Each of the three regions of the state (Denver Metro, Other Metro, Rural) accounted for approximately the same number of fatalities between 1994 and 1996, although the death rates for each region were different (see Table 2 on page 3).

Occupant

The highest death rates for occupants of motor vehicles are found among those who are between the ages of 13 and 15 years (11.2 per 100,000 population), residents of the rural regions of the state (12.9), and of white/Hispanic race/ethnicity (6.1) (see Table 2). A similar pattern in the

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Table 1. Childhood deaths from selected leading causes of death and death rates by age group, sex, region of residence and race/ethnicity: Colorado residents, ages 1-15, 1994-1996 total

CAUSE	TOTAL		AGES 1-4		AGES 5-8		AGES 9-12		AGES13-15	
	N	RATE	N	RATE	N	RATE	N	RATE	N	RATE
Total Deaths	629	24.8	215	30.6	105	15.4	102	15.3	207	42.8
Unintentional Injuries	255	10.1	77	10.9	39	5.7	45	6.8	94	19.4
Motor Vehicle*	166	6.5	42	6.0	22	3.2	33	5.0	69	14.3
All Other	89	3.5	35	5.0	17	2.5	12	1.8	25	5.2
Malignant Neoplasms	57	2.2	14	2.0	13	1.9	14	2.1	16	3.3
Homicide	48	1.9	20	2.8	3	0.4	6	0.9	19	3.9
Congenital Anomalies	46	1.8	24	3.4	12	1.8	5	0.8	5	1.0
Suicide	43	1.7	*	*	*	*	5	0.8	38	7.9

CAUSE	FEMALE		MALE		DENVER METRO		OTHER METRO		RURAL	
	N	RATE	N	RATE	N	RATE	N	RATE	N	RATE
Total Deaths	241	19.4	388	29.9	304	21.9	192	26.1	133	32.5
Unintentional Injuries	98	7.9	157	12.1	100	7.2	70	9.5	85	20.7
Motor Vehicle*	65	5.2	101	7.8	61	4.4	46	6.3	59	14.4
All Other	33	2.7	56	4.3	39	2.8	24	3.3	26	6.3
Malignant Neoplasms	22	1.8	35	2.7	33	2.4	17	2.3	7	1.7
Homicide	19	1.5	29	2.2	24	1.7	19	2.6	5	1.2
Congenital Anomalies	15	1.2	31	2.4	32	2.3	8	1.1	6	1.5
Suicide	11	0.9	32	2.5	23	1.7	14	1.9	6	1.5

CAUSE	WHITE/ NONHISPANIC		WHITE/ HISPANIC		BLACK		ASIAN		AMERICAN INDIAN	
	N	RATE	N	RATE	N	RATE	N	RATE	N	RATE
Total Deaths	437	22.8	121	29.5	46	37	17	32.5	8	28.5
Unintentional Injuries	183	9.5	49	11.9	12	9.6	7	13.4	4	14.3
Motor Vehicle*	116	6.0	38	9.3	6	4.8	4	7.6	*	*
All Other	67	3.5	11	2.7	6	4.8	3	5.7	*	*
Malignant Neoplasms	40	2.1	11	2.7	*	*	*	*	*	*
Homicide	21	1.1	13	3.2	11	8.8	*	*	*	*
Congenital Anomalies	34	1.8	8	1.9	*	*	*	*	*	*
Suicide	28	1.5	11	2.7	3	2.4	*	*	*	*

*The "Motor Vehicle Deaths" category includes traffic and non-traffic deaths (see definition on page 1). Motor vehicle deaths are records with ICD-9 E810-E825 coded as the underlying cause of death. Number of deaths presented in this table are three-year totals for ages 1-15. Rates are deaths per 100,000 population. * indicates fewer than three events in the category. Denver Metro region includes Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson counties. Other Metro region includes El Paso, Larimer, Mesa, Pueblo, and Weld counties. The "Rural" category includes the remaining counties of the state.

Table 2. Childhood motor vehicle traffic deaths and death rates by age group, sex, region of residence and race/ ethnicity: Colorado residents, ages 1-15, 1994-1996 total

CHARACTERISTICS	ALL VEHICLE TRAFFIC DEATHS		OCCUPANT		PEDESTRIAN		BICYCLIST	
	N	RATE	N	RATE	N	RATE	N	RATE
Total	158	6.2	111	4.4	33	1.3	13	0.5
Age Group								
1-4	38	5.4	28	4.0	9	1.3	*	*
5-8	22	3.2	15	2.2	6	0.9	*	*
9-12	31	4.7	14	2.1	10	1.5	7	1.1
13-15	67	13.8	54	11.2	8	1.7	4	0.8
Sex								
Female	63	5.1	45	3.6	15	1.2	*	
Male	95	7.3	66	5.1	18	1.4	11	0.8
Region of Residence								
Denver Metro	57	4.1	35	2.5	14	1.0	7	0.5
Other Metro	43	5.9	23	3.1	15	2.0	5	0.7
Rural	58	14.2	53	12.9	4	1.0	*	*
Race/Ethnicity								
White/Non-Hispanic	111	5.8	78	4.1	22	1.1	10	0.5
White/Hispanic	36	8.8	25	6.1	8	1.9	3	0.7
Black	6	4.8	4	3.2	*	*	*	*

[1] Includes those driving. Motor vehicle traffic deaths are records with ICD-9 E810-E819 coded as the underlying cause of death. Please refer to the text for the definitions of Occupant, Pedestrian and Bicyclist categories. Number of deaths presented in this table are three-year totals for ages 1-15. Rates are deaths per 100,000 population. * indicates fewer than three events in the category. Denver Metro Region includes Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson Counties. Other Metro region includes El Paso, Larimer, Mesa, Pueblo, and Weld Counties. The "Rural" category includes the remaining counties of the state.

Table 3. Childhood motor vehicle traffic related hospital discharge records and rates by age group, sex, and region of residence: Colorado residents, ages 1-15, 1994-1996 total

	MOTOR VEHICLE TRAFFIC		OCCUPANT		PEDESTRIAN		MOTORCYCLIST		BICYCLIST	
	N	RATE	N	RATE	N	RATE	N	RATE	N	RATE
Total ages 1-15	1,528	60.3	866	34.2	417	16.4	78	3.1	145	5.7
Age Group										
1-4	287	40.8	182	25.9	95	13.5	4	0.6	3	0.4
5-8	384	56.4	183	26.9	141	20.7	9	1.3	45	6.6
9-12	340	51.0	164	24.6	92	13.8	22	3.3	60	9.0
13-15	517	106.8	337	69.6	89	18.4	43	8.9	37	7.6
Sex										
Female	596	48.1	406	32.7	142	11.5	14	1.1	23	1.9
Male	932	71.9	460	35.5	275	21.2	64	4.9	122	9.4
Region of Residence										
Denver Metro	852	61.2	450	32.3	283	20.3	26	1.9	80	5.8
Other Metro	360	49.0	201	27.4	82	11.2	24	3.3	50	6.8
Rural	315	76.9	214	52.2	52	12.7	28	6.8	15	3.7

Motor vehicle traffic related hospital discharges include records with ICD-9-CM codes E810-E819 as any mentioned diagnoses. Please refer to the text for definitions of the categories "Occupant", "Pedestrian", "Motorcyclist" and "Bicyclist". Number of discharge records presented in this table are 3-year total for ages 1-15. Rates are per 100,000 population. Denver Metro region includes: Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson counties. Other Metro region includes El Paso, Larimer, Mesa, Pueblo, and Weld counties.The " Rural" category includes the remaining counties of the state.

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injury rates for occupants is found in the hospital discharge data; children ages 13-15 years and children who are residents of the rural region of the state have the highest rates of motor vehicle traffic-related hospital discharges (see Table 3).

Although BRFSS data do not describe seat belt/safety seat use of children by race/ethnicity, death and hospital discharge data regarding seat belt/safety seat use are available by age and region of residence. In 1995, children 13-15 years old and those children who were residents of rural regions of the state were much less likely to always wear a safety belt/seat[1].

Pedestrian

Pedestrian death rates for children were similar across age groups, sex, region of residence, and race/ethnicity. Between1994-1996, a relatively small number of children (N=33) died, which makes it difficult to determine if particular subgroups are at a higher risk of death.

Injury data from hospital discharge records help shed additional light on the problem. Children ages 5-8 have the highest rate of injury (20.7 per 100,000 population), while children ages 1-4 have the lowest rate (13.5).

Pedestrian-related morbidity varied by age and region of residence. Children in the Denver metro region are injured at almost two times the rate of children in rural and other metro regions of the state (see Table 3).

Bicycle

Because of the small number of motor vehicle-related fatalities involving children on bicycles during the years 1994-1996 (13 total deaths), a pattern in the rates cannot be established. However, hospital discharge data and helmet use data from the BRFSS are useful in providing information to describe the problem and plan prevention efforts. In 1995, older children (ages 9-15) and children in the rural regions of the state were the least likely to always wear bicycle helmets[1]. Hospital discharge data suggests that although children in rural regions may wear their helmets less often, children in the Denver metro area are injured at slightly higher rates, perhaps due to the increased likelihood of riding their bicycles in heavy traffic. In addition, higher rates of bicycle injury are found among children who are least likely to wear helmets (ages 9-12) and male children (see Table 3).

Motorcycle

Because of the small number of childhood motorcycle fatalities, the only information available to describe motorcycle injuries comes from hospital discharge data. The highest rates of injury are among males, children ages 13-15, and children who are residents of rural regions of the state (see Table 3).

Conclusions

The pattern of motor vehicle traffic-related death corresponds with behavioral data describing safety belt/seat and bicycle helmet use among children in Colorado. As suggested by the data describing safety equipment use, certain groups of children are at higher risk for injury and death while riding in a car or on a bicycle [1]. Morbidity and mortality data presented in this report indicate that older children and those living in rural areas have the highest rates of injury and death. This knowledge proves valuable when deciding what groups to target when designing intervention programs and policies.

Additional Information

For more information about child safety seat, safety belt, and bicycle helmet use, please contact the Injury and Disability Prevention Program at the Colorado Department of Public Health and Environment, (303) 692-2586. For more data describing vital statistics in Colorado, please contact the Health Statistics Section at the Colorado Department of Public Health and Environment, (303) 692-2160.

References

[1.] Health Statistics Section, Colorado Department of Public Health and Environment. (1998, October). Child safety belt, car safety seat, and bicycle helmet use: Colorado Behavioral Risk Factor Surveillance System, 1995 and 1997 (Brief No. 30). Denver, CO.