

Alabama Head and Spinal Cord Injury Report

January 1, 2007 – December 31, 2007

Alabama Department of Public Health

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Background

According to the National Center for Health Statistics (NCHS), traumatic injuries cause more deaths among children and young adults than any other disease. The NCHS also reports that, in 2005, accidental injury alone ranks fifth overall nationally among causes of death. Moreover, when the components of traumatic injury, i.e. accidental, suicide, and homicide, are added together, they represent the third leading cause of mortality nationally. In fact, traumatic injuries result in the loss of more potential years of life than any other cause.

The Alabama Department of Rehabilitation Services (ADRS) is charged with offering rehabilitation services to patients with moderate to severe brain, spinal cord, or other debilitating injury. At times, patients are unaware of, or have difficulty understanding, state supported rehabilitation services – the result of which leads to inadequate rehabilitation, disability management, and work force re-entry assistance. Patients who have sustained debilitating injuries are identified and linked with ADRS via the Alabama Head and Spinal Cord Injury Registry (AHSCIR), a registry mandated by Alabama Act 98-611. This law, which requires all hospitals in Alabama to submit data related to head and/or spinal cord injury cases to the Alabama Department of Public Health (ADPH), was passed May of 1998. The Alabama Trauma Registry (ATR), established shortly after AHSCIR data collection began in 1999, strives to broaden collection efforts to include data related to all types of trauma. Since the trauma registry program began providing data to the ADRS in the year 2000, patients with moderate to severe traumatic brain injury and/or spinal cord injury have been identified and contacted. Those requesting services have been provided appropriate, need-based, referral information.

More specifically, development of the ATR component pertains to an expansion of the head and spinal cord injury registry into a larger, more comprehensive program. Trauma registry personnel in the Office of Emergency Medical Services (EMS) of the ADPH collect statewide data by working with hospitals at all levels of trauma care (acute and ancillary). The ATR is beginning to capture data that will allow for more accurate evaluations regarding traumatic injury incidence and patterns. Data is received from hospitals that devote significant resources to trauma care as well as those hospitals that function to treat less severe traumatic injuries but stabilize and transfer more severe traumatic injuries. Ultimately, registry data analysis and injury pattern evaluations will permit researchers and policy makers to identify better ways of reducing injury mortality and morbidity in Alabama.

It is important to provide the public with mortality and morbidity statistics associated with motor vehicle crashes in order to accurately illustrate the impact injuries have on individuals, families, and society. Additionally, the information

assists with efforts related to increasing protective equipment usage rates. Trauma registry data are used by a variety of organizations. Emergency management agencies and emergency medical service providers use the registry information for community trauma prevention education. As previously described, the state department of rehabilitation services uses the AHSCIR data to locate patients suffering from head and/or spinal cord injuries in an effort to make them aware of state supported services and perform follow-up treatment.

Historically, the *Alabama Traffic Injury Registry (ATIR)*, which collected data from 1991 through 1998 from 18 hospital emergency departments, was able to generate and convey similar information; however, due to the small sample size and other limitations, it was not possible to draw broad conclusions with respect to statewide mortality and morbidity. *ATIR* data collection was labor intensive, required frequent travel to hospital emergency departments and was unable to capture all trauma cases treated at the 18 participating hospitals. The demographic characteristics of patients treated at hospitals from which the *ATIR* collected data were, simply put, not representative of the state as a whole. Therefore, it was not possible to accurately assess the extent of disparity in Glasgow Coma Scale (GCS) scores, the Abbreviated Injury Scale (AIS) scores, Injury Severity Scores (ISS), and functional ability at discharge of persons whose injuries were severe enough for admittance to the hospital and among different segments of Alabama's population. For obvious reasons, if hospital participation for the general trauma registry (ATR) is broad enough, more representative samples will be available which, in turn, will allow for more accurate information regarding statewide injury – especially motor vehicle crash related injury.

The Alabama Statewide Cancer Registry, located in the Bureau of Health Promotion and Chronic Disease, has provided the ATR/AHSCIR staff with a successful example regarding registry operation and management. Collaboration between the ATR/AHSCIR and cancer registry staff has contributed greatly to the development and operation of the trauma registry program. Also, the ATR/AHSCIR staff has consulted with the staffs and Web sites of other successful state registries. The ATR/AHSCIR has been modeled after these successful programs and proposes, in cooperation with a statewide emergency response program, to establish one of the most comprehensive trauma surveillance systems in the country.

Methods

The case definition for inclusion in the ATR program denotes any patient with at least one injury ICD-9-CM diagnosis code between 800.00 and 959.9, excluding 905–909 (late effects of injury), 910-924 (blisters, contusions, abrasions, and insect bites), and 930-939 (foreign bodies). The patient must also have been admitted to the hospital for at least 24 hours, transferred into and/or out of the hospital, died after receiving any evaluation or treatment at the hospital, or dead upon arrival.

Reportable diagnoses for the Alabama Head and Spinal Cord Injury include all confirmed cases of head and spinal cord injury with at least one of the following ICD-9-CM diagnoses:

800.0 - 801.9	Fracture of the vault or base of the skull
803.0 – 804.9	Other and unqualified and multiple fractures of the skull
850.0 – 854.1	Intracranial injury, including concussion, contusion, laceration
806.0 – 806.9	Fracture of vertebral column with spinal cord lesion
950.1 – 950.3	Injury to the optic chiasm, optic pathways, & visual cortex
952.0 – 952.9	Spinal cord lesion without evidence of spinal bone injury
959.01	Head Injury, unspecified
995.55	Shaken infant Syndrome

Data Use and Comparability

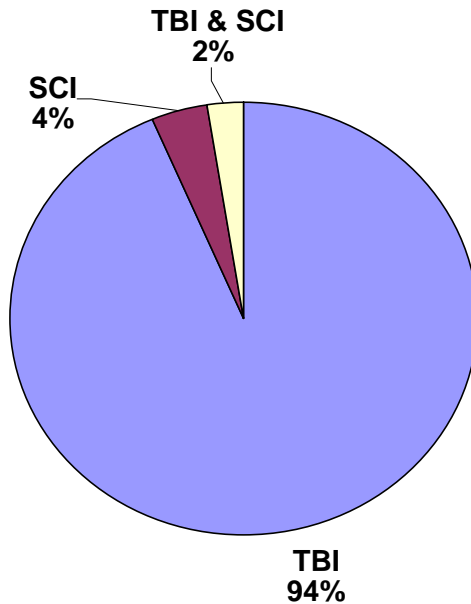
All data contained in this report must be interpreted with careful judgment. It is important to note that the information presented in this report is based on data from the ATR, which, as of July 31, 2008, did not contain information from all acute care hospitals in the state. The data contained in this report cannot be construed to represent the state of Alabama as a whole, and is not comparable to state or federal data from other sources.

Less severe head and spinal cord injuries may be under-represented in this analysis since less severe injuries are not submitted to the registry due to the case definition specifics or registrar omission. Additionally, mortality may be under-estimated because persons expired at the scene, were in transit to a facility, or arrived at hospitals not yet participating in the program. The statistical significance of the summary data for the SCI and combined TBI/SCI cases is also limited by the small population size regarding some respective data subgroups.

RESULTS

The ATR received reports of 2,937 head and spinal cord injury cases that were admitted to participating hospitals during calendar year 2007. Head injuries (TBI) constituted 94% (n = 2,750) of the reported cases and spinal cord injuries (SCI) constituted 4% (n =117). There were 70 cases (2%) in the registry that had both head and spinal cord injuries. This document will use the term traumatic brain injury (TBI) when referring to head injuries. Separate analyses are presented for each of the three categories. All categories are mutually exclusive.

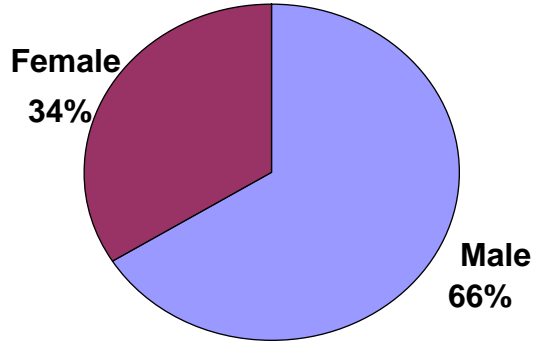
Figure 1
Type of Injury
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(N = 2,937)



Population size of each category will be noted in the caption for each graphic illustration.

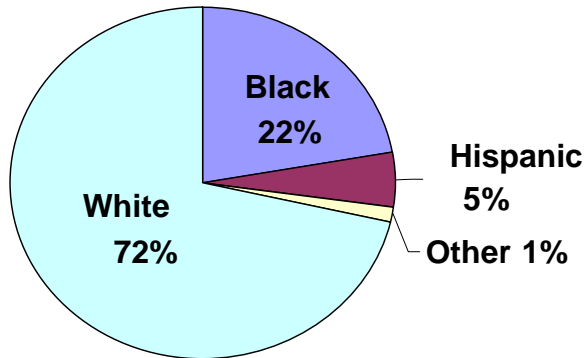
Traumatic Brain Injury

Figure 2
Proportion of TBI Cases by Gender
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 2,750)



There were 2.0 times more male TBI cases (n = 1,818) than female cases (n = 932) reported to the ATR for calendar year 2007.

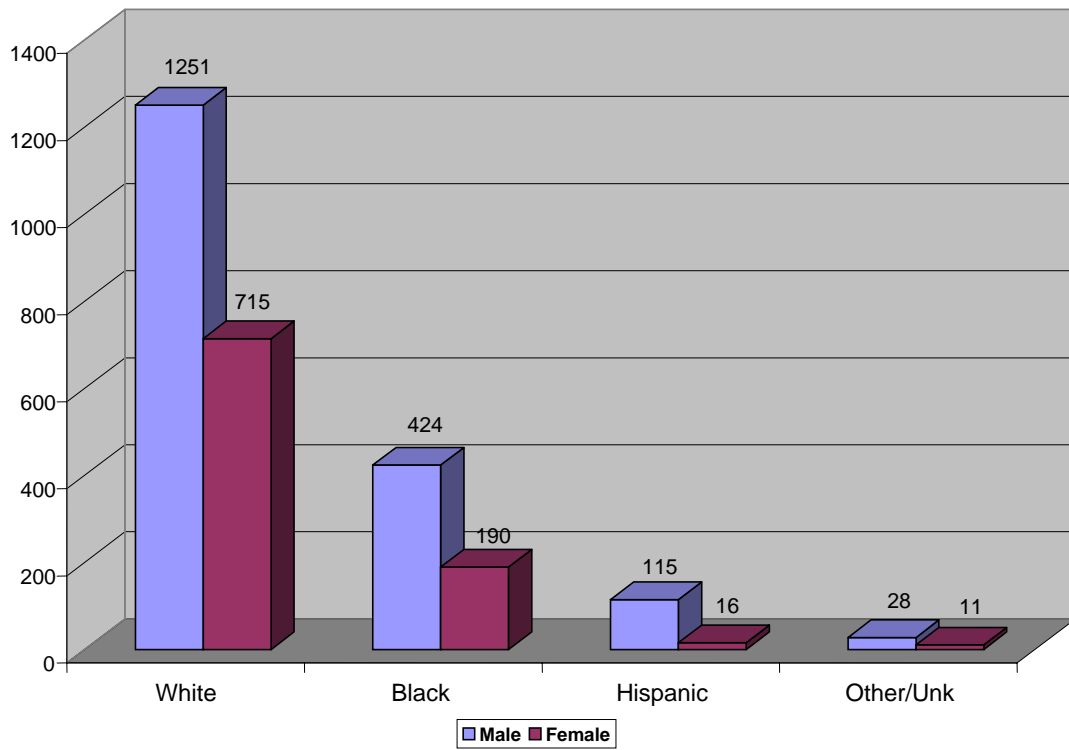
Figure 3
Proportion of TBI Cases by Race/Ethnicity
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007– December 31, 2007
(n = 2,750)



Whites constitute 72% (n = 1,967) of the cases, Blacks 22% (n = 614), and Hispanics 5% (n = 131) of TBI cases. The Other/Unknown category comprises 1% (n = 38).

Figure 4
Number of TBI Cases by Gender & Race/Ethnicity

Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2007 – December 31, 2007
 (n = 2,750)



Sixty-four percent (n = 1,251) of TBI cases in whites were male, sixty-nine percent (n = 424) of black cases were male, eighty-eight percent (n = 115) in Hispanics were male, and seventy-two percent (n = 28) of the “Other” category, which includes those of Asian, American Indian and unknown ethnicity, were male. The overall percentages in this injury type were 66% male and 34% female (see Figure 2).

Table 1
2007 TBI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2007 – December 31, 2007
 (n = 2,750)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	32	13	14	14	8	4	85	3.1%
5 to 14	70	35	29	15	9	4	162	5.9%
15-24	314	182	129	51	52	8	736	26.8%
25-34	210	83	84	37	32	1	447	16.3%
35-44	181	96	63	27	19	3	389	14.1%
45-54	173	74	58	17	11	1	334	12.1%
55-64	105	70	27	15	5	1	223	8.1%
65-74	79	60	13	5	3	2	162	5.9%
75-84	70	70	5	7	1	2	155	5.6%
>84	17	32	2	2	0	0	53	1.9%
Total	1251	715	424	190	140	26	2746	99.8%
% Total	45.5%	26.0%	15.4%	6.9%	5.1%	1.0%	99.9%	

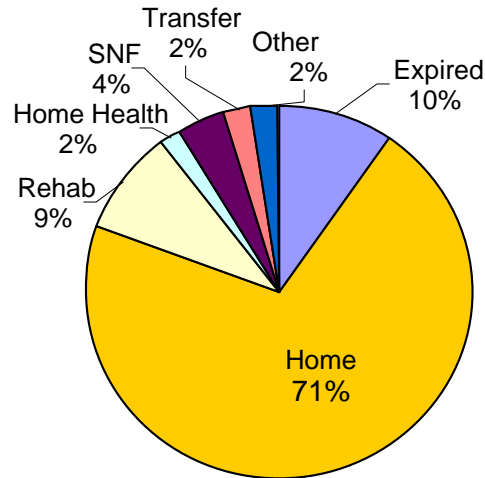
The 15-24 year old age group sustained the largest percentage of TBI cases both in 2007, 26.8% (n = 736), and 2006, 23.8% (n = 620). Overall, there was a 13% (n = 309) increase in the number of TBIs in 2007 over the 2006 numbers. In 2007, the ages of four TBI cases were unknown and, in 2006, the ages of 6 TBI cases were not known. The “Other” category in the data includes Asians, Hispanics, and others.

Table 2
2006 TBI Cases by Age, Gender & Race

Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2006 – December 31, 2006
 (n = 2,441)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	37	12	25	13	8	2	97	2.9%
5 to 14	87	25	36	14	8	2	172	7.5%
15-24	290	161	96	36	31	6	620	23.8%
25-34	202	63	84	33	23	4	409	18.0%
35-44	170	81	59	25	16	5	356	13.6%
45-54	128	51	52	20	7	1	259	14.2%
55-64	107	54	30	6	2	2	201	7.9%
65-74	61	51	9	6	2	1	130	4.8%
75-84	58	63	10	4	2	1	138	5.2%
>84	24	24	0	3	0	2	53	1.8%
Total	1164	585	401	160	99	26	2435	99.7%
% Total	47.0%	24.5%	15.5%	6.9%	4.8%	1.0%	99.7	

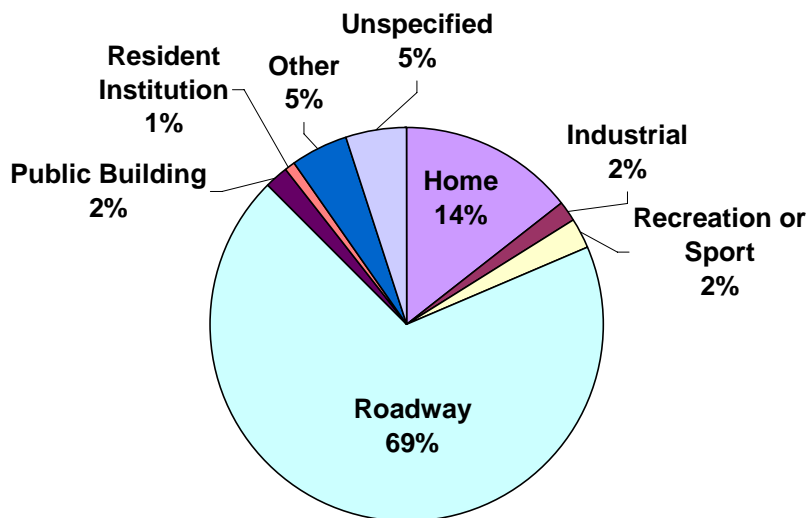
Figure 5
Discharge Disposition Following TBI Cases
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 2,750)



By far the greatest portion, seventy-one percent (n = 1,954), were discharged home. From the data, it cannot be determined how many of these were referred to outpatient rehab facilities. Two percent (n = 43) were discharged to home health services. Ten percent (n = 265) of TBI cases died. Two percent (n = 60) were transferred to hospitals who did not submit data to the ATR. Nine percent (n = 248) were transferred to inpatient rehab facilities. Four percent (n = 119) were sent to skilled nursing facilities (SNF). The “Other” category includes psychiatric hospitals, hospices, and assisted living facilities, as well as “against medical advice” and not documented discharges.

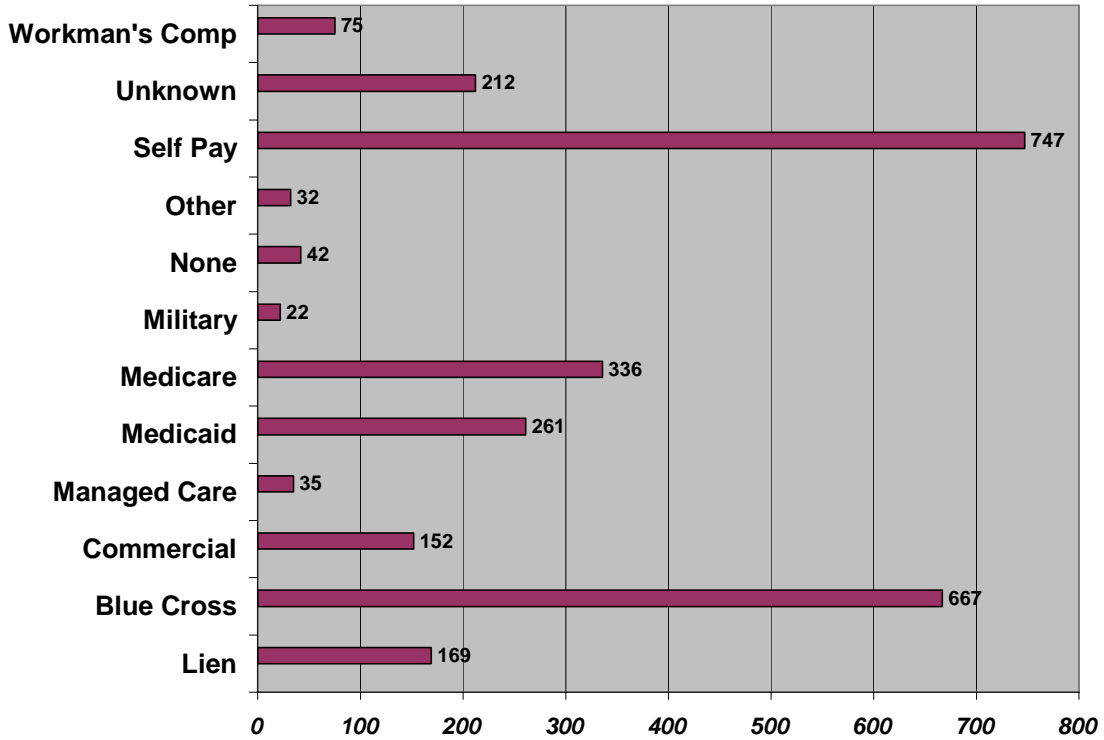
Figure 6
Site of Injury Occurrence in TBI Cases

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 2,750)



Most traumatic brain injuries reported to the ATR occurred on roads, streets and highways, sixty-nine percent (n = 1,898). Fourteen percent (n = 396) occurred in the home, two percent (n = 63) in places for sports and recreation, two percent in public buildings (n = 51), one percent (n = 27) in residential institutions such as hospitals and nursing homes, and five percent (n = 130) in a variety of other settings. Five percent (n = 136) of cases had no site specified.

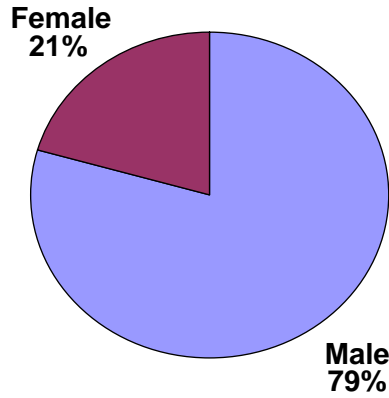
Figure 7
Payer Source for TBI Cases
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2007 – December 31, 2007
 (n = 2,750)



Individuals paid for their own care in 27% (n = 747) of cases according to information sent to the ATR. Twenty-four percent (n = 667), were paid for by various Blue Cross/Blue Shield plans. There was no payment in only 2% (n = 42) of cases whereas there was no payment in 20% of cases in 2006. Medicare and Medicaid paid in 12% (n = 336) and 9% (n = 261), respectively. Various commercial insurance companies were primary payers in 6% (n = 152) of TBI cases reported to the Registry. Workman's compensation was the primary payer in 3% (n = 75), hospital liens were held in 6% (n = 69), and managed care plans were the primary payers in 1% (n = 35). The payment source was not documented in 8% (n = 212). The source of payment data sent to the ATR is particularly subject to misclassification for various reasons, e.g. the commercial group might include some managed care organizations or the primary payment source may not be properly submitted when there are multiple sources of payment.

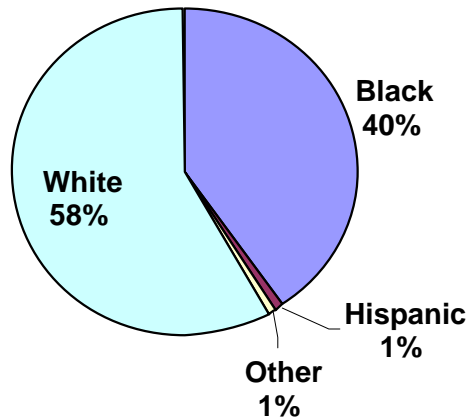
Spinal Cord Injury

Figure 8
Proportion of SCI Cases by Gender
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 117)



There were 3.9 times more male SCI cases (n = 93) than female cases (n = 24) reported to the Alabama Trauma Registry for calendar year 2007.

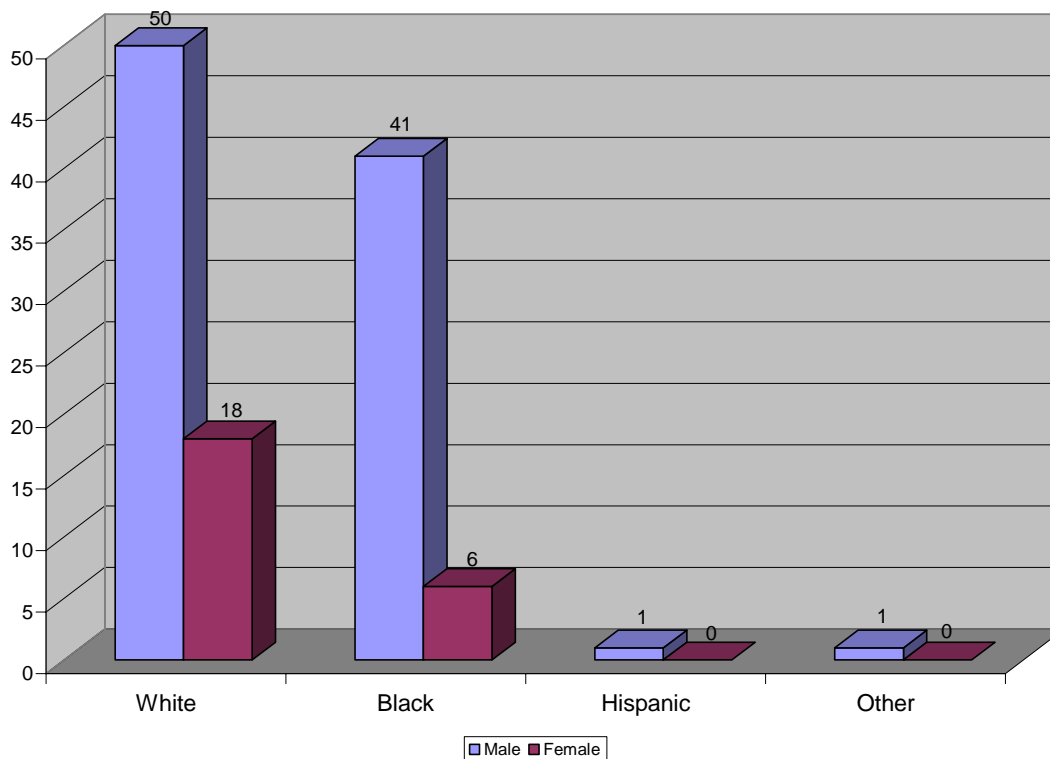
Figure 9
Proportion of SCI Cases by Race/Ethnicity
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 117)



Whites constitute 58% (n = 68) of the SCI cases, Blacks 40% (n = 47), Hispanics 1% (n = 1), and Other groups 1% (n = 1).

Figure 10
Number of SCI Cases by Race/Ethnicity and Gender

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 117)



Seventy-four percent (n = 50) of SCI cases in whites were male and eighty-seven percent (n = 41) in blacks were male. One hundred percent in both Hispanics (n = 1) and in the “Other” category (n = 1) were male. The overall percentages in this injury type were 79% male and 21% female (see Figure 8).

Table 3
2007 SCI Cases by Age, Gender & Race
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2007 – December 31, 2007
 (n = 117)

Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	0	0	0	0	0	0	0	0.00
5 to 14	2	0	2	0	0	0	4	3.4%
15-24	7	7	10	2	0	0	26	22.2%
25-34	10	2	8	2	0	0	22	18.8%
35-44	7	1	7	0	1	0	16	13.7%
45-54	11	2	7	1	0	0	21	17.9%
55-64	3	1	6	1	1	0	12	10.3%
65-74	5	1	0	0	0	0	6	5.1%
75-84	5	2	1	0	0	0	8	6.8%
>84	0	2	0	0	0	0	2	1.7%
Total	50	18	41	6	2	0	117	100.00%
% Total	42.7%	15.4%	35.0%	5.1%	1.7%	0.00	100.00	

The 15-24 year old age group experienced the largest percentage of spinal cord injuries, 22.2% (n = 26), as was the case in 2006, 31.1% (n = 32). However, the total number of individuals with both head and spinal cord injuries increased 14%, from 103 in 2006 to 117 in 2007. The “Other” category in the table on this page includes Asians, Hispanics, and other racial/ethnic origin.

Table 4
2006 SCI Cases by Age, Gender & Race
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2006 – December 31, 2006
 (n = 103)

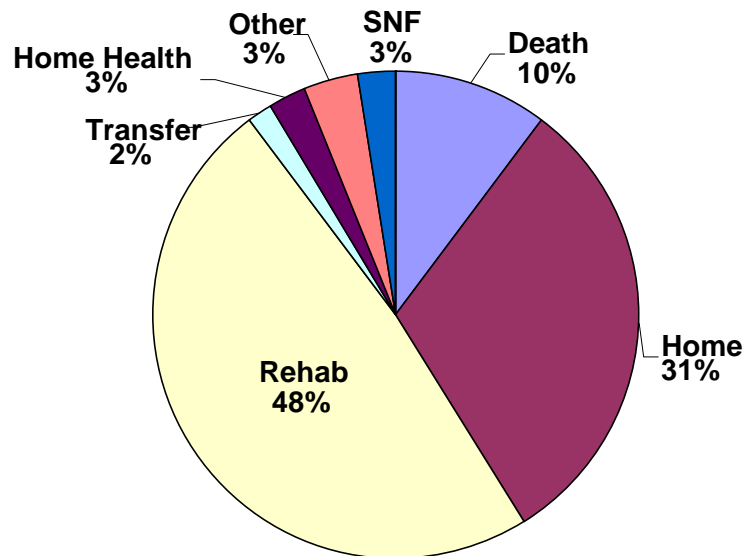
Age	White Males	White Females	Black Males	Black Females	Other Males	Other Females	Total	% Total
<5	0	1	0	0	0	0	1	1.0%
5 to 14	0	0	0	2	0	0	2	1.9%
15-24	14	5	11	1	0	1	32	31.1%
25-34	8	3	6	2	0	0	19	18.5%
35-44	3	3	6	1	0	0	13	12.6%
45-54	10	1	5	0	1	0	17	16.5%
55-64	5	2	1	0	0	0	8	7.8%
65-74	1	0	0	0	0	0	1	1.0%
75-84	2	3	0	2	0	0	7	6.8%
>84	2	1	0	0	0	0	3	2.9%
Total	45	19	29	8	1	1	103	100.00%
% Total	43.7%	18.4%	28.2%	7.8%	1.0%	1.0%	100.00	

Figure 11
Discharge Disposition Following SCI Cases

Alabama Head and Spinal Cord Registry (AHSCIR)

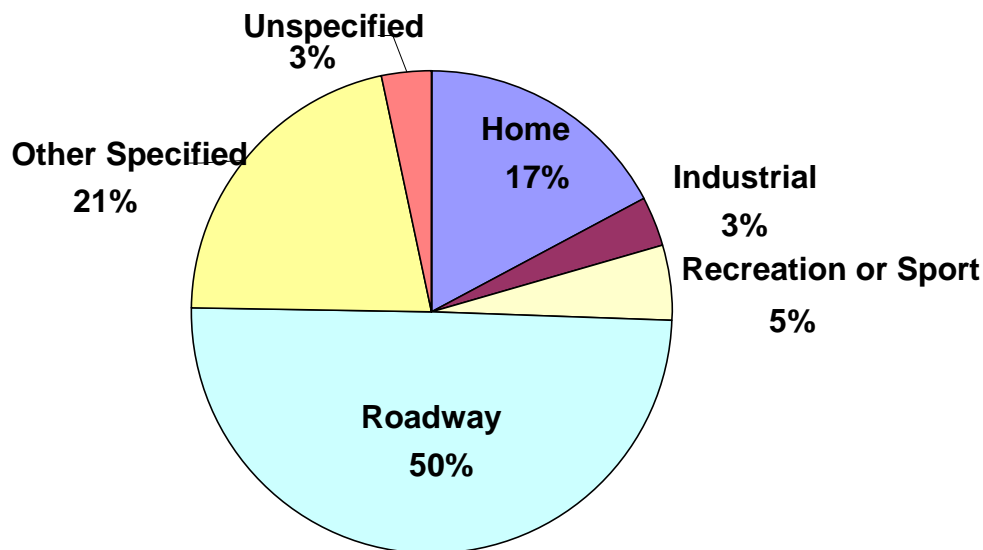
January 1, 2005 – December 31, 2005

(n = 117)



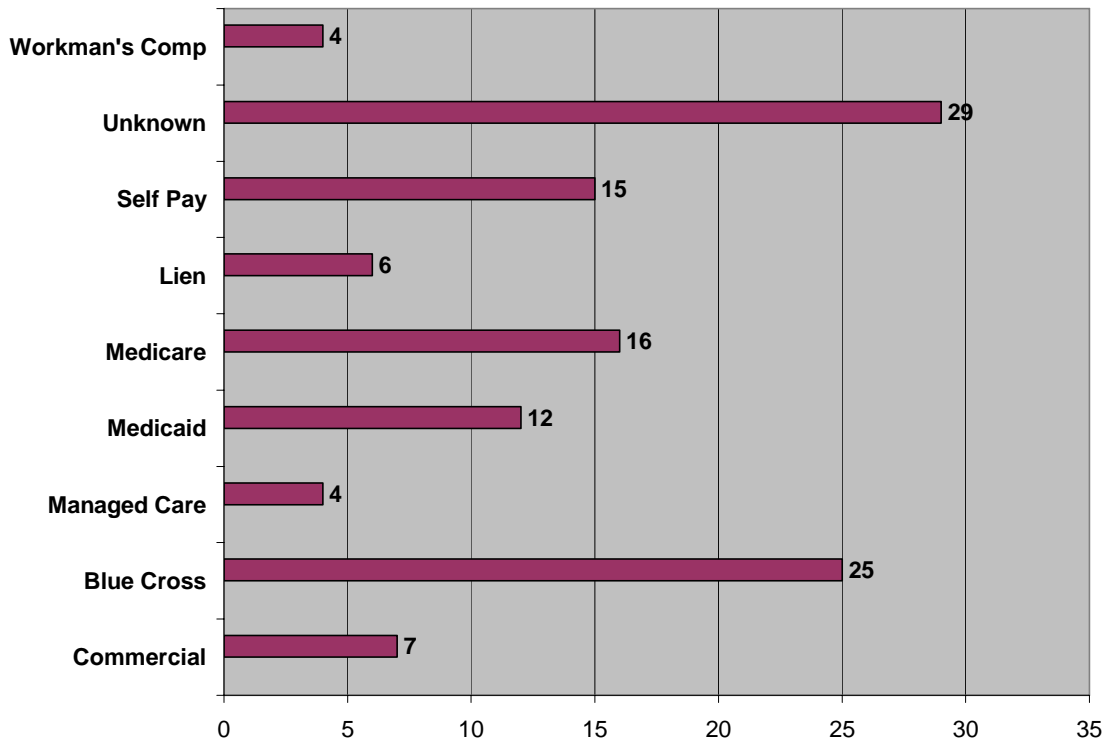
Thirty-one percent (n = 36) were discharged home. Three percent (n = 3) were referred to home health services. Forty-eight percent (n = 67) of SCI cases went to residential rehabilitation facilities and three percent (n = 3) went to skilled nursing facilities (SNFs). Ten percent (n = 12) of SCI cases died. The discharge disposition of three percent (n = 4) of the cases was not specified.

Figure 12
Site of Injury Occurrence in SCI Cases
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 117)



Most spinal cord injuries, 50% (n = 58), reported to the ATR occurred on streets and highways. Seventeen percent (n = 20) occurred in private residences. Three percent (n = 4) occurred in industrial settings, and five percent (n = 6) in places for sports and recreation. Three percent (n = 4) had no injury setting documented. The remaining 21% (n = 31) were in various other specified settings.

Figure 13
Payer Source for SCI Cases
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2007 – December 31, 2007
 (n = 117)

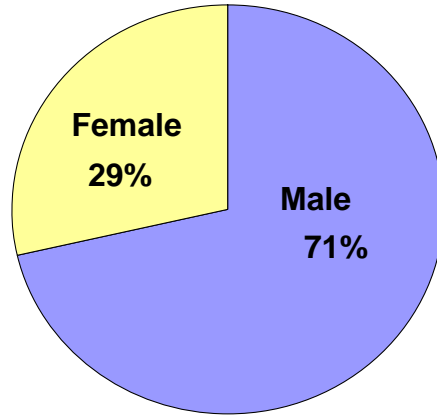


Blue Cross/Blue Shield was the most frequent primary payment source for SCI cases at 21% (n = 25); however, primary payers were not documented 25% (n = 29) of cases. The injured individuals or their families paid in 13% (n = 15) of cases, the same percentage as in 2006. Medicare and Medicaid in 14% (n = 16) and 10% (n = 12), respectively. The primary payer was private commercial insurance in six percent (n = 7) of cases. Workman's compensation was the primary payer in 6% (n = 7) of cases and liens were used to pay in five percent (n = 6).

Cases with Both Head and Spinal Cord Injuries

Figure 14
Proportion of Cases with Both Traumatic Brain and Spinal Cord Injuries by Gender

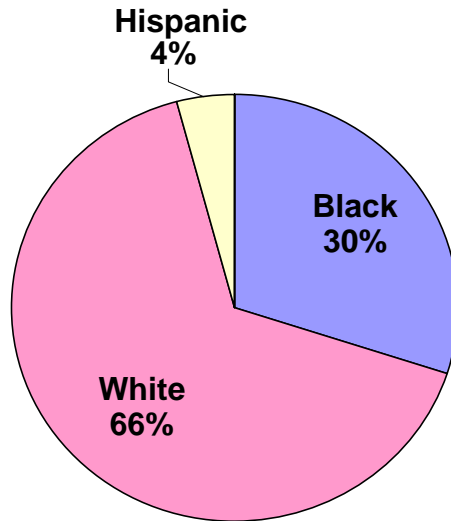
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 70)



There were 2.5 times more male cases (n = 50) with simultaneous head and spinal cord injuries than female cases (n = 20) reported to the Alabama Trauma Registry for calendar year 2007.

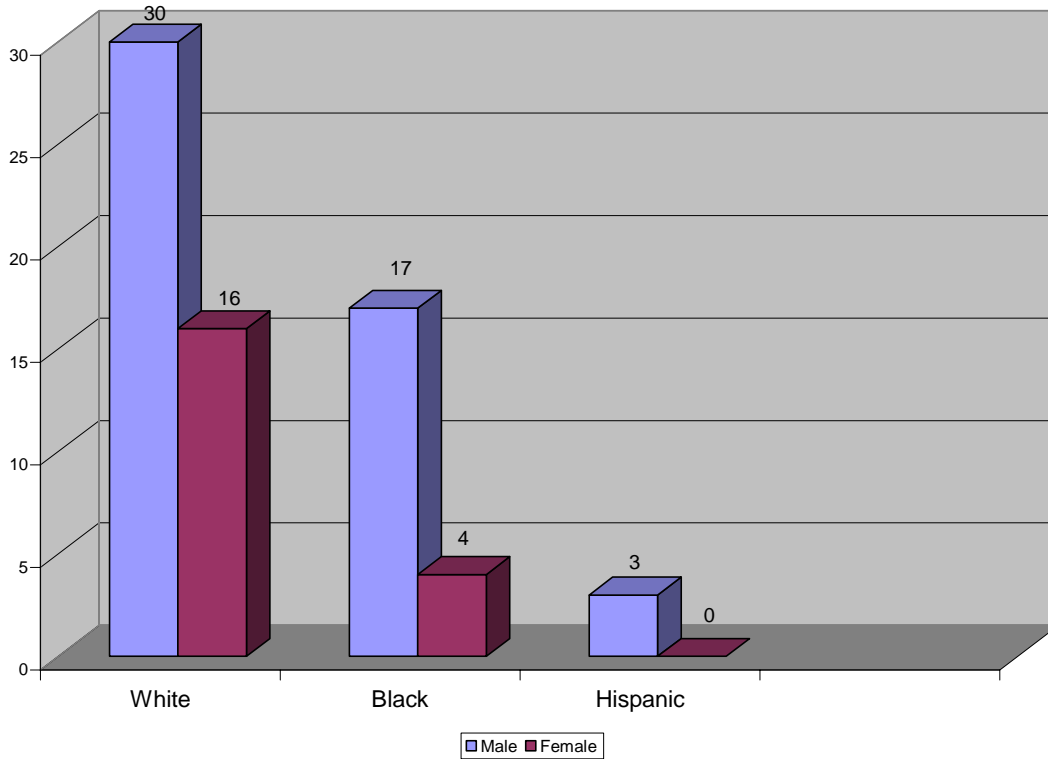
Figure 15
Proportion of Cases with Both Traumatic Brain and Spinal Cord Injuries by Race/Ethnicity

Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 70)



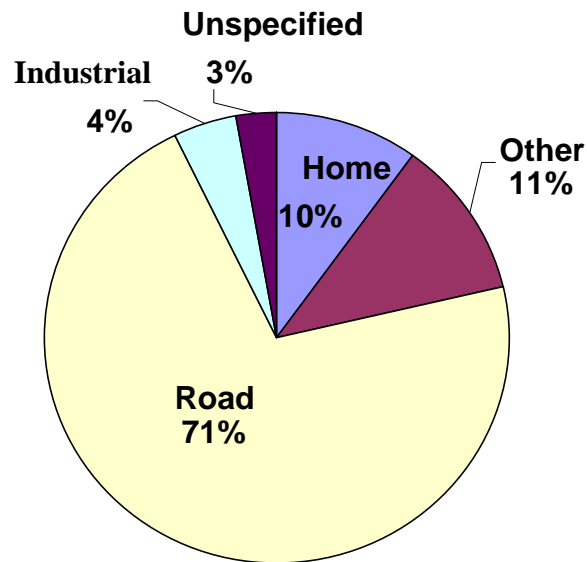
Whites constitute 66% (n = 46) of the cases with both head and spinal cord injuries, Blacks 30% (n = 21), and Hispanics 4% (n = 3).

Figure 16
Number of Cases with Both TBI and SCI by Gender and Race
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2007 – December 31, 2007
 (n = 70)



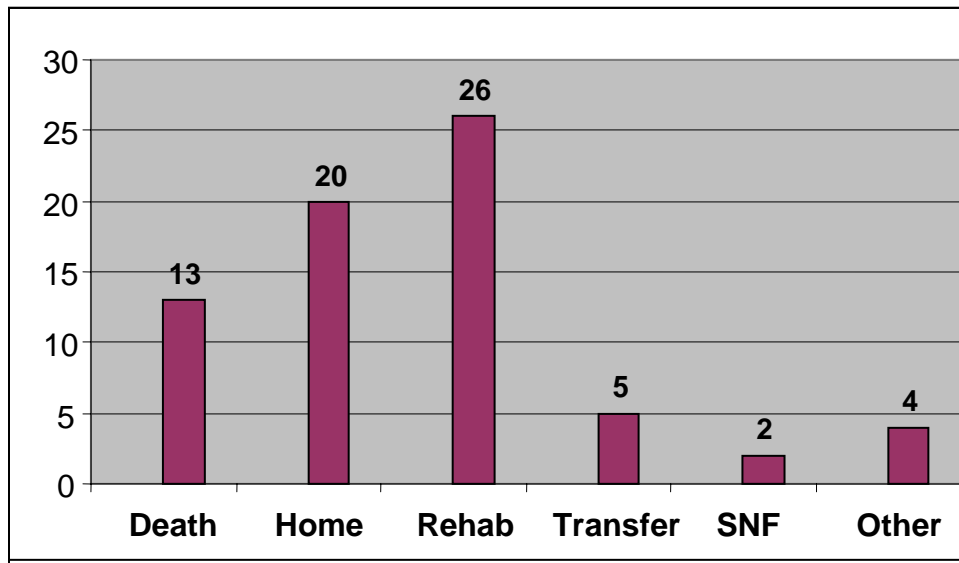
Sixty-five percent (n = 30) of cases with both head and spinal cord injuries in whites were male, eighty-one percent (n = 17) in Blacks were male, and all three Hispanic cases were male. The overall percentages in this injury type were 71% male and 29% female (see Figure 14).

Figure 17
Site of Injury Occurrence in Cases with Both TBI and SCI
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 70)



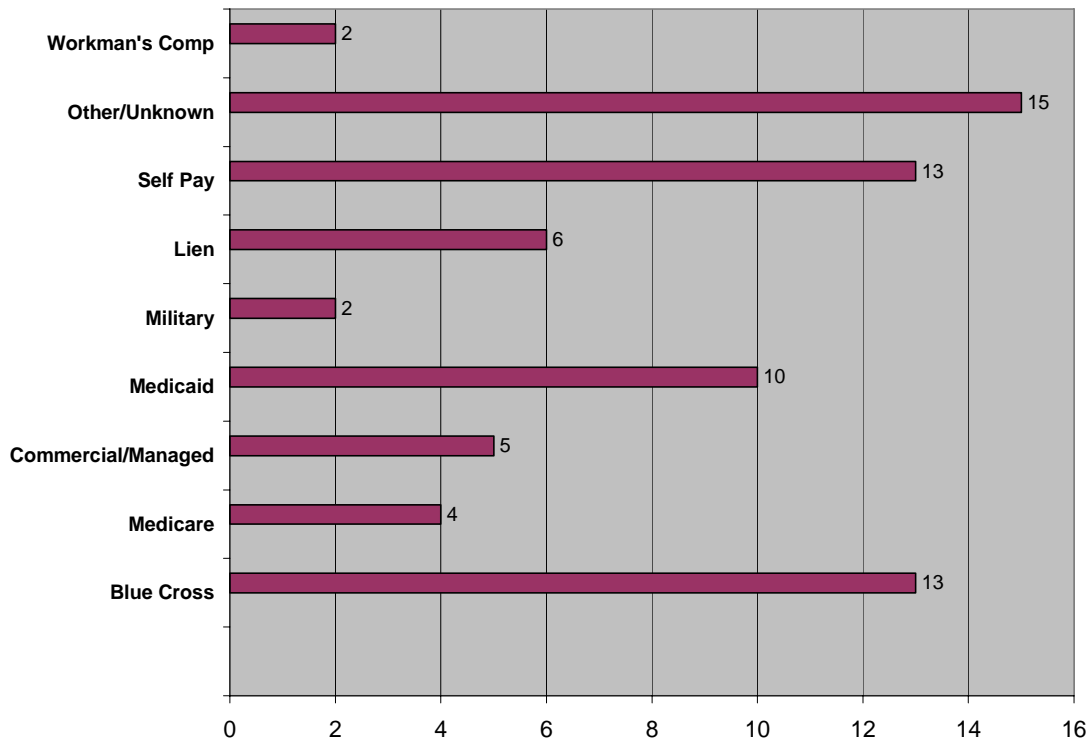
Seventy-one percent (n = 50) of ATR cases that had both TBI and SCI occurred on streets and highways. Ten percent (n = 7) occurred in the home. Four percent (n = 1) occurred in places for recreation or sport. Two percent (n = 1) were in industrial settings, and one case occurred on a farm. The place of injury was not specified in two percent of cases (n = 1).

Figure 18
Discharge Disposition Following Cases with Both TBI and SCI
Alabama Head and Spinal Cord Registry (AHSCIR)
January 1, 2007 – December 31, 2007
(n = 70)



Twenty-six cases (37%) were discharged to residential rehabilitation facilities. Twenty (29%) were discharged home. Thirteen cases (19%) with both head and spinal cord injuries died. Two (3%) were discharged to skilled nursing facilities (SNFs). Five (7%) were transferred to other acute care facilities. Four cases (6%) were discharged to other type destinations.

Figure 19
Payer Sources for Cases with Both TBI and SCI
 Alabama Head and Spinal Cord Registry (AHSCIR)
 January 1, 2007 – December 31, 2007
 (n = 70)



Blue Cross/Blue Shield paid in 13 cases (19%) that had both head and spinal cord injuries. Individuals or their families paid for their own medical care in 13 cases (19%). The source of payment in four cases (6%) was Medicare and Medicaid in ten cases (14%). Workman's compensation paid in two cases (3%). Commercial insurance and managed care companies paid in five cases (7%). Compensation was documented as "lien" in six cases (9%).