

# Health Care Access and Utilization after Spinal Cord Injury



Lee L. Saunders, PhD

Webcast

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# Spinal Cord Injury (SCI)



- Results in immediate and general permanent changes in sensory, motor, bowel, bladder, and sexual function
- Risk of secondary conditions and early mortality
- 12,000 new cases per year
- 265,000 living with SCI in the US
- Average age at injury = 40.7 years
- 80.7% male
- 66.5% White, 26.8% African-American

# Cost of SCI



- Significant direct and indirect cost over the lifetime

**Table 1. Annual direct charges and costs by neurologic category (2009 US Dollars)**

	Neurologic Category			
	C1-4 ABC	C5-8 ABC	T1-S5 ABC	AIS D
<b>Annual direct charges</b>				
<b>First year (t = 1)</b>	953,360	688,886	464,633	311,141
<b>After first year (t &gt; 1)</b>	165,554	101,560	61,550	37,792
<b>Annual direct costs*</b>				
<b>First year (t = 1)</b>	423,152	293,529	191,431	122,753
<b>After first year (t &gt; 1)</b>	150,508	89,254	49,147	33,535

**\*Adjusted by the cost to charge ratios or insurance reimbursement rates**

# Cost of SCI



	Mean Days Hospitalized (SE)	Mean Costs per Hospitalization (SE)
1. Urinary Tract Infection	7.3 (0.6)	\$12,617 (1,123)
2. Pressure Ulcer	19.8 (1.9)	\$38,866 (4,524)
3. Respiratory Issues	7.5 (0.8)	\$15,096 (1,811)
4. Nervous System issues	6.9 (1.0)	\$23,213 (3,170)
5. Digestive System Issues	10.9 (4.2)	\$23,157 (8,689)
6. Subsequent Injury	8.2 (1.8)	\$14,308 (2,008)
7. Psychosocial problems	9.0 (1.3)	\$8,505 (1,183)

# Health Care Access (HCA)



- The ability of a person to receive health care services
  - Availability of personnel and supplies
  - Ability to pay for services

# Health Care Access and SCI



- People with disabilities have reported three times more unmet health needs than the general population (Beatty et al., 2003; Donnelly et al., 2007).
- One survey study (Shigaki et al., 2002) suggested those with SCI had difficulty in accessing services (87% of survey population).
- Beatty et al. (2003), only half of the individuals who requested a need for rehabilitation services received them every time they were requested, regardless of health plan type.
- Medicare remains the largest payer of specific rehabilitation services, and Medicare payment policies continue to have an impact on willingness of providers to supply rehabilitation services (Dejong et al., 2002).

# Health Care Access and Insurance Type



- Research on health care access (HCA) and outcomes after SCI has mainly focused on insurance type.
  - Insurance type has been linked with re-hospitalization after rehabilitation, length of stay during rehabilitation (DeVivo 1989), psychological distress, and participation. (Tate 1994)
- Lack of insurance, in addition to racial-ethnic minority status and low income, is associated with barriers to HCA. (Neri 2003)



# HCA and Secondary Conditions



- Access to care is a critical, yet understudied, factor in relation to secondary conditions after SCI. (Beatty et al., 2003; Donnelly et al., 2007; Neri & Kroll, 2003b; Shigaki, Hagglund, Clark, & Conforti, 2002)
- Low income (proxy variable for poor access to services) has been linked to early mortality after SCI (Krause, Zhai, Saunders, & Carter, 2009), and secondary conditions are the primary predictors of mortality. (Krause, Carter, Pickelsimer, & Wilson, 2008; Krause et al., 2009)

# SCI Research



- Identifying participants through inpatient rehabilitation programs limits the generalizability of findings to those who cannot afford or do not have access to those programs.
- Payments for rehabilitation services are often restricted or denied because many health insurance companies do not deem rehabilitation services as ‘medically necessary’. (Elrod & DeJong, 2008)
- Participants identified through a state-based surveillance system include all those with SCI regardless of if and where rehabilitation was received.

# Objectives



- To identify the health care access (HCA) and utilization of persons in a population-based cohort with traumatic SCI.
- To compare the HCA in a population-based cohort with SCI with a clinically based cohort.
- To compare self-report and medical record report of health care utilization in a population-based cohort with SCI.

# METHODS



# Participants



- Institutional Review Board approval was obtained prior to study initiation.
- Identified through the South Carolina SCI Surveillance System Registry
  - All non-federal hospital discharge records are mandated to be submitted to the Office of Research and Statistics in SC
  - ICD-9-CM codes of 806.[0-9] or 952.[0-9]
  - Persons discharged alive from the hospital 1998-2012

# Participants



- Eligibility Criteria:
  - 18 or older at assessment
  - Traumatic SCI without full recovery
  - 1 or more years post-injury
- 2,063 participants meeting criteria approached to participate
  - All potential participants were sent an assessment tool to return by mail
  - 833 participants (40.4%)

# Assessment



- **Demographics**

- Gender
- Race-ethnicity
- Age

- **SCI Characteristics**

- Injury level
- Ambulatory status
- Etiology

- **Socioeconomic Status**

- Annual household income
- Education
- Post-SCI employment

# Health Care Access



- Personal doctor or health care provider
- Time since last routine check-up
- A time in the past year postponed care because of
  1. cost
  2. transportation
- Type of Insurance
- Trouble paying medical bills



# Health Care Utilization



- Number of hospitalizations in the past year
  - Number of days hospitalized in the past year
- Number of emergency department (ED) visits in the past year
- Number of surgeries in the past year

# RESULTS



## Health Care Access & Utilization

# Demographic & SCI Characteristics



Characteristic	%
<b>Sex</b>	
Male	71.5
Female	28.5
<b>Race/Ethnicity</b>	
White	60.6
Black	34.4
Hispanic	2.0
Other	3.0
<b>Age at survey</b>	49.5 (16.9)
<b>Years post-injury</b>	5.8 (3.8)
<b>Injury Severity</b>	
C1-C4, Non-ambulatory	6.3
C5-C8, Non-ambulatory	12.1
Non-cervical, Non-ambulatory	16.9
Ambulatory	64.8

# Socioeconomic Status



Characteristic	%
<b>Annual household income</b>	
<\$25,000	60.2
\$25,000 - \$74,999	28.8
\$75,000+	11.1
<b>Highest level of education</b>	
Less than high school	20.3
High school degree/GED	37.2
Associates/Technical degree	27.5
Bachelor's degree or higher	15.0
<b>Currently Employed (ages 18-64)</b>	18.9
Employed at injury	64.1

# Insurance Status\*



Characteristic	Pre-injury	Post-injury
	Column %	
Medicaid	19.8	33.1
Medicare	23.4	46.3
Worker's Compensation	7.9	3.8
Private	35.2	24.1
Other	17.2	16.0
No Insurance	18.7	15.8

\*Percentages do not add to 100% as persons could select more than one type

# Health Care Access



<b>Variable</b>	<b>%</b>
<b>Healthcare Access</b>	
<b>Routine check-up</b>	
<b>Past year</b>	70.4
<b>1-2 years ago</b>	12.1
<b>More than 2 years ago</b>	17.5
<b>Time in the past year no insurance</b>	
<b>Yes</b>	20.8
<b>Regular health care provider</b>	
<b>No</b>	10.5
<b>Yes-one</b>	73.1
<b>Yes- more than one</b>	16.4
<b>Missed care due to cost or transportation</b>	38.7
<b>Trouble paying medical bills in past year</b>	42.5
<b>Currently have unpaid medical bills</b>	52.8

# Health Care Utilization



Variable	%
<b>Hospitalizations in the past year</b>	
0	60.9
1	28.2
2+	10.9
<b>Days hospitalized</b>	
Mean (s.d.)	12.4 (14.6)
<b>ED visits in past year</b>	
0	51.2
1	29.3
2+	19.5
<b>Surgeries in the past year</b>	
0	69.4
1	26.3
2+	4.3

# Comparison with a Clinical Population





# Clinical Population



- Persons identified through inpatient or outpatient records at Shepherd Center in Atlanta, GA
- Part of an ongoing longitudinal study, but data collected during the same time period as population-based cohort
- Inclusion criteria:
  - 18 or older at assessment
  - Traumatic SCI without full recovery
  - 1 or more years post-injury
- Of 2,573 eligible, 1,689 participants

# Demographic & SCI Characteristics



Characteristic	Clinical (n=1,689)	Population (n=833)	Total	p-value
	Column Percent			
<b>Demographics</b>				
<b>Gender</b>				0.1887
Male	74.4	71.9	73.6	
Female	25.6	28.1	26.5	
<b>Race</b>				<.0001
White	72.9	60.4	68.8	
Black	21.7	34.7	26.0	
Other	5.4	4.9	5.2	
<b>Age</b>	48.5 (13.3)	49.4 (16.8)	48.8 (14.5)	0.1487
<b>Injury Characteristics</b>				
<b>Injury Severity</b>				<.0001
C1-C4, NonA	9.9	6.3	8.7	
C5-C8, NonA	25.3	12.0	21.0	
NonC, NonA	33.6	16.9	28.1	
Ambulatory	31.2	64.8	42.2	
<b>Time post-injury</b>	15.9 (9.9)	5.8 (3.8)	12.6 (9.7)	<.0001
<b>Etiology</b>				<.0001
MVC	51.5	48.5	50.5	
Fall	17.0	30.7	21.5	
Violence	10.0	7.3	9.1	
Other	21.6	13.6	19.0	

# Socioeconomic Status



Characteristic	Clinical (n=1,689)	Population (n=833)	Total	p-value
	Column Percent			
<b>Socioeconomic Status</b>				
<b>Household Income</b>				<b>&lt;.0001</b>
<\$25,000	46.3	60.2	50.9	
\$25,000-\$74,999	33.3	28.8	28.8	
\$75,000+	20.3	11.1	11.1	
<b>Education</b>				<b>&lt;.0001</b>
Less than HS	10.8	20.3	14.0	
High School	31.0	37.2	33.0	
Associates	27.1	27.5	27.2	
Bachelors+	31.1	15.0	25.8	
<b>Employment</b>				<b>&lt;.0001</b>
Currently employed	25.5	17.1	22.7	
Employed post-injury	20.9	12.7	18.2	
Not employed post-injury	53.6	70.2	59.1	

# Health Care Access



Characteristic	Clinical (n=1,689)	Population (n=833)	Total	p-value
	Column Percent			
<b>Healthcare Access</b>				
<b>Personal Doctor</b>				<b>&lt;.0001</b>
None	6.7	10.5	7.9	
One	80.3	73.1	78.0	
More than one	13.0	16.4	14.1	
<b>Routine Checkup</b>				0.0814
Past year	73.0	70.6	72.2	
Past 2 years	12.9	11.9	12.5	
2+ years	14.1	17.5	15.4	
Postponed care b/c cost/insurance	13.5	29.0	18.6	<b>&lt;.0001</b>
Postponed care b/c transportation	12.8	21.8	15.7	<b>&lt;.0001</b>
Private insurance	44.1	23.4	36.5	<b>&lt;.0001</b>

# Predicting Cohort Membership



Variable	Odds Ratios (95% CI)*	p-value
<b>Education (v. &lt; High School)</b>		<b>&lt;.0001</b>
High School	1.48 (1.01-2.17)	
Associates	1.60 (1.07-2.40)	
Bachelors+	3.07 (1.97-4.79)	
<b>Employed (v. Current Employed)</b>		0.0672
Employed post-injury	1.04 (0.68-1.59)	
Not employed post-injury	1.45 (1.01-2.08)	
<b>Miss care past year due to cost (v. no)</b>		<b>0.0040</b>
Yes	0.63 (0.47-0.86)	
<b>Miss care past year due to transportation (v. no)</b>		<b>0.0164</b>
Yes	0.66 (0.47-0.93)	
<b>Private insurance (v. no)</b>		<b>&lt;.0001</b>
Yes	2.30 (1.72-3.06)	

\*controlling for race, age, years post-injury, injury severity, and etiology

# Conclusions



- There were clear differences between the population and clinically based cohorts with respect to demographics, injury characteristics, SES, and HCA.
- These disparities highlight a need to study long term health outcomes in a population-based cohort which includes those who may have more limited access to resources than clinically-based cohorts.
- Future work should also assess health care utilization of a population-based cohort to assess usage patterns and possibly identify areas of unmet need.

# Comparison of Self-report and Medical Record Report Health Care Utilization



# Medical Record Reports



- We compared both self-reported hospitalizations and ED visits with the number of visits recorded through the office of research and statistics (ORS)
- ORS would include any hospitalizations or ED visits in non-federal hospitals in South Carolina



# Hospitalizations & ED Visits



- **Self-report**

- 742 hospitalizations
- 1,129 ED visits

- **Medical Record**

- 446 hospitalizations
- 1,071 ED visits

# Predicting Hospitalization Over-reporting



<b>Variable</b>	<b>P-value</b>
<b>Years Post-injury</b>	0.5262
<b>Age</b>	0.0455
<b>Income</b>	0.4721
<b>Race</b>	0.1093
<b>Physical Health</b>	0.0002
<b>Mental Health</b>	0.2665
<b>Married/Couple</b>	0.5021
<b>Injury Severity</b>	0.0021
<b>Border County</b>	0.0614

# Reporting Timeframe



	12-month	13-month	14-month	15-month
12-month self-reported Hospitalizations	0.66127	0.65257	0.63026	0.60804

- We assessed the correlation between self-report (asked for a 12-month time frame) and medical record abstraction from 12 to 15 months after the date of survey.
- Correlations between self-report and medical record decreased as the time-frame of medical record abstraction was increased

# Border Counties



- Our model showed border county was close to significant in the relationship with over reporting (0.0614), but, through investigation, we did not find evidence to support this as the primary cause of over reporting.

# Next Step



- Our next step will be to compare the predictive models of both self-report and medical record report of utilization.
- These results will demonstrate if the two different ways of measuring health care utilization (self-report, medical record abstraction) are predicted by the same variables, or if they have different predictive models.

# Summary



- Our results have shown the importance of assessing outcomes in a population-based cohort of persons with SCI.
- Persons in this cohort may be underrepresented in the current literature and are significantly different with regards to injury characteristics, socioeconomic factors, and health care access.
- Future analyses will assess how these important factors relate to health outcomes in this population.

# Thank you!



- Lee Saunders: [saundel@musc.edu](mailto:saundel@musc.edu)
- Website: <http://www.longevityafterinjury.com>