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# Spinal Cord Injury Co-Morbidities

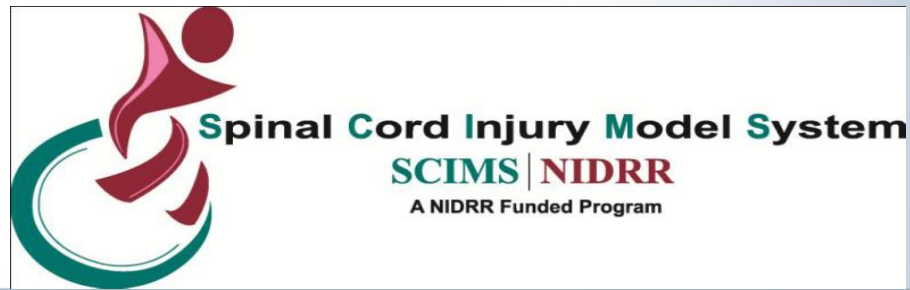
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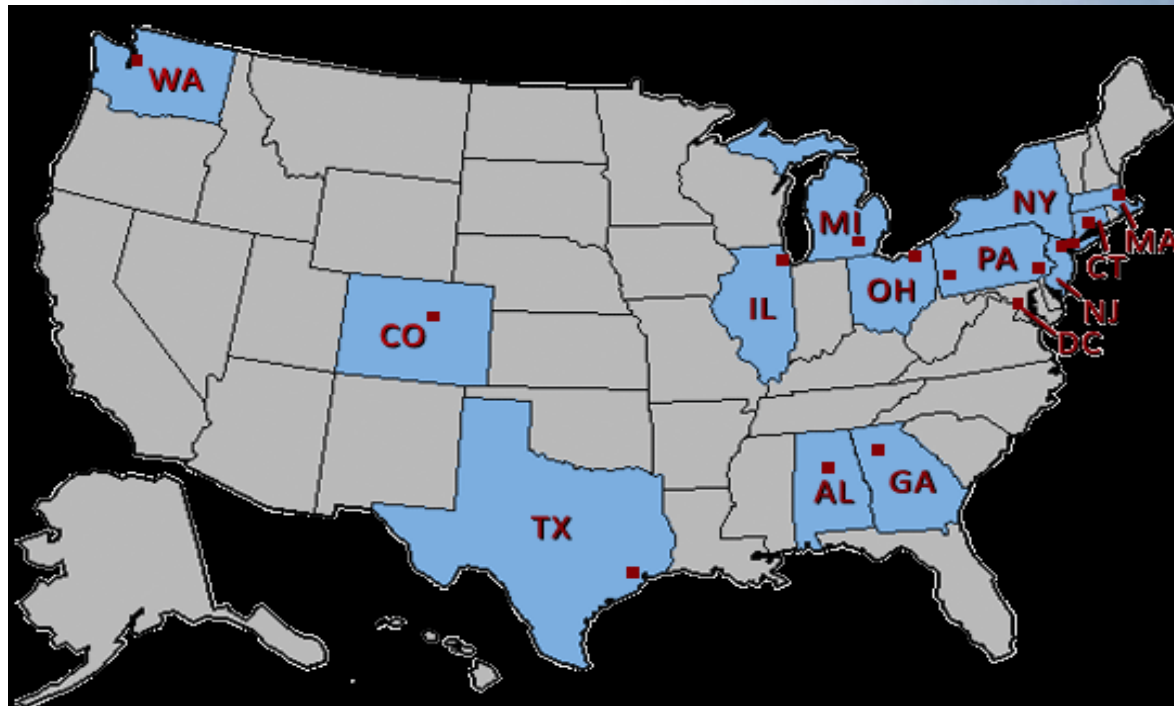


# The Genesis of the SCI Model Systems

- *“ A Model System must be able to meet the needs of a person with SCI by competently treating the direct injury as well as all organ systems affected (of which there are many); the functional deficits that result, by providing training and equipment; the psychological adjustments that must be made; the vocational/avocational pursuits that must be changed; and the providing of long-term specialized care.”*

~ John Young, 1971

# Current SCI Model Systems



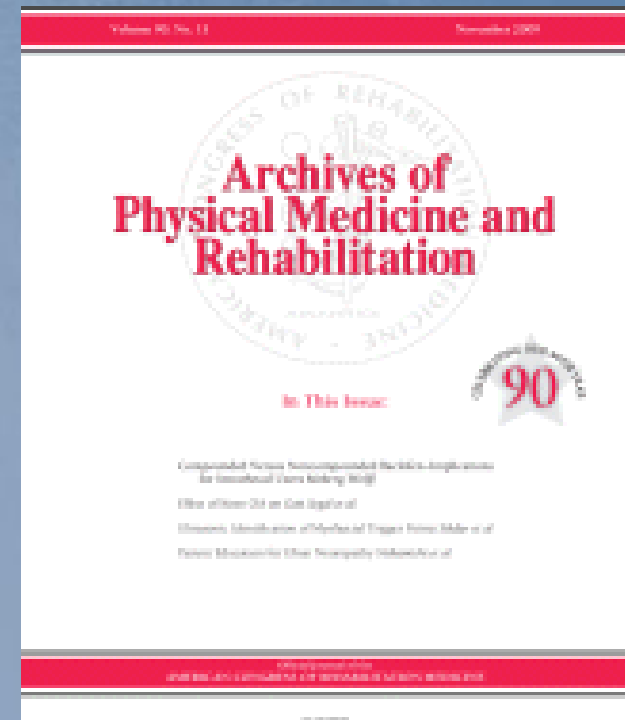
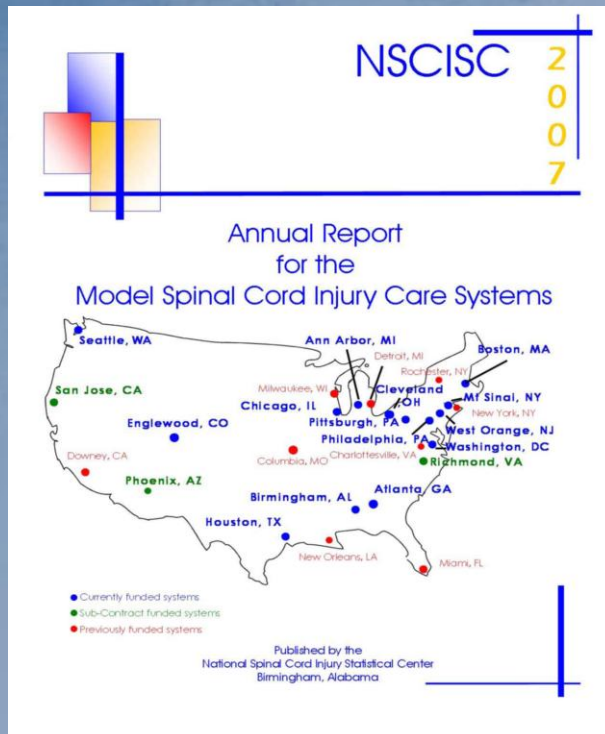
# SCIMS programs (2006-2011)

- UAB Model Spinal Cord Injury Care System, Birmingham, AL
- The Rocky Mountain Regional Spinal Injury System, Englewood , CO
- National Capitol Model Spinal Cord Injury Model System, Washington, DC
- Georgia Regional Spinal Cord Injury System, Atlanta, GA
- Midwest Regional Spinal Cord Injury System, Chicago, IL
- North East Regional Spinal Cord Injury System, Boston, MA
- University of Michigan Spinal Cord Injury System, Ann Arbor, MI
- Northern New Jersey Spinal Cord Injury System, West Orange, NJ
- Mount Sinai Spinal Cord Injury System, New York, NY
- Northeast Ohio Regional Spinal Cord Injury System, Cleveland, Ohio
- University of Pittsburgh Model Center on Spinal Cord Injury, Pittsburgh, PA, Ho
- Texas Model Spinal Cord Injury System, Houston, TX
- Northwest Regional Spinal Cord Injury System, Seattle, WA

# The National SCIMS Database

- Captures about 13% of all new SCI in US
- Established at UAB in 1983
- Coordinates data collected by all centers
  - Registry – 11,053 participants (1986-2009)
  - Form I - 26,852 participants
  - Form II - 120,568 participants up to 35 years post injury
- NSCISC has a Data Sharing policy
- Does not collect data on co-morbidities; it did on secondary conditions; it does on associated injuries

# Products from NSCISC and SCIMS



# SCI Facts at a Glance

- Incidence: Approximately 40 cases per million population in the U.S. or 12,000 per year.
- Prevalence: 262,000 persons alive in 2009
- Reported military figures: inconclusive
  - Varies by source
  - Varies by war (World War II, OIF/OEF)
- *MSKTC offers information on secondary conditions*



# Spinal Cord Injury

- Is a life altering and chronic condition that can affect an individual's independence, sense of self-worth, and create additional health problems.
- It is particularly devastating for those whose self-identities are defined by their physical performance.

# Presentation Outline

- The multiple facets of co-morbidities
- SCI related co-morbidities
- Emerging research on depression and pain after SCI
- Summary thoughts

# 1. The Multiple Facets of Co-Morbidities

- Medical Complications
- Co-morbidities
- Secondary Conditions
- Associated Injuries

*There is no clear consensus on how to define these terms.*

# Definitions: Who says what?

Marge, 1988; IOM, 1991; Roth et al.,1992; Chen et al. 1999:

•**Medical co-morbidity:** any medical problem antecedent to the onset of acute SCI ; a health condition that develop independently of the primary condition; some will follow SCI (i.e. SCI and insulin-resistant diabetes)

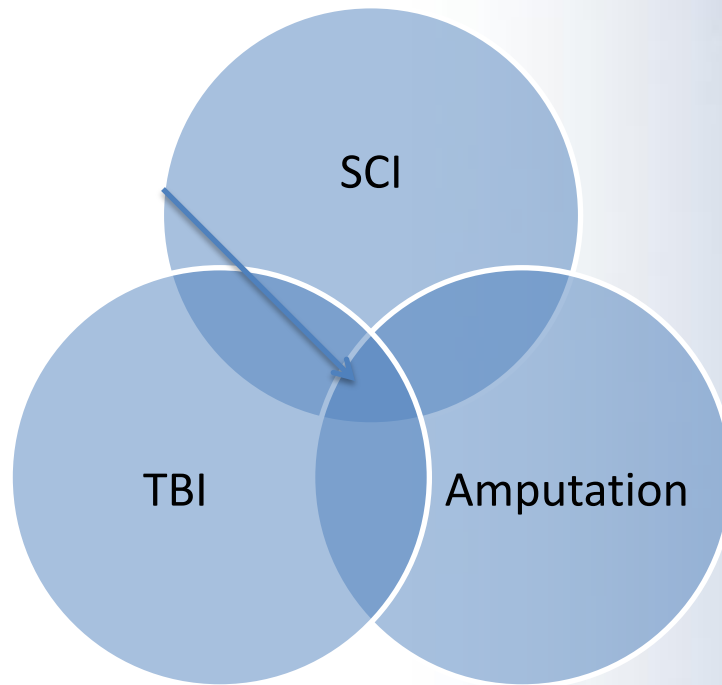


•**Secondary condition:** any additional physical or mental health condition that occurred as a result of having a primary disabling condition

# Associated Injury – NSCISC definition

- Injuries resulting from the same traumatic event that caused the spinal cord injury
- The following injuries are documented:
  - Traumatic brain injury
  - Non-vertebral fractures
  - Severe facial injuries affecting sensory organs
  - Major chest injury requiring mechanical ventilation
  - Traumatic amputations
  - Severe hemorrhaging
  - Damage to any internal organ requiring surgery
- 42.7% report associated injuries

# Polytrauma & SCI-Related Injuries



## 2. SCI Co-Morbidities

### Long-term Morbidity and Mortality

- Life expectancy continues to increase, but are still somewhat below those without SCI
- Mortality rates are significantly higher during the first year after injury.
- Leading causes of death are pneumonia, septicemia, and pulmonary emboli (PE)

*DeVivo, 2008, Facts & Figures ([www.nscisc.uab.edu](http://www.nscisc.uab.edu))*

Date	Authors	Medical Complications and Co-Morbidities
1988	Lyons et al.	Prevalence of psychiatric co-morbidities may be high (adj. disorder, depression, alcohol dep.)
1997	Krause et al.	Self-destructive behaviors include 1) direct : suicide; 2) indirect: excessive alcohol, drugs
1999	McKinley et al.	Pressure ulcers were most frequent in young complete SCI Persons; autonomic dysreflexia; pneumonia/atelectasis with older >60 and tetraplegia complete most at risk; DVT higher in completes
1999	Chen et al.	Pressure ulcers (23.7%); pneumonia (12.9%); DVT (9.8%); dysreflexia (7.9%)
2003	Krassioukov et al.	Co-morbidities were frequent in older SCI: infections, psychiatric disorders, pressure ulcers, cardiovascular
2005	Furlan et al.	No differences by gender with exception of > DVT and psychiatric conditions in women with SCI
2008	Furlan & Fehlings	Cardiovascular dysfunction; DVT; pulmonary emboli; and stroke
2010	Hitzig et al.	Age predicted spasticity; kidney and cardiac problems; hypertension: and pain

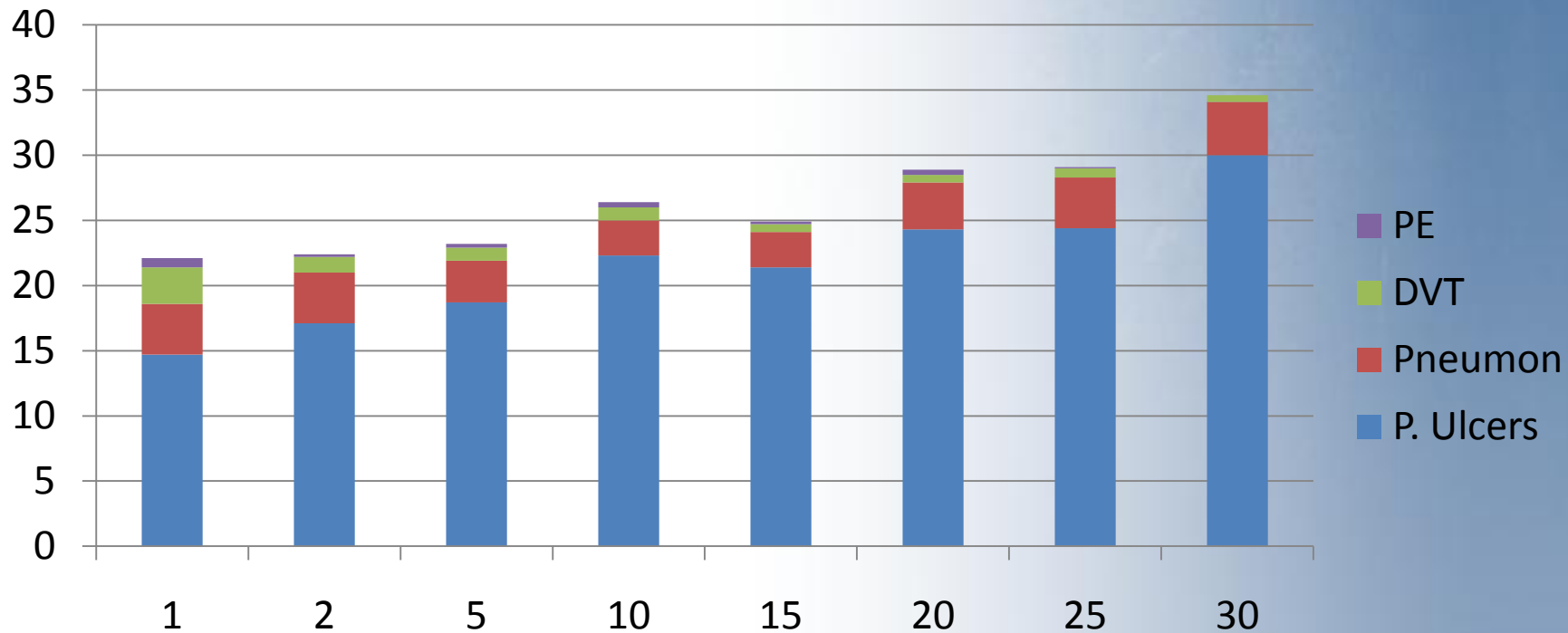


# % of SCI Patients with Medical Complications During Post Injury Years

Source: National Spinal Cord Injury Statistical Center, University of Alabama, 2006

Complication	1	2	5	10	15	20	25	30
Pressure Ulcer	14.7	17.1	18.7	22.3	21.4	24.3	24.4	30.0
Pneumonia	3.9	3.9	3.2	2.7	2.7	3.6	3.9	4.1
DVT	2.8	1.2	1.0	1.0	0.6	0.6	0.7	0.5
Pulmonary Emboli	0.7	0.2	0.3	0.4	0.2	0.4	0.1	0.0

# % of Secondary Medical Complications



# New Studies on SCI Co-morbidities

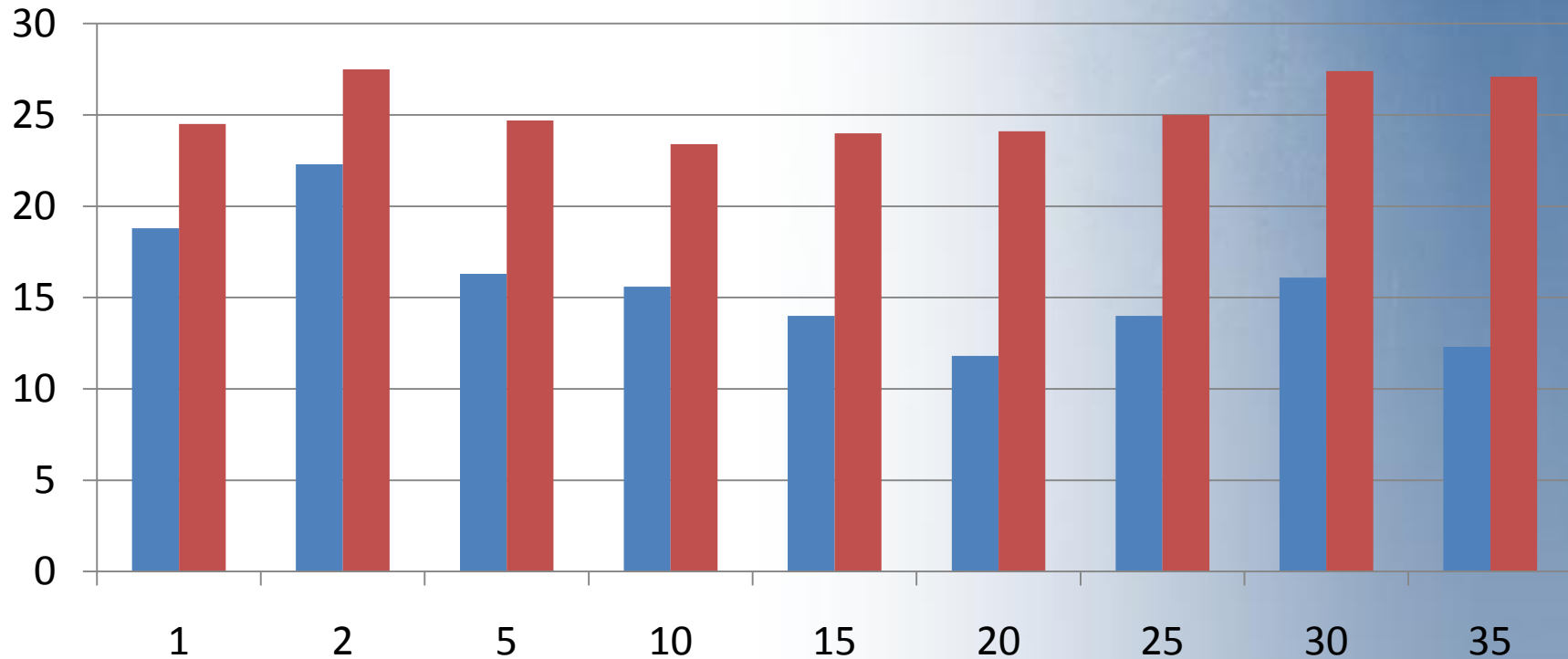
- Disorders of metabolism - Diabetes Type 2: A model for premature aging in SCI
- Cardiovascular co-morbidities
- Hormonal changes and body composition studies (muscle /fat tissue)
- Obesity studies

*Baumann, Spungen and others*

### 3. Critical Role of SCI Depression and Pain in Polytrauma

- Both impact rehabilitation and health outcomes; participation and quality of life
- Depression is associated with the experience of chronic pain; behavioral neglect; pressure ulcers; UTIs; alcohol abuse; and high cost of care. Pain is also highly associated with psychological distress, anxiety and anger
- Both impact one's engagement to treatment and motivation to recover and stay healthy after injury(ies)
- Both are associated with suicidal behavior (#10 as a cause of death for SCI);

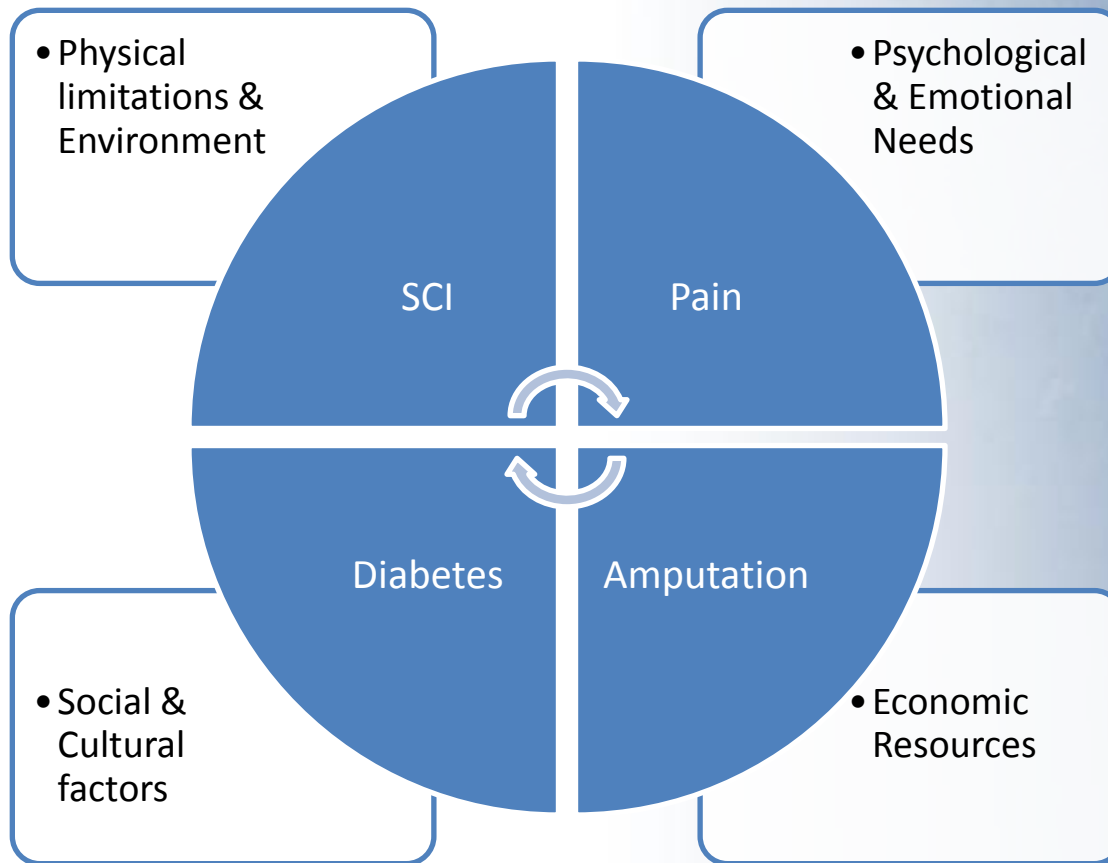
# Depression and Pain Years Post Injury



## Prevalence, Gender, Ethnicity and Aging

- Depression rates: from 12% (Years 20;35) to 22% (Year 2)
- Pain prevalence: 23% (Year 10) to 27% (Years 30;35) ; other studies report higher rates 26% to 100%
- Minority status, education, income and gender are related to depression
- Aging and level of injury are positively associated with pain
- Both pain and depression are associated with other co-morbid and secondary conditions (i.e. spasticity, pressure ulcers, cardiovascular disease, arthritis, substance abuse)

*Sources: NSCISC; Richards et al. 1980; Tate et al. 1994; Krause et. al. 2000; Putzke et al. 2002*



A Holistic Model of Polytrauma Care

# Treatment for SCI Depression and Pain

- Pharmacological approaches (SSRI's; SSNRI's; anti-convulsive, morphine)
  - PRISMS Multi-site Trial at Univ. of Washington
  - Preventive Trial at Univ. of Michigan
  - Morphine Sulfate for Neuropathic Pain Trial at Mount Sinai
- Physical Activity Trials for Depression
  - Physical Activity for Depression in People Aging with MS and SCI
- Cognitive Behavioral Therapy Trials (Canada)
- Behavioral Activation Trials ( VA Puget Sound) – non SCI
  - PTSD and depression with OEF/OIF veterans



# Directions for Emergent Research

- A clear understanding of factors associated with pain and depression can guide the development of multidisciplinary treatments addressing the many facets of polytrauma care
- New models of treatment need to be tested. Treatment for SCI/TBI, for example, needs to address many skills: problem solving, attention and concentration; memory and behavioral disturbances
- The process of aging with SCI needs to be studied carefully as age may affect the development and treatment of co-morbidities and secondary conditions acquired after SCI.
- Behavioral activation treatment offers an approach to issues of re-engagement and motivation. It is designed to reconnect individuals with meaningful and rewarding experiences. (*Turner et al. 2010*)

# Final Summary Thoughts

- Systems of care must collect data on all relevant co-morbidities, complications and secondary conditions
- Best practice guidelines reflecting the interactive nature of such conditions into treatment are key to avoid fragmentation and ineffective services
- Preventive research needs to be encouraged to target new co-morbidities developing after injury or being exacerbated by it.
- Polytrauma requires a multi-agency response to the problem with multiple avenues for funding and collaborations to promote best care and highest quality of research.