



De Hoogstraat
Revalidatie

Epidemiology of Traumatic Spinal Cord Injuries in The Netherlands in 2010

J.H.B. Nijendijk, October 18, 2013

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Definition

New traumatic spinal cord injury (TSCI):

A newly acquired traumatic transverse lesion of the spinal cord or cauda equina, resulting in loss of motor, sensory, bladder or bowel function below the level of the lesion, lasting longer than 2 weeks



Motives

- Why traumatic?
 - ICD-9 806, vertebra# with SCI
 - ICD-9 952, SCI without vertebra#
- 1994*
- Health-care planning, e.g. concerning rehabilitation clinics specialized in SCI, or to focus preventive measures

* van Asbeck FWA, Post MWM, Pangalila RF. An epidemiological description of spinal cord injuries in the Netherlands in 1994. Spinal Cord 2000; 38: 420-424



Objectives

Up to date epidemiological description

How many new patients with TSCI are discharged to rehabilitation centres specialized in TSCI?

- Sex
- Age
- Tetraplegic or paraplegic lesions
- Motor complete or incomplete lesions
- Causes
- Pre-existing stenosis of the spinal cord
- Stabilising surgery
- Hospital stay (days)
- Discharge destination



Expected differences 1994-2010



Expected differences 1994-2010

Distribution of age

Causes 1994*:

- Fall (49%)
- Traffic (31%)



*Van Asbeck FWA, Post MWM, Pangalila RF. An epidemiological description of spinal cord injuries in the Netherlands in 1994. Spinal Cord 2000; 38: 420-424



Expected differences 1994-2010

- Cause: more falls
- Increase in the elderly
- Increase in discharge to nursing home



Methods

- DHD: all 806/952 in Dutch hospitals
- DHD invited hospitals to participate, to authorize DHD to deliver us date of birth, patient number, date of arrival
- We requested for the anonymous discharge letters
- We analyzed
- We phoned / emailed in case of incomplete letters





91 hospitals

9 hospitals sent no data to LRM

82 hospitals delivered **486** records with ICD-9 806/952 to LMR

15 hospitals did not grant DHD permission, concerning 67 records
2 hospitals asked consent from their 4 patients, 3 did not respond

65 hospitals gave DHD permission to provide us anonymous records, concerning **416** records:

- 11 trauma centres: 204 records
- 54 general hospitals: 211 records
- consent by the patient: 1 record

40 records excluded or not obtained (36 duplicates, 4 medical files not available)

376 unique records obtained

4 records contained insufficient information to decide on presence of SCI

372 records available for analysis:

185 recent TSCI

187 no recent TSCI

Results

Incidence of survivors of TSCI:

$(185-30)*((486+35.2)/416)/16.6$

= **11.7**/million inhabitants/annum

1994: 10.4/million inhabitants/ annum



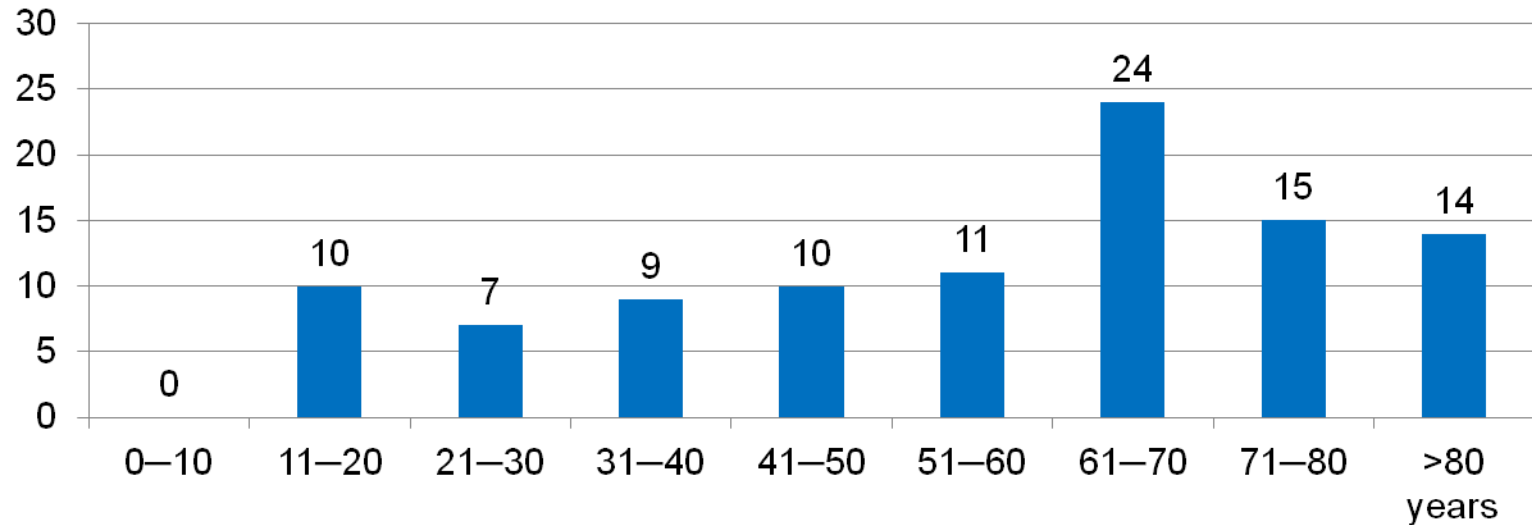
Results

	1994	2010	p
Male	77%	74%	ns
Tetraplegia	57%	69%	s
Incomplete	51%	65%	s
Pre-existing stenosis in tetraplegic patients	35%	53%	s
Stabilizing surgery	44%	58%	s
Mean hospital stay	31 days	25 days (21-29)	



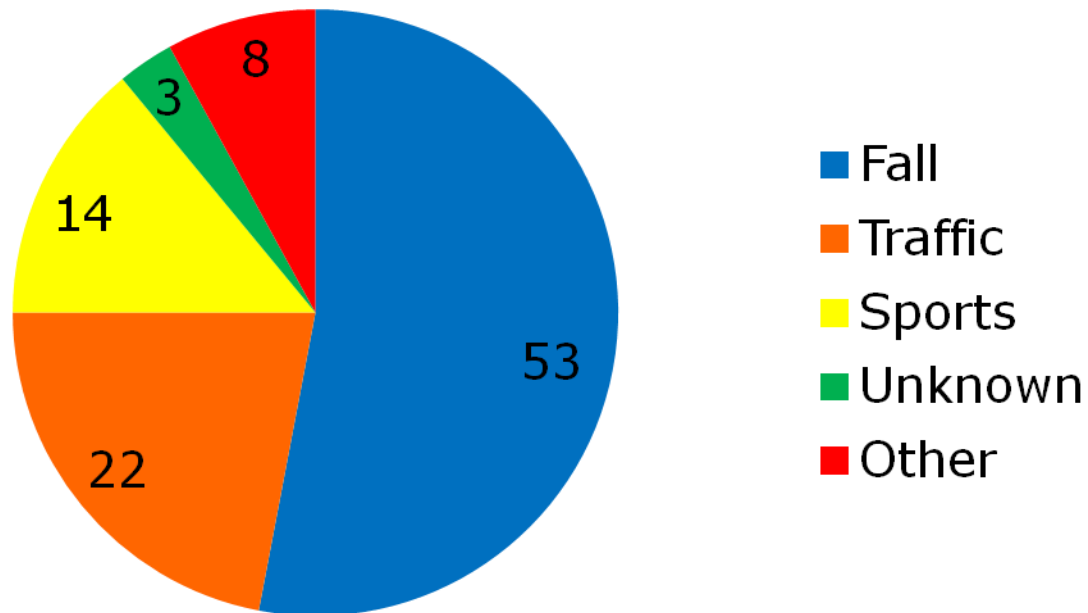


Distribution of age in %



	1994	2010	p
Age 21-30	25%	7%	0.001
Age >60	30%	53%	0.001

Cause



	1994	2010	p
Fall	49%	53%	ns
Traffic accident	31%	22%	ns

Results

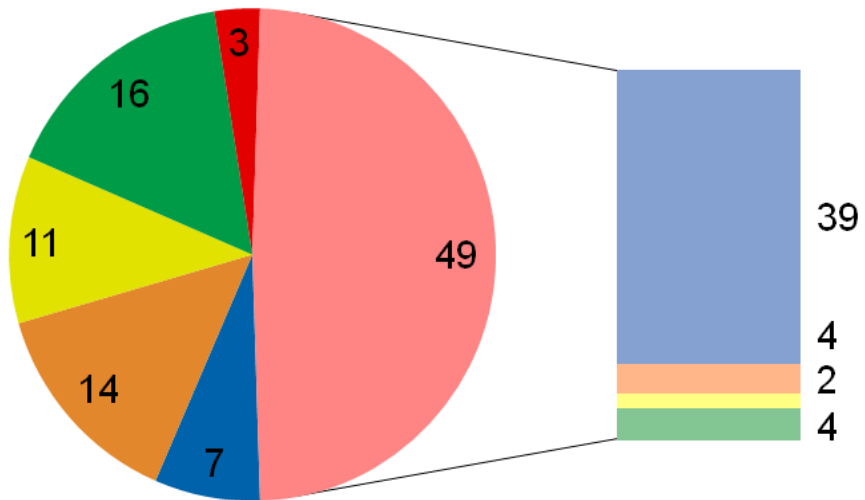
Cause traffic and sports	1994	2010
Bicycle	5%	4%
Moped	3%	2%
Motorcycle	7%	6%
Car	16%	8%
Traffic, other	0%	2%
Biking	?	3%
Mountainbiking	?	1%
Diving	6%	4%
Sports, other	3%	6% (10%)

Trampoline jumping, horse riding, paragliding, abseiling, skiing, motor cross, tennis

Results

Cause	1994	2010
Fall	49%	53%
- Same-level		24%
- Fall from height		26%
- Jump from height		2%
Violence	0%?	2%
Fallen tree branch	0%?	2%
Other	8%	5%
Unknown	4%	3%

Distribution of destination in %



- Home
- Nursing home
- Other acute care hospital
- Deceased
- Unknown
- Rehabilitation clinic specialized in SCI
- Rehabilitation clinic not specialized in SCI
- Rehabilitation not specified
- Rehabilitation outpatient

	1994	2010
Rehabilitation centre	58%	49%
Home	7%	7%
Nursing home	9%	14%
Deceased	16%	16%

Destination of discharge

Complete lesion:

78% to rehab specialized in TSCI

Incomplete lesion:

47% to rehab specialized in TSCI

(when compared with nursing home, home and rehabilitation not specialized)



Discussion

- Hospitals: not registering ICD / not participating
- ICD-9-codes by accident not granted
- Low (Western Europe 16/million/annum)
- TSCI: disease of the elderly
- Specialized care for TSCI in the elderly:
Challenge for the future





Conclusion

- Incidence of TSCI surviving the acute phase in 2010:
11.7 / million inhabitants /annum
- A substantial proportion of TSCI patients was not referred to a specialized rehabilitation centre
- TSCI becomes a disease of the elderly





Results

	Clinical rehabilitation (specialized)	Nursing home	Home, with or without therapy
Median age (years)	49 (49)	77	57
Age range (years)	14-91 (14-78)	24-90	15-83
Level			
- Tetra complete	11(11)	4	0
- Tetra incomplete	40(32)	17	13
- Para complete	23 (21)	3	0
- Para incomplete	9 (8)	0	7

Cause	N	%		N	%
Traffic	40	21.6	Pedestrian	1	0.5
			<u>Bicycle</u>	<u>8</u>	4.3
			Moped	3	1.6
			<u>Motorcycle</u>	<u>11</u>	5.9
			<u>Car</u>	<u>15</u>	8.1
			Mobility Scooter	1	0.5
			Not specified	1	0.5
			Occupational (workplace)	2	1.1
Sports	26	14.1	Trampoline jumping	1	0.5
			Diving	7	3.8
			<u>Biking</u>	<u>6</u>	3.2
			<u>Mountain biking</u>	<u>2</u>	1.1
			Skiing	2	1.1
			Horse riding	2	1.1
			Motor cross	2	1.1
			Tennis	1	0.5
			Abseiling, Paragliding	2	1.1
			Not specified	1	0.5
			Fall	98	53.0
Fall from height	49	26.4			
Suicide attempt: jump/fall from height	4	2.2			
Violence	3	1.6			
			Gunshot wound	2	1.1
			Stab wound	1	0.5
Iatrogenic	2	1.1			
Fallen tree branch	4	2.2			
Other	5	2.7			
Unknown	5	2.7			



Table 1 Demographic characteristics of patients with TSCI (N=185)

	N	%
Gender		
Male	137	74.1
Female	48	25.9
Age (years)		
0-10	0	0
11-20	19	10.3
21-30	13	7.0
31-40	17	9.2
41-50	18	9.7
51-60	21	11.4
61-70	44	23.8
71-80	27	14.6
>80	26	14.1
Type of SCI		
Tetraplegia	128	69.2
complete	32	17.3
incomplete	91	49.2
unknown	5	2.7
Paraplegia	57	30.8
complete	30	16.2
incomplete	24	13
unknown	3	11.6





Associations between discharge destination and type of TSCI

	Clinical rehabilitation (specialized)	Nursing home	Home, with or without therapy	Deceased
Level				
- Tetra/complete	11 (11)	4	0	13
- Tetra/incomplete	40 (32)	17	13	9
- Tetra/unknown completeness	0 (0)	0	1	3
- Para/complete	23 (21)	3	0	1
- Para/incomplete	9 (8)	0	7	2
- Para/unknown completeness	0 (0)	1	0	2



	Non responding general hospitals ¹ (n=15)	Responding general hospitals (n=54)	Oddsratio	P 2-sided χ^2
Number of records of ICD-9 code 806 and/or 952	67	211		
Male (n, %)	35; 52,2%	139; 65,9%	0,57	0,044
Mean age (years; standard deviation; 95% CI)	62,4; 18,7; 57,9-66,9	56,3; 21,6; 53,4-59,2		
Mean hospital stay (days; standard deviation; 95% CI)	9,5; 8,1; 5,0-14,0	9,3; 12,6; 7,6-11,0		
Distribution of destination (n, %)				0,322
- Home	31; 46,3%	121; 57,3%		
- Nursing home	2; 3,0%	4; 1,9%		
- Other institute	27; 40,3%	74; 35,1%		
- Dead	7; 10,4%	12; 5,7%		

¹ General hospitals which did not grant DHD permission to give us the anonymous records



Destination	n	%2010	%1994
Deceased	30	16.2	15.9
Home	13	7.0	7.1
Other acute care hospital	21	<u>11.4</u>	<u>8.0</u>
Nursing home total	25	<u>13.5</u>	<u>8.8</u>
- Permanent stay	4	2.2	
- Reactivation	15	8.1	
- Not specified	6	3.2	
Rehabilitation total	91	<u>49.2</u>	<u>58.4</u>
- Clinic specialized in SCI	72	39.0	
- Clinic not specialized in SCI	7	3.8	
- Outpatient	8	4.4	5.3
- Not specified	4	2.2	
Unknown	5	2.7	1.8

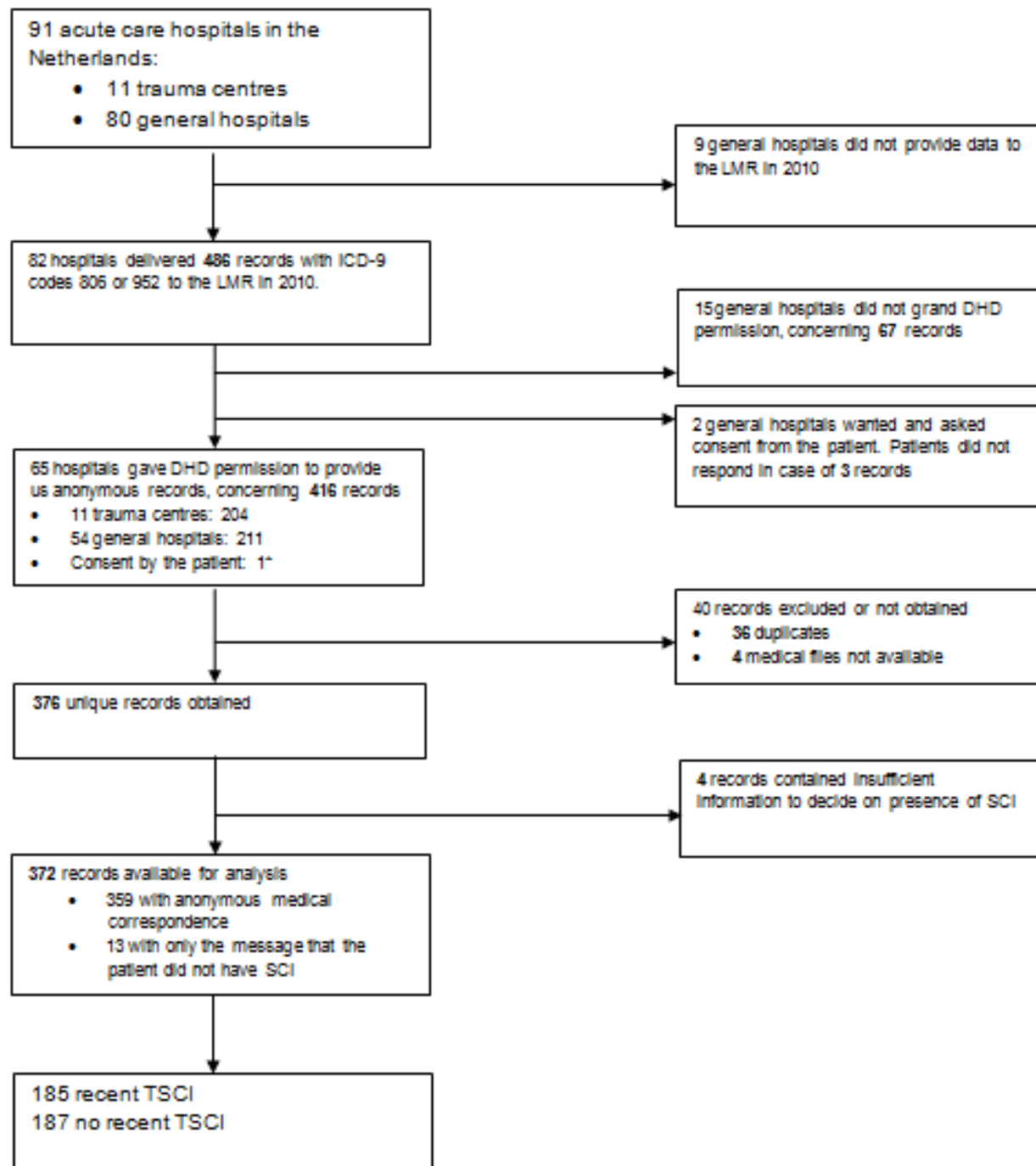




Associations between discharge destination and type of TSCI

	Clinical rehabilitation (specialized)	Nursing home	Home, with or without therapy	Deceased
Level				
- Tetra/complete	11 (11)	4	0	13
- Tetra/incomplete	40 (32)	17	13	9
- Tetra/unknown completeness	0 (0)	0	1	3
- Para/complete	23 (21)	3	0	1
- Para/incomplete	9 (8)	0	7	2
- Para/unknown completeness	0 (0)	1	0	2





Results

Destination	1994	2010
Deceased	16%	16%
Home	7%	7%
Other acute care hospital	8%	11%
Nursing home total	9%	14%
- Permanent stay		2%
- Reactivation		8%
Rehabilitation total	58%	49%
- Clinic specialized in SCI		39%
- Clinic not specialized in SCI		4%
- Outpatient	5%	4%
Unknown	2%	3%

Table 5. Comparison of study results in 1994 and 2010

	1994	2010	P
Incidence of TSCI ¹	12.1/million/annum	14.0/million/annum	0.695
Incidence of TSCI surviving the acute phase	10.4/million/annum	11.7/million/annum	0.670
Incidence of TSCI for male	87 adjusted 97.01, 18.6/million/annum	137 20.9/million/annum	0.752
Incidence of TSCI for female	26 adjusted (iym 13 zonder gegevens van de 126) 28.99 5.4/million/annum	48 7.2/million/annum	0.564
Incidence of TSCI for age 0-20	15 adjusted 16.55 6.3/million/annum	19 6.1/million/annum	1.00
Incidence of TSCI for age 21-40	44 adjusted 48.54 14.1/million/annum	30 8.9/million/annum	0.297
Incidence of TSCI for age 41-65	25.5 adjusted 28.13 8.9/million/annum	58 12.3/million/annum	0.513
Incidence of TSCI for age 66-80	23.5 adjusted 25.92 25.2/million/annum	52 34.3/million/annum	0.241
Incidence of TSCI for age >80	5 adjusted 5.52 16.1/million/annum	26 54.3/million/annum	0.000
Number of inhabitants of The Netherlands	15.1 million	16.6 million	
Male inhabitants	7.6 million	8.2 million	
Female inhabitants	7.8 million	8.4 million	
Inhabitants aged 0-20	3.8 million	3.9 million	
Inhabitants aged 21-40	5.0 million	4.2 million	
Inhabitants aged 41-65	4.6 million	5.9 million	
Inhabitants aged 65-80	1.5 million	1.9 million	
Inhabitants aged >80	0.5 million	0.6 million	

¹ TSCI: traumatic spinal cord injury



Table 5. Comparison of study results in 1994 and 2010

	1994	2010	P
Incidence of TSCI ¹	12.1/million/annum	14.0/million/annum	0.695
Incidence of TSCI surviving the acute phase	10.4/million/annum	11.7/million/annum	0.670
Male	77%	74%	0.622
Age 21-30 years old	25%	7%	0.001
Over 60 years old	30%	53%	0.001
Tetraplegia	57%	69%	0.079
Pre-existing stenosis in tetraplegic patients	35%	53%	0.010
Incomplete lesion ²	51%	62%	0.117
Aetiology: Fall	49%	53%	0.572
Traffic accident	31%	22%	0.149
Stabilizing surgery	44%	58%	0.048
Mean hospital stay	31 days	25 days (95% CI 20.7-28.7 days)	
Destination: Deceased	16%	16%	1.00
Home ³	7%	7%	1.00
Nursing home	9%	14%	0.268
Rehabilitation ⁴	58%	49%	0.202
Records ICD 806 or 952	479	486	
Available records including duplicates, empty files and insufficient information	329	416	
Suitable records analysed	324	372	
TSCI	126	185	
TSCI surviving the acute phase	108	155	
Number of inhabitants of The Netherlands	15.1 million	16.6 million	

1 TSCI: traumatic spinal cord injury

2 Incomplete lesion: AIS C+D

3 Home: excluding outpatients

4 Rehabilitation: including outpatients

