



# Trends in the treatment of patients with spinal cord lesions seen within a period of 20 years in German centers

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Twenty-one special centers are running treatment of spinal cord injuries in Germany. Their heads represent a study group to coordinate methods and to investigate results collecting data since 1976. So we have experiences for about 20 years. 1500 recent cases are treated per annum. Seventy-five percent got their lesion by trauma. Beside these there is only a little capacity to treat patients with non-traumatic or congenital lesions (25%). Sixty-two percent are para-, 38% are tetraplegic, 28% female, 2% are children. Within 22,212 recent cases 35% got their injury by traffic, 14% at work. Sports and diving caused 4%, suicide 5% and killing attempts 1%. Though numbers since 1976 are decreasing, traffic and work are main reasons causing spinal injuries. Readmission reasons are mainly disorders of soft tissues (23%) and the urinary tract (21%). Out-patients are checked in 67% of all cases. All investigation data represent very stable trends within the last 20 years. Altogether the special centers carried out treatment and consultation in about 22,000 recent cases, 45,000 readmissions and 80,000 out-patients.

**Keywords:** spinal cord injury; special treatment in Germany; trends of origin; causes of readmission and consulting; capacity of special centers

## Introduction

There are statistical investigations concerning data of special treatment by all Spinal Cord Injury Centers in Germany collected since 20 years. In 1976 the Head Office of the Workmen's Compensation Associations started a bed procurement bureau to arrange the admission of patients with a spinal cord injury to get them in special treatment centers as soon as possible. Today this bureau is represented by the center in Hamburg and can be contacted day and night. There was also founded a study group, represented by the heads of all special centers in Germany with the intention to meet twice a year and exchange experiences about therapy and collect data about the results. Every meetings minutes are transcribed. Additionally a report concerning data of the last 6 months is given. So we have an overview since 1976. In 1996 we did an evaluation of all investigations collected within 20 years. Within this time the number of centers increased from 11 to 21 and corresponding the number of beds from 406 to 1071 (Table 1). According to this development we saw a distinct increase of treatment activities in all centers.

## Methods

All collected data should be used for the requirement of therapeutic facilities now and in the future. So we had to look for changes in our clients concerning lesion, status and origin. We were looking for trends to be prepared. The method we used, was to compare 5-year-intervals by different questions.

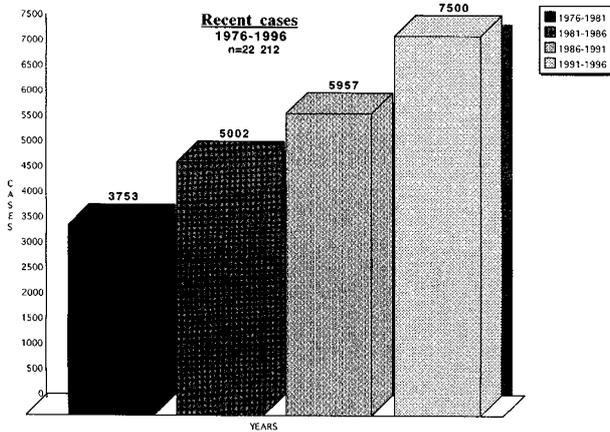
## Results

### *Statistical investigations*

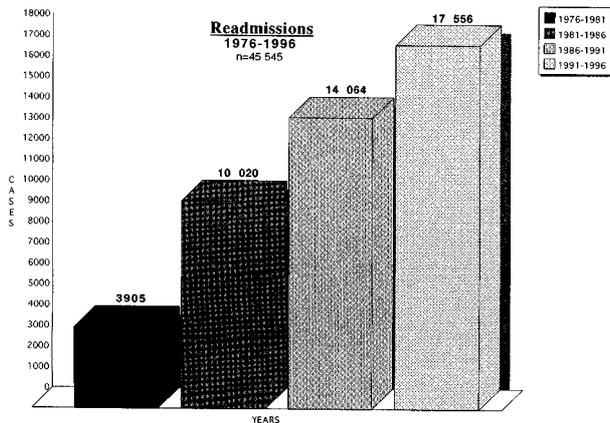
From 1976 until 1981 we treated 3753 recent cases, until 1986 5002 and until 1991 5957. In 1996 we found a group of treated patients of 7500 (Figure 1). We saw an ongoing development of growing numbers. Readmissions increased more clearly within this time from 3950 up to 17,556 in 1996 (Figure 2). Similarly there were growing numbers in the treatment of out-patients. They raised from a base of 7622 up to 33,258 (Figure 3). This may demonstrate the intention of the centers to recognize the urgency of treatment to our patients or to have check-ups regularly. Altogether we found an impressive activity of all centers within these 20 years in the treatment of 22,212 recent cases, 45,545 readmissions and 81,379 out-patients.

**Recent cases**

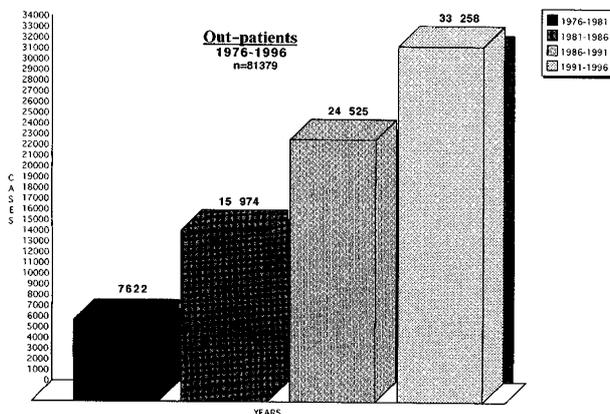
The investigation of these data give us the possibility to state several trends. A very stable average of male persons can be realized. It changed from 73% to 71%



**Figure 1** Recent cases (1976-96)



**Figure 2** Readmissions (1976-96)



**Figure 3** Out-patients (1976-96)

only (Table 2). Stable, too, we recognized the level of lesion in this group. The paraplegic patients ranged from 61% to 63% in 1996, and tetraplegic persons decreased from 39% to 37%. This means a very stable trend since 1976 (Table 3).

Looking at the readmissions we found males to be about 75% (Table 4) and the level of lesion changing from 71% to 66% for those with paraplegia (Table 5).

**Table 1** Spinal-cord-injury-centers in Germany 1976-96

	Centers	Beds
1976	11	406
1981	15	602
1986	17	765
1991	20	909
1996	21	1071

**Table 2** Trends (recent cases): gender (%)

	Female	Male
1976-81	27	73
1981-86	28	72
1986-91	29	71
1991-96	29	71

n = 22,212

**Table 3** Trends (recent cases): level of lesion (%)

	Tetraplegic	Paraplegic
1976-81	39	61
1981-86	39	61
1986-91	38	62
1991-96	37	63

n = 22,212

**Table 4** Trends (readmission): gender (%)

	Female	Male
1976-81	25	75
1981-86	24	76
1986-91	25	75
1991-96	24	76

n = 45,545

**Table 5** Trends (readmission): level of lesion (%)

	Tetraplegic	Paraplegic
1976-81	29	71
1981-86	31	69
1986-91	32	68
1991-96	34	66

n = 45,545

Within the out-patients the male numbers decreased from 79% to 77% (Table 6) and those with paraplegia from 78% to 72% (Table 7).

*Origin of lesion*

The spinal cord injury was the result of accidents at work in 14% of all cases (Table 8). Thirty-five percent were caused by traffic accidents, 4% by sport and water activities, 5% by suicide and 1% by killing attempts. About 12% of our patients got their injury by private accidents. The remaining capacity of the centers was left to the treatment of lesions by diseases or malformations (25%). Coming back to assess trends we concentrated the data of all patients with a lesion due to trauma. We found a great number of victims by traffic accidents. It was stable concerning a leading position within all causes since 1976, though the numbers were decreasing from 51% to 44%. For comparison we found the data of injuries caused by accidents at work declining clearly from 23% to 18% (Figure 4).

**Table 6** Trends (out-patients): gender (%)

	Female	Male
1976–81	21	79
1981–86	22	78
1986–91	23	77
1991–96	23	77

n = 81,379

**Table 7** Trends (out-patients): level of lesion (%)

	Tetraplegic	Paraplegic
1976–81	22	78
1981–86	24	76
1986–91	26	74
1991–96	28	72

n = 81,379

**Table 8** Recent cases: origin 1976–96

	Absolute	%
Accident at work	3119	14
traffic	7699	35
sports	853	4
diving	856	4
Suicide attempts	1080	5
Killing attempts	239	1
Diseases	5457	25
Malformation	196	–
Other accidents	2713	12

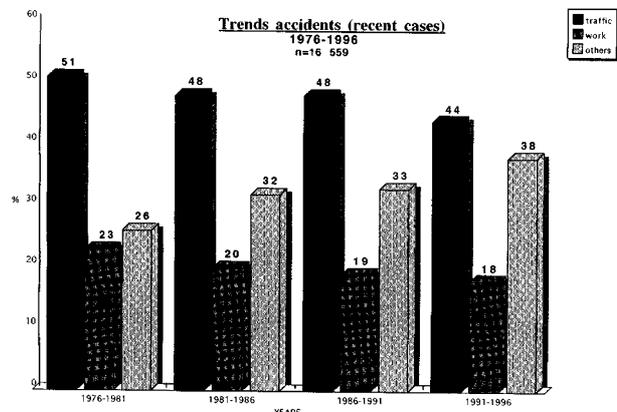
n = 22,212

*Readmissions*

In about 45,000 patients we looked for the main reasons for readmission and found soft tissue disorders at first (23%) followed by complications of the urinary tract (21%). In 20% of all cases readmission was necessary because of training defects. Thirteen percent for a check-up and 12% because of disorders of the spine or extremities (Table 9). To summarize we found a trend of decreasing numbers in pressure sores (32% to 23%) within 20 years. On the other hand numbers of complications of the urinary tract seemed to be very stable (21%) (Figure 5).

*Out-patients*

For about 81,000 out-patients the main reason for consultation was examination of the health status. We found this in 67%. Additionally 12% asked for advice (Table 10). This may demonstrate that the advice of the German Centers are instruments of prevention and selection to ongoing treatment. Analyzing the trends we found an increasing number consulting, on the



**Figure 4** Trends: accidents (recent cases)

**Table 9** Readmission causes 1976–96

	Absolute	%
Consultation	5733	13
Soft tissue	10,431	23
Respiratory tract	732	2
Blood circulation	361	1
Urinary tract	9611	21
Orthopedics	5252	12
Neurology	1850	4
Training	9354	20
Social problems	224	–
Others	849	2
Experts opinion	1184	2

n = 45,545

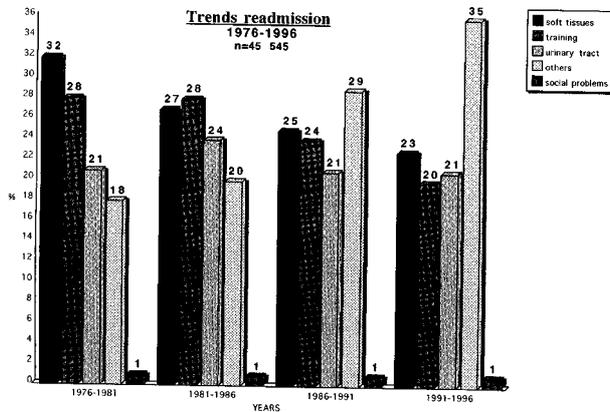


Figure 5 Trends: readmissions

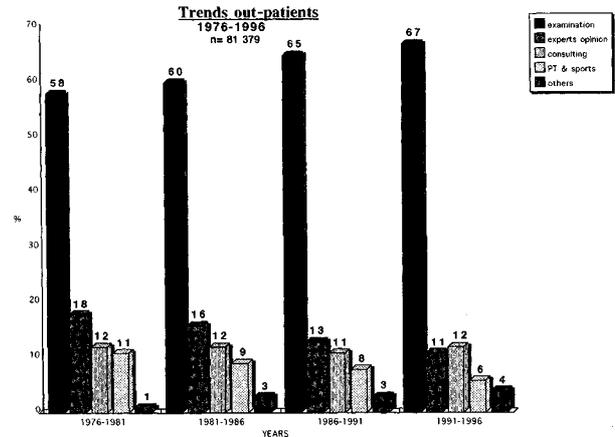


Figure 6 Trends: out-patients

Table 10 Out-patients, causes of consulting 1976-96

	Absolute	%
Examination	54,923	67
Consulting	10,117	12
Expert opinion	9348	11
Treatment	8106	10
Physiotherapy and sports	5221	6
Occupational therapy	1156	1

n = 81,379

other hand the numbers of physiotherapy (11% to 6%) and examinations for experts opinion (18% to 11%) decreased severely (Figure 6).

### Insurances

Ninety-five percent of all patients got their affirmation by the legal accident insurance or the health insurances. In recent cases the part of the workmen's compensation insurances is very stable (about 19% within 20 years). This number increases for readmitted patients up to 30% and for out-patients to 44%. The health insurances are involved in 69% of all recent cases, in 62% of the readmitted and in 51% of all out-patients (Figure 7). This may demonstrate the positive effects of the legal insurance system (life-long responsibility), and contrary to the disadvantages of a health insurance system, which tries to share responsibility by splitting the costs to various support systems.

### Discussion

Twenty years of experiences and data collection demonstrate several trends. Most of them are stable over all in spite of increasing numbers of recent cases. This may be connected with a growing bed capacity of the centers. On the other hand it demonstrates that

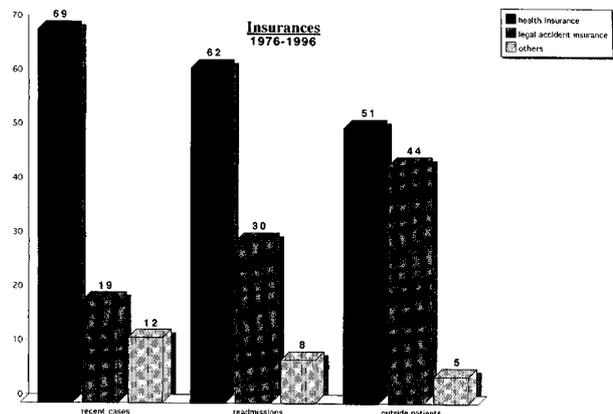


Figure 7 Trends: insurances

there was a lack of capacity in the past and still it is. We found the proportion of tetraplegics to paraplegics within 20 years to be unchanged. It ranges about 40% to 60%. We have no explanation for this. There is a stable number of severe traumatized persons by traffic accidents since 1976 though the incidents of accidents followed by death is going down.<sup>1</sup> Traffic is seen as the main cause of SCI within our investigation period. Private accidents are next. On the contrary accidents at work are showing decreasing numbers. That depends on a system of prevention methods and security at work given by the workmen's compensation associations. Prevention is also done in traffic affairs. But rising velocity, heaviness of traffic and increasing numbers of vehicles cause greater risks.

Readmissions take a big part of bed capacity of all centers. Main causes are disorders of soft tissue, followed by complications of the urinary tract. Here found very stable trends. We found that treatment of complications is one of the main tasks of the centers.

More than 45,000 patients were treated within 20 years in German centers. About 50% had complications of soft tissue or the urinary tract as the typical disorders of spinal cord injured persons. This part was nearly stable within these years and demonstrates the special centers competence.

Treatment of complications and prevention in life-long care are extremely important and should be done in the special centers. We found the best results in patients supported by one insurance system for their whole life. Nevertheless a two-class health system exists because of different ways of support. The workmen's compensation associations are well recommended because support concerns first treatment up to life-long care. Other insurances try to divide the different phases of treatment to changing supporters. The consequences are bad.

### Conclusions

Numbers of recent cases, readmissions to the centers and outside patients have been increasing in the 20 years. They will increase in future, too. The capacity of treatment facilities should increase in the same way.

There is a need for more centers and more beds. We think about 1900 beds as a minimum for sufficient treatment for recent cases, readmissions and out-patients control.

There is no change in our patients constellation. Proposition of tetraplegic to paraplegic patient is stable. There is a stable trend in all origins of recent cases. Readmitted persons have the same reasons of disorders since 20 years. Out-patients ask for consultations in increasing numbers. Here we also found a demand for more capacity.

So we state, that *all* rehabilitation centers which run rehabilitation in different levels should be combined in one system of treatment facilities and should be matched to the standards of the spinal cord injury centers. Best results of treatment are guaranteed by support for all treatment stages.

### Reference

- 1 Federal Statistical Office D-65180 Wiesbaden: Verkehr, 1993.