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ORIGINAL ARTICLE

Medical conditions and outcomes at 1 year after acute traumatic spinal cord injury in a Greek and a Swedish region: a prospective, population-based study

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Study design: Prospective, population-based study. This paper is part of the Stockholm Thessaloniki Acute Traumatic Spinal Cord Injury Study (STATSCIS).
Objectives: To evaluate and compare outcomes, length of stay (LOS), associated conditions and medical complications at 1-year post-trauma.
Settings: The Greater Thessaloniki region, Greece, and the Greater Stockholm region, Sweden. While Stockholm follows a SCI system of care, Thessaloniki follows a fragmented 'non-system' approach.
Subjects: Out of the 87 cases in Thessaloniki and the 49 cases in Stockholm who comprised the study population of STATSCIS, 75 and 42 cases respectively were successfully followed-up during the first year post-trauma.
Results: Significantly superior outcomes (that is, survival with neurological recovery, functional ability and discharge to home) and shorter LOS for initially motor complete cases occurred in Stockholm. Management routines known to increase long-term morbidity, for example, long-term tracheostomy and indwelling urethral catheters were significantly more common in Thessaloniki. Major medical complications, that is, multiple pressure ulcers, heterotopic ossification and bacteremia/sepsis were more frequent in Thessaloniki.
Conclusions: Our findings show how two rather similar cohorts of TSCI manifest large discrepancies in terms of 1-year outcomes and complications, depending on the type of management they receive. As the major difference between regions was the presence or absence of a SCI system of care, rather than differences in availability of modern medicine, the mere presence of the latter does not seem to be sufficient to guarantee adequate outcomes. This study provides strong evidence as to the urgent need of implementing a SCI system of care in Greece.
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Keywords: SCI system of care; treatment; epidemiology; recovery; mortality; spinal injury unit

Introduction

The concept of 'Spinal Cord Injury (SCI) system of care' is now well-established internationally and has its roots in the pioneering work of Guttmann at Stoke Mandeville (UK), Munro in Boston (US) and Bors in California (US).[1] Subsequently, several units have been established around the world adopting this concept. On the basis of several publications dealing with operational and technical specifications,[2–4] as well as clinical practice guidelines,[5] it is reasonable to use the term 'SCI system of care' as a defined entity. Although the concept is well established, it may still be questioned whether the improvement in prognosis after a SCI is primarily attributed to the advances in medicine or to the establishment of a SCI-system approach.

This paper presents part of the Stockholm Thessaloniki Acute Traumatic Spinal Cord Injury Study (STATSCIS). STATSCIS performs a direct comparison between two care paradigms; a SCI-system approach after a centralized and predefined clinical process (Stockholm) and a fragmented 'non-system' approach scattered over dozens of facilities (Thessaloniki). The comparison is prospective and concurrent, thus making it possible to attribute any differences in outcomes to the type of approach, and not to general advances in medicine over time. Such a comparison is, by definition, impossible when using historical controls, as for example, when comparing outcomes of a contemporary

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versus a historical system through a retrospective study design, as observed in other studies.[6]

As STATSCIS has presented earlier, apart from the nearly double annual incidence of TSCI in the Greek region as compared to the Swedish region, and the dominance of transportation-related injuries in Thessaloniki and of fall injuries in Stockholm, the demographic profile of study groups were largely similar.[7] Furthermore, despite the two groups appearing with similar clinical characteristics on admission, they received statistically significant different acute management.[8] Finally, STATSCIS has reported that 'late' case-mortality rate, that is, mortality occurring during the first year but later than 7 days post-trauma, was dramatically higher in Thessaloniki, reaching nearly 20%, as compared to 0% in Stockholm.[9]

In this paper, the two study groups were assessed in terms of (a) outcomes, (b) length of stay (LOS), (c) associated conditions and their management and (d) medical complications during the first year post-trauma.

Materials and methods

The methodology of this paper, that is, settings, surveillance systems, inclusion criteria and ethical considerations, is identical to that of STATSCIS as a whole and has been described earlier.[7]

Material

Overall, 81 out of 87 (93%) consecutive cases with acute TSCI in Thessaloniki and 47 out of 49 (95%) in Stockholm consented to participate in the study. Of the consented cases, six in Thessaloniki and five in Stockholm were lost before 1-year follow-up, and were thus excluded from further analyses. Furthermore, 11 of the consented cases in Thessaloniki and zero in Stockholm died during the first year. Subsequently, some analyses included the 75 consented cases in Thessaloniki and the 42 cases in Stockholm, whereas in some other analyses fatalities were excluded.

Data collection and analysis

Each case was individually followed-up during the first year post-trauma according to a subset of the Nordic Spinal Cord Injury Registry forms (www.nscic.se).

Outcomes: First year post-trauma outcomes were considered and analyzed as follows:

a. By *general outcome*: characterizing each case as either with 'favorable outcome', that is survival and upgrading of American Spinal Injury Association (ASIA) Impairment Scale (AIS) between admission and follow-up, or with 'unfavorable outcome', that is, death or no upgrading of AIS;
b. By *neurological recovery*: characterizing each case as either 'improved', that is, upgrading of AIS between admission and follow-up, or 'non-improved', that is, downgrading or no upgrading of AIS;
c. By the *ASIA motor score*: comparing means at 1-year follow-up, and mean differences between admission and 1-year follow-up;
d. By the *Functional Independence Measure* (*FIM) motor score*: comparing means at 1-year follow-up; and
e. By *type of residence* at 1-year follow-up.

Neurological assessment included a full examination according to the International Standards for Neurological Classification for SCI. Details on data collection have been provided elsewhere.[8]

Functional outcome was assessed with the 'motor part' of FIM, while the communication and the social cognition parts were disregarded. The motor part of FIM is an ordinal scale with values between 13 and 91, in which the higher the score, the more independent the person is on performing Activities of Daily Living.

For assessment of outcomes, cases were divided in two groups, depending on their motor completeness on admission—AIS grades A and B formed the 'initially motor complete' group (IMC), whereas AIS grades C and D formed the 'initially motor incomplete' group (IMIC).

Mortality cases were only considered for the analysis of general outcome, whereas for the other four categories, only the consented cases who survived were considered.

Length of stay: calculated in days for the period of:

a. Intensive care unit (ICU);
b. General (non-SCI) hospital ward;
c. Spinal injury unit (SIU);
d. In-patient rehabilitation center; and
e. Total in-patient.

Analyses were performed by considering only the surviving cases that were divided according to the motor completeness of their lesion.

Associated conditions and their management: This category was operationally defined to comprise:

a. Associated conditions: these are expected characteristics of the condition itself, which are directly a consequence of the TSCI pathology,[10] for example, decreased awareness of bowel and bladder filling; and
b. Their management, for example, bladder and bowel emptying method.

Mortality cases were not considered in analyses.

Medical complications: This category, also denoted in literature as *secondary conditions*, was operationally defined to comprise medical events that are related to TSCI and are likely preventable,[10] occurring during the first year post-trauma. Examples are pressure ulcers and urinary infections. Mortality cases were considered in analyses.

Descriptive data are presented as *n* (%), mean, standard deviation (s.d.) median, and interquartile range (IQR). Statistical significance was set at $P<0.05$. Differences in proportions between regions were examined by χ^2-test and Fisher's exact test. Statistical mean differences between regions were determined by independent Student's *t*-test. For ordinal variables or in cases of non-normal distribution the Mann–Whitney test was used. All statistical analyses were performed using the SPSS software (Statistical Package for the Social Sciences, v. 16.0, Chicago, IL, USA).

Table 1 Neurological improvement between admission and 1-year follow-up[a]

			1 Year					
	AIS grades	*Missing*	*A*	*B*	*C*	*D*	*E*	*Death*
Thessaloniki								
Admission	Missing *(n=6)*					33.3 (2)		66.7 (4)
	A *(n=29)*		72.4 (21)	—	6.9 (2)	—	—	20.7 (6)
	B *(n=3)*		—	66.7 (2)	33.3 (1)	—	—	—
	C *(n=17)*	5.9 (1)	—	—	29.4 (5)	52.9 (9)	5.9 (1)	5.9 (1)
	D *(n=26)*	19.2 (5)	—	—	—	46.2 (12)	34.6 (9)	—
	Total *(n=81)*	(*n*=6)	(*n*=21)	(*n*=2)	(*n*=8)	(*n*=23)	(*n*=10)	(*n*=11)
Stockholm								
Admission	Missing (*n*=4)				25.0 (1)	75.0 (3)		
	A (*n*=17)	5.9 (1)	64.7 (11)	11.8 (2)	5.9 (1)	11.8 (2)	—	—
	B (*n*=3)		—	33.3 (1)	33.3 (1)	33.3 (1)	—	—
	C (*n*=9)		—	—	10.0 (1)	90.0 (8)	—	—
	D (*n*=14)	28.6 (4)	—	—	—	57.1 (8)	14.3 (2)	—
	Total (*n*=47)	(*n*=5)	(*n*=11)	(*n*=3)	(*n*=4)	(*n*=22)	(*n*=2)	(*n*=0)

Abbreviation: AIS, ASIA impairment scale.
[a]Percentage was calculated based on the number of cases with each grade on admission examination.

Results

Table 1 presents the distribution of AIS grades on admission and at 1-year post-trauma, whereas Table 2 summarizes outcomes data.

Outcomes

a. *General outcome*: a statistically significant higher proportion of IMC cases in Stockholm had a favorable outcome as compared to those in Thessaloniki ($P=0.028$), whereas there were no differences found between regions for the IMIC cases.
b. *Neurological recovery*: although there were no statistically significant differences between the two regions, there was a trend toward more upgrades in AIS for the IMC cases in Stockholm as compared to those in Thessaloniki.
c. *ASIA motor score*: no statistically significant differences between the regions were observed either in the mean ASIA motor scores at 1 year or the mean gain between admission and 1-year follow-up.
d. *FIM motor scores*: a statistically significant higher mean FIM motor score was reached by the IMC group in Stockholm as compared to the corresponding group in Thessaloniki ($P=0.019$), whereas the IMIC groups appeared rather similar between regions.
e. *Type of residence*: at 1-year post-trauma, seven (27%) out of the IMC cases in Thessaloniki were still not discharged from the in-patient rehabilitation center. All others, in both regions, were living in private homes, except for two cases in Stockholm, one IMC and one IMIC that were discharged to nursing homes.

Length of stay

Similar proportions of cases between regions were hospitalized in an ICU, with the IMC cases in Thessaloniki spending a fivefold longer time in such a facility as compared to the respective cases in Stockholm ($P<0.001$) (Table 3). Significantly more IMC ($P=0.031$) and IMIC cases ($P=0.037$) in Thessaloniki were hospitalized for a fivefold ($P<0.001$) and a threefold ($P<0.001$) longer period respectively in a general ward as compared to the respective groups in Stockholm. Due to the lack of a SIU in Greece, only four Greek cases (all IMC) were hospitalized in a SIU abroad, whereas all Swedish cases were hospitalized in such a facility. LOS in a rehabilitation centre was four times longer for both the IMC ($P<0.001$) and IMIC ($P<0.001$) Greeks as compared to Swedes. Total in-patient period was statistically significant longer (two-fold) for the IMC cases ($P<0.001$), but shorter for the IMIC ($P=0.028$) in Thessaloniki as compared to the respective cases in Stockholm.

Associated conditions and their management

Despite the absence of major differences in self-reported bladder sensory function (that is, awareness of bladder filling, urgency for bladder emptying), the two groups appeared with statistically significant differences as regards bladder emptying method ($P=0.013$) (Table 4). Clean intermittent catheterization was used by 17 cases (27%) in Thessaloniki versus 16 cases (38%) in Stockholm. Indwelling urethral catheter was used by six cases (9%) in Thessaloniki and in no case in Stockholm, whereas suprapubic catheter was used by four cases (6%) in Thessaloniki versus nine (21%) in Stockholm.

Six cases in Thessaloniki had a tracheostomy at 1-year follow-up, one of whom was using a home ventilator, whereas no case in Stockholm had such devices. Finally, no significant differences were found as regards pain or spasticity.

Medical complications

Sepsis/bacteremia was significantly more common in Thessaloniki as compared to Stockholm ($P=0.002$), as were cardiac arrhythmias ($P=0.049$) (Table 5). Deep venous thrombosis and pulmonary embolism were rare in both groups.

Table 2 Outcomes

	Thessaloniki n *(%)*	*Stockholm* n *(%)*	P-*value*
General outcome[a]			
IMC			*0.028*
Favorable	3 (9)	7 (37)	
Unfavorable	29 (91)	12 (63)	
IMIC			1.000
Favorable	19 (51)	10 (53)	
Unfavorable	18 (49)	9 (47)	
Neurological recovery[b]			
IMC			0.070
Improved	3 (12)	7 (37)	
Non-improved	23 (88)	12 (63)	
IMIC			1.000
Improved	19 (53)	10 (53)	
Non-improved	17 (47)	9 (47)	
Type of residence[b]			
IMC			*0.029*
Home	18 (73)	18 (95)	
Rehabilitation center	7 (27)	0 (0)	
Nursing home	0 (0)	1 (5)	
IMIC			0.345
Home	36 (100)	18 (95)	
Nursing home	0 (0)	1 (5)	
	Mean (s.d.) median (IQR) N	*Mean (s.d.) median (IQR) N*	
ASIA motor score at 1 year[b]			
IMC	37.88 (24.21) 45.50 (19–51) 26	49.63 (20.44) 50.00 (48–66) 19	0.103
IMIC	90.94 (14.32) 99.00 (83–100) 36	94.67 (5.05) 96.00 (96–99) 18	0.496
ASIA motor scores gain[c]			
IMC	6.50 (6.77) 5.00 (0–12) 26	10.74 (17.11) 3.00 (0–20) 19	1.000
IMIC	17.42 (19.25) 10.50 (3–29) 36	25.67 (21.27) 22.00 (10–35) 18	0.100
FIM motor score[b]			
IMC	44.15 (27.45) 38.00 (20–74) 26	61.00 (24.62) 73.00 (32–79) 19	*0.019*
IMIC	79.94 (14.46) 86.00 (72–91) 36	83.32 (8.06) 85.00 (78–91) 19	0.993

Abbreviations: ASIA, American Spinal Injury Association; FIM, Functional Independence Measure; IMC, initially motor complete; IMIC, initially motor incomplete; IQR, interquartile range.
Italics represent statistically significant findings at $P<0.05$ level.
[a]Fatalities were considered for the analysis. Six cases in Thessaloniki and four cases in Stockholm were not considered as information on initial motor completeness was missing because of reasons as: lack of communication, co-existing stroke or orthopedic extra-spinal injuries, co-existing traumatic brain injury and late identification.
[b]Fatalities were not considered for the analyses. Two cases in Thessaloniki and four in Stockholm were not considered as information on initial motor completeness was missing because of some of the reasons mentioned in.[a]
[c]Fatalities were not considered for the analyses. Two cases in Thessaloniki and five in Stockholm were not considered as sufficient initial scoring was missing because of some of the reasons mentioned in.[a]

Statistically significant differences between study groups were also observed in the incidence of pressure ulcers during the first year post-trauma, but not in the prevalence at the time of follow-up. With regard to incidence, one out of five cases in Thessaloniki and none in Stockholm had suffered five or more ulcers.

No significant differences between groups were found as regards the occurrence of urinary infections requiring treatment and respiratory infections.

Symptomatic heterotopic ossifications were significantly more common in the Greek group as compared with the Stockholm group ($P=0.017$).

Discussion

Our findings indicate that the absence of a SCI system of care is correlated with inferior outcomes and longer LOS

Table 3 Length of stay[a]

	Thessaloniki *Mean (s.d.) median (IQR)* *N (%)*	*Stockholm* *Mean (s.d.) median (IQR)* *N (%)*	P-*value*
Intensive care unit			
IMC	54 (65) 41 (26–52)	11 (11) 8 (1–22)	*<0.001*
	16 (62)	16 (84)	0.182
IMIC	19 (19) 11 (5–32)	7 (6) 7 (1–12)	0.180
	10 (28)	8 (42)	0.368
General hospital ward			
IMC	52 (62) 32 (20–63)	9 (8) 5 (4–13)	*<0.001*
	25 (96)	13 (68)	*0.031*
IMIC	26 (17) 19 (13–35)	10 (9) 8 (4–14)	*<0.001*
	36 (100)	16 (84)	*0.037*
Spinal injury unit			
IMC	108 (68) 86 (59–178)	62 (36) 53 (41–78)	0.088
	4 (15)	19 (100)	*<0.001*
IMIC	(– (–) –)	34 (14) 35 (21–47)	Not reported[b]
	0 (0)	19 (100)	*<0.001*
In-patient rehabilitation center			
IMC	206 (98) 217 (108–297)	55 (23) 51 (40–74)	*<0.001*
	21 (81)	18 (95)	0.222
IMIC	129 (70) 115 (85–170)	33 (16) 38 (19–41)	*<0.001*
	10 (28)	18 (95)	*<0.001*
In-patient total			
IMC	255 (104) 271 (143–349)	121 (37) 119 (90–156)	*<0.001*
	26 (100)	19 (100)	Not reported[b]
IMIC	68 (76) 30 (16–99)	74 (30) 76 (45–97)	*0.028*
	36 (100)	19 (100)	Not reported[b]

Abbreviations: IMC, initially motor complete; IMIC, initially motor incomplete; IQR, interquartile range.
Italics represent statistically significant findings at $P<0.05$ level.
[a]Fatalities were not considered for the analyses. Two cases in Thessaloniki and four in Stockholm were not considered as information on initial motor completeness was missing.
[b]*P*-values not reported because of zero cells or lack of meaning.

in IMC cases, and, in some instances, with more frequent severe medical complications.

The most striking result of STATSCIS was, and remains, the dramatically higher case-mortality rate during the first year post-trauma in Thessaloniki.[9] In contrast to most studies evaluating outcomes and complications after TSCI, we did include fatalities in some analyses. As death is, by definition, a result of the most severe type of complication the exclusion of fatalities would distort and underestimate the overall outcome and the frequencies of complications.

Outcomes and length of stay

The IMC cases in Thessaloniki presented with inferior general and functional outcomes as compared with those in Stockholm, whereas the IMIC appeared rather similar between regions. In contrary, no statistically significant differences were reached as regards neurological recovery, ASIA motor scores at 1 year and ASIA motor scores gain in either IMC or IMIC cases. Presumably, for the IMC cases, this was due to the small sample size, as there was a trend pointing toward superior outcomes in Stockholm. In this study, it can be observed that the IMC cases seem more vulnerable to a non-systematic approach of care than the IMIC cases. However, further studies are needed to conclusively clarify this particular issue.

By comparing these two different approaches of care, it also becomes evident that a longer LOS *per se* is not associated with superior outcomes, as it has been suggested earlier.[11,12] More specifically, the results of a recent study on four spinal rehabilitation units reported that cases with early rehabilitation initiation, combined with a shorter rehabilitation period, achieved high functional gain or efficiency, whereas cases with a moderately delayed rehabilitation, combined with a long rehabilitation period, achieved high functioning.[12] In this study, because of the large differences in the clinical processes between the two regions, it was not possible to define accurately the point of initiation of rehabilitation. If total in-patient LOS is considered instead of rehabilitation LOS, because IMC cases in Thessaloniki had longer LOS and inferior outcomes as compared with the respective cases in Stockholm, the difference in efficiency between regions becomes very distinct.

Associated conditions and medical complications

It is noteworthy that six tetraplegic cases in Thessaloniki still had a tracheostomy at 1-year post-trauma, despite five of

Table 4 Associated conditions and their management

	Thessaloniki (n = *64*) n *(%)*	*Stockholm* (n = *42*) n *(%)*	P-*value*
Bladder			
Awareness of bladder filling			*0.524*
Yes	42 (66)	25 (60)	
No	22 (34)	17 (40)	
Bladder management method			*0.013*
Normally initiated	34 (53)	17 (40)	
Intermittent catheterization	17 (27)	16 (38)	
Indwelling catheter	6 (9)	0 (0)	
Suprapubic catheter	4 (6)	9 (21)	
Other	3 (5)	0 (0)	
Bowel			
Awareness of bowel filling			*0.462*
Yes, directly	35 (55)	18 (43)	
Yes, indirectly	11 (17)	8 (19)	
No	18 (28)	16 (38)	
Colostomy	2 (3)	0 (0)	0.517
Circulation			
Orthostatism	7 (11)	2 (5)	0.313
Autonomic dysreflexia	6 (19)[a]	4 (17)[a]	1.000
Respiratory			
Tracheostomy	6 (9)	0 (0)	0.079
Ventilator	1 (2)	0 (0)	*1.000*
Pain			
Above NLL	5 (8)	7 (17)	*0.212*
At NLL	28 (44)	18 (43)	*1.000*
Below NLL	22 (34)	15 (36)	*1.000*
Spasticity			0.186
No	29 (45)	15 (36)	
Mild	19 (30)	12 (29)	
Moderate	7 (11)	11 (26)	
Severe	9 (14)	4 (10)	

Abbreviation: NLL, neurological level of lesion.
Italics represent statistically significant findings at $P<0.05$ level.
[a]Percentage counted considering only the cases being at a risk to develop autonomic dysreflexia; 31 cases in Thessaloniki and 23 cases in Stockholm.

Table 5 Medical complications

	Thessaloniki (n = *75*) n *(%)*	*Stockholm* (n = *42*) n *(%)*	P-*value*
Renal			
Urinary tract infection			*0.125*
None	30 (40)	11 (26)	
1–2	22 (29)	20 (48)	
⩾3	23 (31)	11 (26)	
Pyelitis	6 (8)	3 (7)	1.000
Orchitis	2 (3)	0 (0)	0.536
Other	4 (5)	4 (10)	0.455
Pressure ulcers			
During the last year			*0.008*
None	38 (51)	24 (57)	
1	5 (7)	8 (19)	
2–4	18 (24)	10 (24)	
⩾5	14 (19)	0 (0)	
On 1-year follow-up[a]			0.400
Yes	15 (23)	7 (17)	
No	49 (77)	35 (83)	
Pulmonary			
Pneumonia	21 (28)	8 (19)	*0.373*
Tracheal stenosis	3 (4)	0 (0)	*0.552*
Other	5 (7)	2 (5)	*1.000*
Musculoskeletal			
Heterotopic ossification	17 (23)	2 (5)	*0.017*
Decreased spinal mobility	7 (9)	0 (0)	*0.048*
Others	4 (6)	2 (5)	1.000
Circulation			
Sepsis/bacteremia	18 (24)	1 (2)	*0.002*
Cardiac arrhythmias	8 (11)	0 (0)	*0.049*
DVT	4 (5)	0 (0)	*0.295*
Compartment syndrome	2 (3)	1 (2)	*1.000*
Pulmonary embolism	0 (0)	1 (2)	*0.359*

Abbreviation: DVT, deep venous thrombosis.
Italics represent statistically significant findings at $P<0.05$ level.
[a]Percentage calculated considering only the survivors at follow-up.

them being weaned off the ventilator at that time. Similarly, the relatively frequent use of long-term indwelling urethral catheters in Thessaloniki is yet another feature of practice deviating from current recommended clinical guidelines. There is ample evidence showing clear contra-indications in the long-term use of indwelling urethral catheter as compared with suprapubic catheter or the method of clean intermittent catheterization.[13–15] These findings constitute management routines known to increase long-term morbidity.

Sepsis/bacteremia constitute major complications, which were significantly more prevalent in Thessaloniki as compared with Stockholm, and were associated with several of the mortality cases.[9] By contrast, the low incidence of deep venous thrombosis and pulmonary embolism in both regions likely reflects the implemented clinical protocol of systematic administration of anticoagulant prophylaxis.[8]

Symptomatic UTIs and pneumonia affected similar proportions between regions. Although some complications become self-evident, some others become evident only in the long term, or in the course of comprehensive monitoring. Thus, we suspect some degree of underestimation of these latter types of complications, especially in the Greek setting, because of: (a) inadequate tracking, and (b) non-systematic and non-centralized documentation. Similar underestimation of complication rates could be observed in previous studies comparing cases with early and delayed admission to a SCI system of care.[16]

Pressure ulcers were the second most common medical complication in both settings; however, the regions appeared with radical differences in the incidence of *multiple* ulcers. Acquiring a pressure ulcer of any grade in the acute stage might be to some extent inevitable, whereas acquiring multiple ulcers during the first year post-trauma more likely indicates some kind of systemic error. The recurrence of ulcers and their presence in multiple locations are probably indicators of either: (a) suboptimal clinical routines when acquired pre-discharge, or (b) inadequate education of the patient when acquired post-discharge. The unavailability of ulcer grading and location does not allow for further analysis

of this issue in this study. Data from other settings, report rates of pressure ulcers on the first annual follow-up year post-trauma to range between 12 and 36%.[17–20] In some of these studies, pressure ulcers were the most frequent medical complication, with an increasing rate in later follow-ups.[19] Cases transferred early to a SCI system of care were reported to suffer a statistically significant lower number of ulcers as compared with those admitted later.[16]

Conclusion

In conclusion, we show how two rather similar cohorts of TSCI manifest large discrepancies in terms of 1-year outcomes, LOS and complications, depending on the type of management they receive. The region with a SCI system of care (Stockholm) appeared with significantly superior outcomes, shorter LOS and less complications, as compared with the region that lacked such a system (Thessaloniki). IMC cases are mainly affected in terms of outcomes and LOS by the absence of a systematic approach. Overall, when the longer LOS is considered together with the inferior outcomes and the higher frequencies of complications in Thessaloniki, the discrepancies in efficiency and effectiveness of health care between regions become even more noteworthy.

As the major difference between regions was the presence or absence of a SCI system of care, and not the presence or absence of modern medicine, the mere presence of the latter does not seem to be sufficient to guarantee adequate outcomes. Several studies, before this, have highlighted the benefits of a SCI system of care.[3,4,12,16,21] In addition, others have stressed the need of establishing SIUs in Greece.[22] We hope that STATSCIS will serve as a further factual basis for the urgent priority that needs to be given to such a mission.

Conflict of interest

The authors declare no conflict of interest.

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