

## FACTORS RESPONSIBLE FOR READMISSIONS TO REHABILITATION CENTER FOLLOWING SPINAL CORD INJURY

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### ABSTRACT

**Objective:** The objective of the current study is to determine the demographics, clinical characteristics and complications of those SCI patients who were readmitted to rehabilitation center in Pakistan.

**Material and Methods:** Clinical records of 1258 Spinal Cord Injury patients admitted to the Paraplegic Center, Peshawar from 2011 to 2016 were retrieved and 166 (13.2%) patients were identified who were readmitted in the rehabilitation center. Data of the readmitted patients was accessed and information regarding demographics, causes of readmission, neurological level, complications, co-morbid conditions were evaluated. Data was analyzed using SPSS version 20.

**Results:** Mean age of readmitted patients was  $35.7 \pm 14.6$  years. Majority of them (90.4%) were having complete Spinal Cord Injury and frequency of readmissions into the rehabilitation center amongst these individuals ranged from 1-5 times. A big proportion (88.0%) of these patients were readmitted for Pressure Ulcer management while 12.0% patients were readmitted for further physical rehabilitation. Mean duration from date of injury to last readmission date in years was  $9.03 \pm 8.00$  years. Majority (37.9%) of patients were readmitted in 1-5 years post injury. In majority of patients who were readmitted for pressure ulcer management, location of worst pressure ulcer was found to be ischium (43.2%). 74.7% patients were having Grade IV pressure ulcer and 48.6% patients were having single pressure ulcer while 51.4% were having multiple pressure ulcers.

**Conclusions:** Significant proportion of Spinal Cord Injury patients are readmitted to rehabilitation centers in Pakistan. Pressure Ulcers remain the main reason for readmission to rehabilitation center. Majority of Spinal Cord Injury patients need readmissions in first five years post injury.

**Key Words:** Pakistan, Paraplegic, Pressure ulcer, Readmission, Rehabilitation, Spinal cord injury.

### INTRODUCTION

Readmission is common following Spinal Cord Injury (SCI) and throughout the world high readmission rates among SCI patients are reported<sup>1-5</sup>. Readmissions in SCI patients is not only a significant concern in developing countries, but studies from developed countries also reported significant issues associated with readmissions<sup>2-6</sup>. Different studies conducted in different countries reported different

rate of readmission among SCI patients, ranging from 18% to 64%<sup>1-9</sup>. Majority of studies reported that about 25% SCI patients may need readmission in 1st year post discharge from rehabilitation center<sup>2-4,7,9-12</sup> and generally, readmission rates reduces following 1st year post-discharge<sup>2,7,8</sup>.

SCI not only results in loss of sensations and movements below neurological level but also affects bowel and bladder functions<sup>13</sup>. These physiological changes prone SCI patients at risk of developing secondary complications<sup>14,15</sup>. Recent studies reported that common complication among SCI patients in Pakistan are pressure sores (63.8%) followed by fractures (16.5%) and deep venous thrombosis (2.7%)<sup>16-19</sup>. Though majority of these complications are prevent-

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able, when they do develop, they are difficult to manage without readmissions<sup>8,9</sup>. Therefore readmissions are common among SCI patients for the management of these secondary complications<sup>2,5,11,12</sup>. Moreover, as SCI is lifelong disability, patients are prone to complications throughout life and thus SCI patients may require readmissions throughout life<sup>2</sup>.

Readmissions among SCI patients is a huge problem for the patient and their family as well as for the society and health care system and therefore throughout the world, much attention has been paid to understand patterns and antecedent for readmissions among SCI patients<sup>1,9</sup>. Pakistan, a developing country, where sufferings of SCI patients are much more than developed countries but previously conducted research studies in Pakistan only reported demographics and complications of SCI patients<sup>16,17,19-22</sup>. To the author's knowledge, there is paucity of studies in Pakistan which had reported readmissions of SCI patients to rehabilitation centers. Therefore, the current study will determine the demographics, clinical characteristics and complications of those SCI patients who were readmitted to rehabilitation center in Pakistan. The findings of the study will be used by policy makers and planners for the prevention of readmission in SCI patients in Pakistan.

**METHODS AND MATERIALS**

This was a cross sectional study which was conducted at Paraplegic Centre Peshawar, Pakistan. SCI patients readmitted to Paraplegic center from 2011 to 2016 were included in this study. Clinical records of total 1258 SCI patients admitted to the Paraplegic center from 2011 to 2016 were reviewed and 166 patients were identified who were readmitted. Data of these 166 readmitted patients was accessed and information regarding demographics, reasons of readmissions, physiological intactness of SCI (complete SCI/incomplete SCI), neurological level, complications, co morbid conditions and other relevant medical information of these patients were noted. In those patients who were readmitted more than one time, data of last admission was noted. Data was analyzed using SPSS version 20. Ethical approval for the study was obtained from the chief executive officer (CEO) of the Paraplegic Centre Hayatabad.

Paraplegic Centre Peshawar, Pakistan is one of the oldest and biggest SCI specialized rehabilitation center which provide free of cost services to SCI patients in Pakistan. SCI patients are admitted for rehabilitation after their initial treatment and surgical interventions in other tertiary care hospitals. Besides

rehabilitation services, Paraplegic center also provide facilities regarding Pressure ulcer (PU) management including nursing care, flap surgery and medication to SCI sufferers.

In Paraplegic center, SCI patients are only re-admitted if they need further rehabilitation or they need PU management. Mostly further rehabilitation is provided to those SCI patients who haven't completed their rehabilitation in first admission due to any reason or who showed neurological improvement and require rehabilitation according to their new functional status. Due to lack of facilities, SCI patients who developed other serious medical conditions following SCI like kidney problems, genitourinary problems etc. are not readmitted in Paraplegic center and are referred to other hospitals specialized in respective conditions.

**RESULTS**

A total of 1258 SCI patients were admitted to Paraplegic Centre, Peshawar from 2011 to 2016, out of which 166 (13.2%) patients were readmitted cases. Mean age of these 166 patients was 35.7±14.6. A big proportion of the included patients (65.1%, n=108) were male while 34.9% (n=58) patients were female. The number of married (50.6%, n=84) patients was almost equal to unmarried patients (49.4%, n=82). Most of the patients (83.1%, n=138) were from Khyber Pakhtunkhwa, while 17(10.2%) were from tribal areas and 11 (6.6%) were form other provinces of the country. Less than a half (47.6%, n=79) of

**Table 1: Demographic information of SCI patients readmitted to rehabilitation center**

	Parameters	Frequency
Gender	Male	108 (65.1%)
	Female	58 (34.9%)
Marital Status	Married	84 (50.6%)
	Unmarried/Single	82 (49.4%)
Education	Uneducated	79 (47.6%)
	Educated	87 (52.4%)
	Students	28 (16.9%)
	House wife	45 (27.1%)
Profession	Laborer/No specific profession	51 (30.7%)
	Others	42 (25.3%)
	Khyber Pakhtunkhwa	138 (83.1%)
	Tribal areas	17(10.2%)
Province	Other Provinces of Pakistan	11 (6.6%)

Table 2: Frequency of readmissions in different age groups

Frequency of readmissions	Age Group				
	1- 20 years	21-40 years	41-60 years	Above 60 years	Total
1	18 (14.6%)	68 (55.3%)	28 (22.8%)	9 (7.3%)	123
2	2 (8.3%)	15 (62.5%)	6(25.0%)	1 (4.2%)	24
3	0 (0.0%)	5 (50.0%)	5(50.0%)	0 (0.0%)	10
4	0 (0.0%)	3 (60.0%)	1(20.0%)	1 (20.0%)	5
5	0 (0.0%)	2 (50.0%)	2(50.0%)	0 (0.0%)	4
Total	20	93	42	11	166

Table 3: Causes of readmissions in SCI patients with different readmission numbers

No. of readmissions	PU management	Further rehabilitation	Total
1	105 (85.4%)	18 (14.6%)	123
2	23 (95.8%)	1 (4.2%)	24
3	9 (90.0%)	1(10.0%)	10
4	5 (100%)	0 (0.0%)	5
5	4 (100%)	0 (0.0%)	4
Total	20	93	166

Table 4: Presence/ Absence of PU and location of worst PU in different SCI level

Level of SCI	Presence/ Absence of PU and location of worst PU						
	Sacrum/ Coccyx	Gluteal	Ischium	Trochan- ters	Knee	Ankle/ Feet	Skin intact
Complete tetraplegia	3 (33.3%)	1 (11.1%)	1 (11.1%)	1 (11.1%)	0 (0%)	0 (0%)	3 (33.3%)
Incomplete tetraplegia	0 (0%)	0 (0%)	0 (0%)	1 (20.0%)	0 (0%)	0 (0%)	4 (80.0%)
Complete thoracic paraplegia	22 (19.0%)	13 (11.2%)	48 (41.4%)	19 (16.4%)	2 (1.7%)	4 (3.4%)	8 (6.9%)
Complete lumbar paraplegia	1 (9.1%)	1 (4.0%)	10 (40.0%)	2 (8.0%)	0 (0%)	1 (4.0%)	2 (8.0%)
Incomplete lumbar paraplegia	1 (9.1%)	0 (0%)	4 (36.4%)	1 (9.1%)	0 (0%)	2 (18.2%)	3 (27.3%)
Total	35	15	63	24	2	7	20

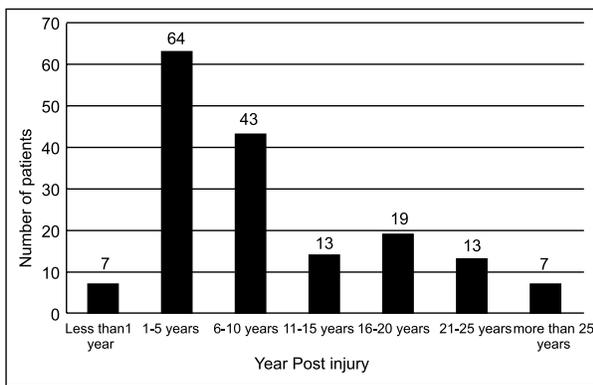


Figure 1: Number of readmitted patients post injury duration

the patients were uneducated while 87(52.4%) were having different levels of education (From primary level to PhD). 45 (27.1%) patients were house wives, 28 (16.9%) were students, 51 (30.7%) were having no profession while remaining 42 (25.3%) patients were

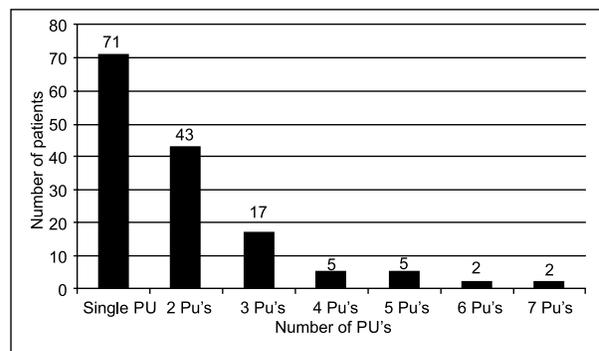


Figure 2: Number of PU's in readmitted patients having other professions (Table 1).

The most common cause of SCI in these patients was fire arm injury (33.7%, n=56), followed by fall from height (29.5%, n=49) and road traffic accident (14.5%, n=24), while remaining 37 (22.3%) patients were having other causes of injury. Complete SCI

(ASIA A) was reported in 150 (90.4%) patients while remaining 16 (9.6%) were having incomplete SCI (ASIA B, C, D, E). Majority of patients (69.9%, n=116) were having complete thoracic paraplegia followed by complete lumbar paraplegia (15.1%, n=25), incomplete lumbar paraplegia (6.6%, n=11), complete cervical tetraplegia (5.4%, n=9) and incomplete cervical tetraplegia (3.0%, n=5).

Number of readmissions in individual SCI patients ranged from 1-5 times. Majority of patients (74.1%, n=123) readmitted only one time to rehabilitation center and most of readmitted patients (32.5%, n=54) were in age group 21-30 years as shown in Table 1. PU management was the main reason for readmission in 88.0% (n=146) of SCI patients, while 12.0% (n=20) patients were readmitted for further rehabilitation (Table. 2).

Mean duration from date of injury to last readmission date in years was  $9.03 \pm 8.00$  years while median and range was 7.00 and 32 respectively. 7 (4.2%) patients were readmitted within 1st year following SCI while majority (37.9%, n=63) patients were readmitted in 1-5 years post injury as shown in Figure 1.

Out of 146 patients, who were readmitted for PU management, location of worst PU was found to be ischium (43.2%, 63/146) (Table 3).

One hundred and nine (74.7%) patients were having Grade IV PU while 1 (1/146; 0.7%), 9 (9/146; 6.2%), and 27 (27/146; 18.5%) patients were having Grade I, Grade II and Grade III PU, respectively. 71 (71/146, 48.6%) patients were having single PU while 75 (74/146, 51.4%) were having more than 1 PU (Figure 2).

Five (3.01%) patients were having vesicle calculus on readmission, 5 (3.01%) suffered from urethral fistula and 4 (2.40%) patients underwent colostomy post SCI. Nine (5.42%) patients were diagnosed with hepatitis C while 2 (1.20%) were having hepatitis B.

## DISCUSSION

Readmissions are not only burden on health care system but also affect SCI patients themselves as readmissions disrupt individual social life and disturb them psychologically<sup>11</sup>. Moreover, Readmissions in SCI patients results in reduced quality of life<sup>5,23</sup>. But the fact is that about 1/3rd of SCI patients require re-hospitalization each year<sup>5,23</sup>. Majority of SCI pa-

tients readmitted to hospitals with complications that are potentially preventable<sup>11</sup>. To minimize burden of readmissions of SCI patients in developing countries like Pakistan, it was necessary to report number and causes of readmissions so that to develop preventive strategies for future. Till now, no other study discussed the issue of readmissions among SCI patients to rehabilitation centers in Pakistan.

In contrast to previous studies, which reported high rates of readmissions ranging from 18% to 64%<sup>1-9</sup>, results of current study showed that only 13.2% SCI patients were readmitted. Analysis of demographic information showed that mean age of readmitted patients was  $35.7 \pm 14.6$ . Previous studies regarding SCI, conducted in Pakistan reported lower mean age<sup>16,17,20,22,24</sup>, which shows that readmitted patients tended to be much older as compared to fresh SCI patients. Previous studies conducted regarding readmissions in SCI patients also reported similar results and there is evidence that increased age is associated with greater chance of readmission<sup>2,3,7,11,12,25</sup>. The other key results showed that majority of readmitted patients were house wives (27.1%) and students (16.9%) due to their nature of life as majority of them tend to sit for longer durations.

Results of current study showed that 88.0% SCI patients were readmitted to rehabilitation center for PU management while 12.0% patients were readmitted for further rehabilitation. Almost all of the previous studies conducted regarding readmission among SCI patients reported skin issues especially PU's as one of the major cause of re-hospitalization<sup>3-6,8</sup>. Besides PU's other causes of re-hospitalization, reported by previous studies were urinary problems, respiratory infections and cardiovascular problems<sup>2-4,7,10-12</sup>.

Majority of patients in current study were readmitted in first five years of post-injury. Previous studies also reported that number of readmission<sup>2-4,7,10-12,25</sup>. Many research studies reported that the most frequent site for PU development in SCI patients is sacral/coccyx region<sup>16,17,26</sup>. However results of current study revealed that in majority (43.2%) of patient's location of worst PU was found to be ischium. This can be explained by the fact that studies which reported sacral/coccyx as common location of PU was conducted on fresh SCI patients while current study included readmitted patients. Fresh SCI patients kept in supine position for longer periods of time using hard mat-

truss are prone to develop sacral/coccyx PU<sup>17,26</sup>. On the other hand readmitted patients mostly used wheel chairs that's why they are more prone to develop ischial PU's.

Frequent readmissions considerably influence the capability of SCI patients to live meaningful life<sup>14,27</sup>, and negatively impact overall general health, self-esteem, mobility and independence of SCI patients and thus further increases disability of SCI patients<sup>12,28</sup>. Readmissions among SCI patient are associated with incredible financial costs and human sufferings and obviously, reducing number of readmissions is the main possibility to decrease financial costs and sufferings associated with readmissions<sup>10,14</sup>.

## CONCLUSION

Significant proportion of SCI patients are readmitted to rehabilitation centers in Pakistan. PU's remain the main reason for readmission to rehabilitation center. Based on the facts and figures presented in the current study, preventive strategies should be developed to minimize burden of readmissions in Pakistan. Large trials and prospective studies are required to determine re-hospitalization rate's among SCI patients in Pakistan.

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