REASONS FOR READMISSIONS IN A SAMPLE OF PAKISTANI PEOPLE WITH TRAUMATIC SPINAL CORD INJURY

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ABSTRACT

Objective: To ascertain different reasons for hospital readmissions in a sample of Pakistani individuals with chronic spinal cord injury.

Study Design: A cross-sectional descriptive study.

Place and Duration of Study: Armed Forces Institute of Rehabilitation Medicine (AFIRM), Rawalpindi Pakistan, from Nov 2011 to Nov 2012.

Material and Methods: It was a cross-sectional survey carried out on individuals with chronic spinal cord injury admitted to the indoor spinal cord injury rehabilitation unit of AFIRM, Rawalpindi. SCI individuals having traumatic SCI of >6 months duration and injury scales of A-D defined by American Spinal Injury Association Impairment Scale (AIS) were included.

Results: Out of 51 recruited patients (mean age 35 ± 11 years), majority (90.2%) were male, educated from grade 9-10, and developed SCI following a motor vehicle accident. Cervical neurological level was the commonest and the majority (74.5%) had SCI of AIS-A on readmission. Diabetes mellitus was the commonest co-morbidity. The mean duration post injury was 3.5 years. The common causes of readmission were pain (27.5%), spasticity (25.5%), and pressure ulcers (19.6%).The mean length of stay was 11.6 days.

Conclusion: Pain, spasticity, and pressure ulcers were the main reasons for hospital readmissions in our sample of Pakistani people with chronic traumatic SCI.

Keywords: Hospital readmission, Pain, Pressure ulcer, Spasticity, Spinal cord injury, Trauma.

INTRODUCTION

Spinal cord injury (SCI) is one of the leading causes of permanent disability. Though life expectancy of people with SCI has increased over time due to improved tertiary care, the changed physiology makes them prone to many secondary problems more often than able-bodied individuals[1]. These problems are significant and sometimes need hospitalization. In fact, these people are more likely to get hospitalized and remain in hospital for longer durations compared to able-bodied individuals[1-3].

The higher tendency for hospitalization not only poses financial burden on the people with SCI and the health care system but also affects their effective functioning in social, vocational, and avocational activities. Therefore, decreasing the frequency and duration of hospitalizations would reduce the total burden of SCI. The common reasons described in the literature for rehospitalizations in this community are urinary tract infections (UTI), pneumonia, spasticity, pain, pressure ulcers (PU), and gastrointestinal problems[1-3].

Patients lacking initial physiatrist care at specialized SCI management centers are more likely to land up in complications leading to readmissions, increased morbidity, and mortality[4]. In Pakistan, SCI cases are on the rise due to mass disasters, terrorism, and natural calamities. Inadequate facilities for SCI management in Pakistan relative to the country's population and poverty are making life difficult for these people. The heath care system is also under stress and cannot cater for the burden of so many diseased people. This study was aimed at identifying

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secondary problems in SCI individuals that necessitate rehospitalizations in order to devise appropriate strategies to reduce the frequency of complications and therefore readmissions.

MATERIAL AND METHODS

It was a cross-sectional survey carried out after approval of the institutional ethics review committee at the SCI Rehabilitation Unit of Armed Forces Institute of Rehabilitation Medicine (AFIRM), Rawalpindi, Pakistan from November 2011 to November 2012. AFIRM is a tertiary-care 100-bedded indoor rehabilitation setup, which is the largest in Pakistan at present. The SCI Rehabilitation Unit is the best equipped in the country with a bed state of 45. A sample size of 47 was estimated via Epi Tools Epidemiological Calculators[5] while keeping level of significance 5%, confidence level 95%, estimated true proportion 3.1%[3], and 5% of absolute presision.

Through non-probability consecutive sampling, we included SCI individuals belonging to both genders and all traumatic etiologies having injury of more than six months' duration and injury scales of A-D defined by American Spinal Injury Association Impairment Scale (AIS)[6]. Patients with co-existing traumatic brain injury, cerebrovascular accident, and polyneuropathies were excluded. During sampling, the male gender was expected to dominate.

Verbal informed consent was taken from the patients and caregivers after explaining the purpose of study, data collection, and publication of results. The information was gathered by interviewing the patient and checking medical file for previous assessments, laboratory and radiological investigations. Interviews were conducted by principal investigators of the study. Patients were asked about their age, marital status (married, unmarried), level of education (illiterate, grade 1-5, grade 6-8, grade 9-10, grade 11-12, graduate, post graduate), cause of SCI (MVA, falls, gunshot injury, blast injury, electrocution), time passed since SCI in years, primary reason for readmission, and the comorbidities (diabetes mellitus (DM), ischemic heart disease (IHD), kidney failure, etc.). Detailed neurological examination was carried out as per AIS scoring guidelines 6 to determine the level (cervical, high thoracic, low thoracic, lumbosacral) and extent of SCI (AIS-A, -B, -C, -D). The neurological level T1-T6 was considered as high thoracic and neurological level T7-T12 was considered as low thoracic levels for SCI.

The data were analyzed with the help of statistical program Statistical Package for Social Sciences (SPSS) version 19.0 (IBM Corp., Armonk, NY, USA). Means and standard deviations were calculated for age, duration of SCI in years, and length of stay (LOS) in hospital in days. Frequencies and percentages were calculated for marital status, level of education, cause of SCI, level and severity of SCI, comorbidities, and the primary reason for readmission.

RESULTS

Out of the final 51 recruited patients (mean age 35 ± 11 years, range = 19-55 years), 46 (90.2 %) were male and 5 (9.8 %) were female (table). Most of them had education from grade 9-10 and developed SCI following a MVA. Cervical neurological level was the commonest followed by low and high thoracic levels. Thirty-eight (74.5%) patients were having SCI of AIS-A on readmission, five had AIS-B, five had AIS-C, and three had AIS-D respectively. The primary etiology for SCI in the majority was MVA followed by falls and gunshot injury (table). Most falls occurred from trees trailed by falls from roof-tops and stairs.

DM was the commonest co-morbidity. The mean duration post injury was 3.5 ± 0.5 years. Maximum number of patients (n=23, 45.1%) were readmitted in 1-5 years post injury (table). The common causes of readmission were pain (27.5%, n=14), spasticity (25.5%, n=13), PU (19.6%, n=10), gastrointestinal problems (9.8%, n=5), UTI (7.8%, n=4), deep venous thrombosis (3.9%, n=2), heterotrophic ossification (2%, n=1), and burns (2%, n=1). The mean LOS was 11.6 ± 8 days.

DISCUSSION

This is the first study evaluating the reasons for readmissions in individuals with chronic SCI in Pakistan. In this study, we found that the average age of the individuals with chronic SCI was 35 years. A systematic review on the epidemiology of traumatic SCI in Asia has found that the average age ranged from 28.3 to 40 years in the South Asian region including Pakistan, India, Bangladesh, Nepal, and Afghanistan[10].

The commonest cause of SCI in our cohort was MVA followed by falls and gunshot injury. This is similar to the international data on SCI etiology where MVA predominate other etiologies of SCI like falls and acts of violence[6,11]. However, other epidemiological studies reported from our country by Qureshi *et al*[12] Rathore *et al*[13] and Masood *et al*[14] as well as from the neighboring countries i.e. Singh *et al*[15] and Dhamangaonkar *et al*[16] from India, Hoque *et al*[7] and Islam *et al*[8] from Bangladesh, and Lakhey *et al*[17] and Shrestha *et al*[18] from Nepal have identified falls as the major reason behind SCI with MVA to follow.

Table: The descriptive statistics of the sample.

Characteristics	n (%)	Characteristics	n (%)
Gender		Marital status	
Male	46 (90.2)	Married	39 (76.5)
Female	5 (9.8)	Unmarried	12 (23.5)
Level of education		Time duration since injury at the time of readmission	
Illiterate	4 (7.8)		
Grade 1-5	5 (9.8)	<1 year	23 (45.1)
Grade 6-8	7 (13.7)	1-<2 years	17 (33.3)
Grade 9-10	21 (41.2)	2-<3 years	6 (11.8)
Grade11-12	10 (19.6)	3-<4 years	4 (7.8)
Graduate	3 (5.9)	≥4 years	1 (2)
Post graduate	1 (2)		
Level of spinal cord injury		Severity of spinal cord injury based on AIS*	
Cervical	21 (41.2)		
Upper thoracic (T1-T6)	10 (19.6)	AIS-A	38 (74.8)
Lower thoracic (T7-T12)	16 (31.2)	AIS-B	5 (9.8)
Lumbosacral	4 (7.8)	AIS-C	5 (9.8)
		AIS-D	3 (5.9)
Comorbidities		Reasons for readmissions	
Diabetes mellitus	4 (7.8)	Pain	14 (27.5)
Ischemic heart disease	3 (5.9)	Spasticity	13 (25.5)
Renal failure	3 (5.9)	Pressure ulcers	10 (19.6)
Nil	41 (80.4)	Urinary tract infection	4 (7.8)
		Gastrointestinal problems	5 (9.8)
		Deep venous thrombosis	2 (3.9)
Primary etiology of spinal cord injury in readmitted patients		Heterotopic ossification	1 (2)
		Burns	1 (2)
Motor vehicle accidents	19 (37.3)	Others	1 (2)
Falls	14 (27.4)		
Falls from roof-tops	3 (5.9)		
Falls from stairs	3 (5.9)		
Falls in deep well	2 (3.9)		
Fall from trees	6 (11.8)		
Gunshot injury	9 (17.6)		
Mine blast injury	6 (11.8)		
Electrocutions	3 (5.9)		

*AIS=American spinal injury association impairment scale

We identified the cervical SCI to be the commonest level of SCI with AIS-A as the most frequent level of SCI severity. The regional studies from Pakistan[12], India[15,16], Bangladesh[7,8] and Nepal[17,18] also describe cervical level to be the most frequent level and AIS-A to be the most frequent grade of SCI. Worldwide, similar epidemiology has been mentioned in the SCI pooled data[6].

The average LOS in our cohort was 11.6 days. It closely matches the average LOS of 11.9 days reported by Davidoff *et al*[3] for patients with SCI admitted within first year post injury. The mean LOS was reported 12.03 days by Savic *et al*[1] and 12.92 days by Charlifue *et al*[19]. Middleton and colleagues found an average LOS of 15.5 days[2].

The pain, spasticity, and PU were the primary etiologies for readmissions in our study. In a five-years' study conducted in Turkey, majority of SCI individuals were rehospitalized due to spasticity (25%) and PU (17.9%)[20]. A multicenter analysis in USA recruiting 8668 persons with SCI found PU as the leading cause of rehospitalization in patients with paraplegia (T1-S5) and diseases of the respiratory system in patients with tetraplegia (C1-C8)[21]. A multicenter study from UK concluded that urinary and skin complications were the two main reasons for hospital readmissions in persons with chronic SCI and skin problems were responsible for occupation of highest percentage of beds (32.2% of all bed-days)[1].

There are other studies that found urinary and gastrointestinal problems to be more alarming than other causes for hospital read-mission in people with SCI. A 10-year Australian study recruiting 253 patients showed that the commonest causes for readmissions were genitourinary (24.1%), gastrointestinal (11.0%), and further rehabilitation (11.0%) in decreasing order of frequency[2]. Another recent American study discovered that two commonest health problems associated with rehospitalization in SCI people were related to genitourinary system (e.g., UTI) and respiratory system (e.g. pneumonia)[22].

Factors related to readmission were beyond the scope of this study. Though, many studies in the past have taken into account the relevant factors in determining the readmission patterns. Factors shown to be associated with increased likelihood of rehospitalisation included lack of tertiary education, time since injury, indwelling catheter, level and severity of injury, and gravity of disability, impairment, and handicap[1,21-23], The researchers were even able to develop models to predict risk of rehospitalisation based on various factors such as level and severity of neurological impairment, time since injury, age, gender, race, and status of marriage and employment[3,23,24].

Previous studies have proposed certain measures to lessen the increasing burden of hospital readmissions in people with SCI. The need of ongoing patient education and programmed follow-ups of vulnerable patients has been highlighted. Training should be conducted in self-evaluation by the patients in domains such as personal care, physical activity, monitoring of disease related symptoms, and compliance to medication. Techniques for conducting pressure relief, skin check, catheterization, and use of assistive equipment when appropriately taught to patients, assisted substantially in prevention of complications[25]. Problem oriented interactive group sessions based on actual problems encountered by SCI patients can prove beneficial in early community reintegration. Future research is required to further elaborate the efficacy of problem-solving interventions in rehabilitation programs.

The limitations of the study included a small sample size and shorter duration post SCI. Excluding non-traumatic SCI was also one of the shortcomings. Identification of risk factors was also lacking in the study.

CONCLUSION

Pain, spasticity, and PU were the main reasons for hospital readmissions in people with chronic SCI of our cohort. These complications

are avoidable in nature and if not prevented, may buildup health burden on the rehabilitation centers.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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