

**ACUTE CARE MANAGEMENT OF SPINAL CORD INJURY:
PATIENT PERSPECTIVE**

Shoaib Ahmed

Bachelor of Science in Physiotherapy (B. Sc. PT)

DU Roll No: 139

Reg. No: 6256

Session: 2013-2014

BHPI, CRP, Savar, Dhaka-1343



Bangladesh Health Professions Institute (BHPI)

Department of Physiotherapy

CRP, Savar, Dhaka-1343

Bangladesh

August, 2018

We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled

**ACUTE CARE MANAGEMENT OF SPINAL CORD INJURY:
PATIENT PERSPECTIVE**

Submitted by **Shoaib Ahmed** for partial fulfillment of the requirements for the degree of Bachelor of Science in Physiotherapy (B. Sc. PT)

.....
Firoz Ahmed Mamin
Associate Professor
Department of Rehabilitation Science,
BHPI, CRP, Savar, Dhaka

.....
Mohammad Anwar Hossain
Associate Professor, BHPI &
Head, Department of Physiotherapy
CRP, Savar, Dhaka

.....
Ehsanur Rahman
Assistant Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

.....
Md. Shofiqul Islam
Assistant Professor
Department of Physiotherapy
BHPI, CRP, Savar, Dhaka

.....
Prof. Md. Obaidul Haque
Head of physiotherapy Department
Vice principal
BHPI, CRP, Savar, Dhaka

DECLARATION

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also decline that for any publication, presentation or dissemination of information of the study. I would bound to take written consent from the department of physiotherapy of Bangladesh Health Professions Institute (BHPI).

Signature:

Date:

Shoaib Ahmed

Bachelor of Science in Physiotherapy (B. Sc. PT)

DU Roll No: 139

Reg No: 6256

Session: 2013-2014

BHPI, CRP, Savar, Dhaka-1343

CONTENTS

	Page No.
Acknowledgement	VII
Abbreviations	VIII
Abstract	XII
CHAPTER-I: INTRODUCTION	
1.1 Back ground	1-4
1.2 Justification of the study	5
1.3 Research question	6
1.4 Objective	
1.4.1 General objectives	7
1.4.2 Specific objectives	7
1.5 Operational definition	8-9
CHAPTER-II: LITERATURE REVIEW	10-15
CHAPTER – III: METHODOLOGY	
3.1 Study design	16
3.2 Study site	16
3.3 Independent variable	17
3.4 Dependent variable	17
3.5 Study area	17
3.4 Sample sampling & population	17

3.5 .1: Inclusion Criteria	21
3.5.2: Exclusion criteria	21
3.6 Data Collection tools	21
3.8 Data Collection procedure and analysis	22
3.9 Ethical issue	23
3.10 Inform consent	23
CHAPTER- IV: RESULT	20-29
CHAPTER- V: DISCUSSION	30-37
5.1 Discussion	30-36
5.2 Limitation	37
CHAPTER –VI: CONCLUSION & RECOMMENDATION	38-39
CHAPTER -VII: REFERENCES	40-45
CHAPTER-VIII: APPENDIX	46-64

Acknowledgement

The first gratitude goes to Almighty Allah for giving me passion enough ability and intelligence to complete study successfully. I wish to express my sincere indebtedness to my supervisor, I am thankful to **Firoz Ahmed Mamin**, Associate Professor Department of Rehabilitation Science, BHPI. and also thanks to clinical physiotherapists of Physiotherapy Department, CRP, Savar, Dhaka for their constant and sympathetic guide and valuable suggestion at all stages to complete this study. I am also very great full to **Mohammad Anwar Hossain**, Associate Professor, Head of Physiotherapy Department, BHPI, CRP, Savar, Dhaka to give permission for data collection. And I am also thankful to **Mozaffor Hossain Zafor**, in charge in Spinal Cord Injury (SCI) Department of CRP who helped me about all information of CRP about Spinal Cord Injury.

I also would like to thanks teachers of BHPI especially my greatest gratitude to the respectable Vice Principal **Prof. Md. Obaidul Haque** and other respected teachers of Bangladesh Health Professions Institute (BHPI), Department of Physiotherapy, who facilitated me and given contribution to complete this studies smoothly. I remain ever grateful to help for their guidance and support without that I could not have come to this stage. And I would also like to give gratitude **Md. Shofiqul Islam** assistant professor, Department of physiotherapy, for sanctioning my thesis.

I also wish to express my heartiest love to my junior brothers and sisters who played a great role in data collections for my research and librarians of BHPI who helped me to providing information and using internet.

I am grateful to others who were engaged at any time for giving me valuable suggestion and helping me in different stages of the study that made my work easy and inspired me to work with enthusiasm.

I am grateful to my participants who gave me their valuable time and spend more time with me.

Abbreviations

- ASIA:** American Spinal Injury Association
- BHPI:** Bangladesh Health Professions Institute
- BMRC:** Bangladesh Medical Research Council
- CRP:** Centre of the Rehabilitation for the Paralysed.
- IRB:** Institutional Research Board
- NHIS:** National Health Interview Survey
- NTSCI:** Non-traumatic spinal cord injury
- SCI:** Spinal Cord Injury
- SCL:** Spinal Cord Lesion
- SPSS:** Statistical Package for the Social Sciences
- WHO:** World Health Organizations

List of Tables

Table No	Topic	Page No
1	Socio-demographic Information	22
2	Injury level of Patients	24
3	Causes of injury	27
4	Location of injury	27
5	First aid immediately post injury	27
6	Consciousness	27
7	Health care providers before going to hospital	28
8	Number of hospital	30
9	Duration of Journey	30
10	Mode of immobilization	30
11	Diagnosis Confirmed	30

List of Figures

Figure No.	Topics	Page No.
1	ASIA of Patients	25

Abstract

Purpose: To find out immediate acute care management after spinal cord injury patients at CRP. Objectives: The aim of this study was to find out care pathway of Bangladesh, causes, transport system use & living area of Spinal Cord Injury patients.

Methodology: The study design was cross sectional. The sample size was 150 and purposive sampling technique was used for sample selection who was admitted in Centre for the Rehabilitation of the Paralyzed (CRP) in Bangladesh which is the largest spinal cord injury rehabilitation center in South Asia. Data was collected by a standard questionnaire and it was analyzed by SPSS software version 16.0.

Results: Among 150 spinal cord injury patients, most of the patients were complete spinal cord injury patients. The complete-A patients are 66.7% (n=100). Majority of the participants were came from rural area (82.7%) and they were farmer 25.3% (n=38). Complete-A patients were (66.7%), incomplete-B was (15.3%), Incomplete-C was (12.7%) and incomplete-D was (5.3%). The skeletal and neurological level of thoracic was most common and then cervical then lumber level. The skeletal and neurological level of cervical were 34.7% and 48.6% (n=52 and n= 73), thoracic were 44.15% and 49.2% (n=66 and n=74), lumber 20.7% and 2.2% (n=32 and n=3). Most of the patients were from low socio economic condition and low educational level.

Conclusion: From the study it can be concluded that most of the participants were village people. So they cannot understand the preventative measure of Spinal Cord Injury. The study may help to provide awareness among the people of Bangladesh. And also express the vulnerable cause, occupation which is responsible for the spinal cord injury. So Spinal Cord Injury can be reduced through taking preventative measure.

Key Words: Acute care management, Spinal cord injury.

1.1 Background

The spinal cord is affected by the diseases and injuries that damages the neurological level which is important health problem in our country and high rates of morbidity and mortality is carried by them (Hoque et al.,2001).To know about the pathway transport after injury & socio demographic profile is the purpose of this study. Village people are mostly victim of spinal cord injury .It is important to know the epidemiology of spinal cord injury, in order to develop health care and social services (Dahlberg et al., 2005).

The level of control of SCI and the possible need is reflected for improved prevention incidence rates. Health care gives an impact for social and personal resources prevalence rates (Wyndaele et al., 2016).

Spinal Cord Injury (SCI) is a catastrophic event and one of the most common causes of severe disability and death following trauma. Approximately 10,000 acute spinal cord injuries occur in the United States each year. Tetraplegia, defined as loss of sensorimotor function as a result of an injury to the cervical spinal cord, accounts for approximately 55% of all SCI. The Edwin Smith Surgical Papyrus of Egypt described SCI five thousand years ago as “ailments not to be treated” due to the poor prognosis. Spinal cord injury in children is a rare injury that can results in lingering loss of motor and sensory function, and dysfunction of the bowel and bladder. Impairment of these functions result in significant social and psychological adequacies for the child and their family (Popovich et al., 2012).

SCI is often associated with a traumatic brain injury. In children and adolescents SCI is most commonly a result of road traffic accidents, falls or diving into water. Traumatic spinal cord injury, one of the most devastating kinds of injury, may lead to different degrees of paralysis, loss of sensory and dysfunction of bladder or bowel. Traumatic spinal cord injury is not only affects one’s health, but also generates a huge economic burden on the family and society. Autonomic dysfunction is common in acute SCI and is particularly noticeable in cervical level injuries.

Bradycardia and neurogenic shock are commonly seen in the acute care setting, but autonomic dysreflexia may also occur in this early period and will certainly be a concern in hospitalized chronic SCI patients. Spinal shock and neurogenic shock, although related, are separate entities. Spinal shock refers to the loss of reflex neurologic activity in the spinal cord, and is defined by loss of all spinal reflexes (Sundararajan et al., 2016).

Neurogenic shock is loss of adequate tissue perfusion associated with hypotension of neurologic origin. However, acute SCI patients may have multiple causes of shock. Sepsis, hypovolemia, and cardiogenic shock must all be considered in the early period of SCI. resuscitation is an appropriate initial measure, but vasopressors are often necessary. Patients using antihypertensive medications before injury may be particularly difficult to control until the medication effects are inactive. Bradycardia occurs because of unopposed vagal tone, with a greater effect seen in higher levels of injury. Stimulation of vagally innervated tissue may further lower heart rate, as is seen commonly during deep tracheal suctioning. Although the bradycardia is often self-limited, atropine may be used either as treatment or as pretreatment in the case of identifiable triggers. External pacing may be of benefit as well. Autonomic dysreflexia requires intact spinal cord reflexes and so will not be seen until emergence from spinal shock (Dolan et al., 1999).

The progression of reaction of the spinal cord injured person has been discussed by many using similar terminologies and frequently noting the resemblance to the process reported in patients approaching death. However it should be noted that there is nothing predictable about the psychological sequelae of SCI. (Forchhimer and Tate et al., 2008).

At traumatic spinal cord injuries are life-changing events. The merger of compliant general physiological impairment, multisystem malfunction, disabilities, a wide range of potential complications, and sensory impairment, together with the non-medical effects, presents challenges to affected persons, career, and clinicians (Masri et al., 2006).

Early care of TSCI includes safe evacuation of the injured from the site, examination and spinal immobilization, careful airway management and cardiovascular support, followed by speedy transfer to a definitive care center. The treatment of spinal cord injury (SCI) spans multiple disciplines, from pre-hospital immobilization through surgical care to

rehabilitation strategies. Those with acute SCI face the risk of neurological deterioration due to secondary injury to the spinal cord. Any advances in the spectrum of care, from pre-hospital stabilization to long-term rehabilitation, will greatly improve the quality of their lives. Identifying inconsistencies and integrating advances along this spectrum of care will certainly benefit the long-term outcome of persons with SCI (Schilero et al., 2018). Non-traumatic spinal cord injury (NTSCI) is a special type of SCI that is not caused by traumatic reasons. The etiologies of NTSCI include vertebral Spondylosis (spinal stenosis), tumorous compression, vascular ischemia and congenital disease (Anneken et al., 2010).

Spinal injuries have been considered as sentinel injury events, and information has been captured in spinal injury registers as one source of information contributing toward injury surveillance. Spinal injuries, potentially, can reflect levels of serious physical harm to an individual. Comparisons of spinal cord injury between younger and older populations have identified differing hospitalization incidence rates and injury characteristics. Hospitalized incidence rates of traumatic spinal cord injuries are increasing among older people in Canada, Finland, the United States, and Austria, with an estimated 20% of all spinal cord injuries involving individuals aged ≥ 65 years. For older individuals, the incidence of cervical spinal fractures at C1–C2 has been shown to be increasing, particularly among those who have had a fall. The occurrence of cervical spinal fractures can be associated with spinal cord injury (Kang et al., 2017).

Long-term disability or death is the cause of Spinal cord injury (SCI). Leading to permanent paralysis by modern man, it is one of the most catastrophic lesions. The Spinal cord injury patients, the victims who are usually young and in their most productive stage of life multiple medical, social and vocational complications affect to them. In Japan from January 1990 to December 1992 a survey of traumatic spinal cord injuries was carried out by a statistical method of the nationwide epidemiological study showed that the incidence was 40.2 per million in the annual report of spinal cord injury. More caudal SCI was 3:1 is the ratio of cervical cord injuries (Shingu et al., 1995).

The prevalence of SCI at 650–900 per million American epidemiological data approximately showed that expected data showed that the rates of adolescents with

disabilities range from 108 per 100,000 in Myanmar to 6,726 per 100,000 in Canada. In Australia a study showed that most devastating medical conditions are Spinal cord injury (SCI) or damage. In all facets of human functioning and existence it causes life changing consequences.

The incidence of traumatic SCI a recent review reported that worldwide varied between 10-4 and 83 per million per year. About 15–17 cases per million per year over the past decade the age-adjusted incidence rate of TSCI in adults aged 15 years has remained at and older surviving to reach hospital. In currently 11.9 cases per million adults per year is the incidence in Victoria in Australia (Devivo et al.,2012).

The ED presentation records contain information collected from public hospital EDs in New South Wales, Queensland and South Australia. Data collected by the ED's included patient demographics, arrival and departure dates, triage category, type of visit and clinical procedures. Mortality data were obtained from the Registry of Births, Deaths and Marriages in the three Australian states. All death information is collected from death certificates (certified by a medical practitioner or pathologist) includes demographic data and date of death. The injured population was identified if there was a principal diagnosis of injury in the hospital admission records in 2009.

The first injury-related hospital admission in 2009 was identified as the index injury admission. All ED, hospital admission and mortality records for the non-injured cohort were identified from 1 January 2008 to 31 December 2010. In New South Wales 182 records and in Queensland 73 records were excluded as no appropriate matched counterpart was able to be identified. Seventeen records were subsequently excluded from Queensland as the gender of the person in the matched comparison population was not the same as their matched injured counterpart (Chhabra et al., 2012).

1.2 Rationale

Now a day Spinal cord Injury is most commonly occurring disabling condition in all developing and developed countries in the world and it will increase day by day due to lack of awareness. Injuries that are affecting the spinal cord and complicated by physical damage are an important health problem in Bangladesh as they carry a high rate of morbidity and mortality. Acute care management of spinal cord injury is important to know as Bangladesh is a developing country and trying to develop health care system. It is generate exact information considering detail about which causes, occupation, age, gender, diagnosis, residential area, educational level and economic level were responsible for that injury. It also helps to raise awareness among the population and will help full to get information about spinal cord injury. And indicate that the spinal cord injury patient who needs a specialized and comprehensive rehabilitation services to continue their activities of daily living in the community.

In our country we are not conscious about immediately acute care management after spinal cord injury. Spinal cord injury can destroy of one's life and his whole family. The patient can survive with full struggle. Life is so much challenging to him. He or she has to face many difficulties which sometimes causes them to suicide. In some area people think that spinal cord injury is the curse by Allah .It is mostly in rural area. It is just an accident which destroys the whole life. So it is very important to aware about the incidence so that we can prevent the injury when occurred injured then immediately step of acute care management. Spinal cord injury completely changes an individual's life. Some Spinal Cord Injury patient could fight with their situation and overcome their problems by specialized care and rehabilitation. Some considered their problems as a curse and left their happy life behind. Their body and mind both become disable. In Spinal Cord Injury patient's rehabilitation program or long time management is major treatment, where physiotherapy is essential. So the study enhances the knowledge about Spinal Cord Injury and its nature such as type, extent etc. The preventative measure may help about Spinal Cord Injury. As if we concern about road traffic accident the injury rate may reduce. If people from all corner of the Bangladesh are aware about the cause of Spinal Cord Injury then it can help to lowering the rate of injury.

1.3 Research question:

What is the acute care management of spinal cord injury?

1.4 Objectives

General objective

To find out the pre-hospital management at first health care system of the Spinal Cord Injury attended at CRP.

Specific objectives

1. To find out the socio-demographic characteristics of Spinal Cord Injury patient.
2. To explore which first health care pathway in Bangladesh is more vulnerable for the injury.
3. To identify the transport system use after spinal cord injury.
4. To find out vulnerable occupation, location of injury and common diagnosis of spinal cord injury for injury.

1.6 Operational definition

Paralysis

Injury or disease to the nervous system can affect the ability to move a particular part of the body. This reduced motor ability is called paralysis.

Neurological level

Up to the level where both sensory and motor function is remains intact.

Paraplegia

The term paraplegia means impairment of motor and/ or sensory function in the thoracic, lumber and sacral segments of the spinal cord which is secondary to the damage of neural elements within the spinal canal. Paralysis occurs of lower portion of the body and of both legs.

Tetraplegia

Injury of the spinal cord in the cervical region, with associated loss of muscle strength in all 4 extremities is called tetraplegia. Paralysis of both legs and both arms, it is also called quadriplegia.

Complete lesion

Absence of sensory and motor functions in the lowest sacral segments is called complete lesion.

Incomplete lesion

An incomplete lesion is the term used to describe partial damage to the spinal cord. With an incomplete lesion, some sensory and/or motor function remains at the lowest sacral segments. Including the lowest sacral segments preservation of sensory or motor function below the level of injury is called incomplete lesion.

Spinal cord injury classification

A = Complete: No sensory or motor function is preserved in sacral segments S4-S5

B = Incomplete: Sensory, but not motor, function is preserved below the neurologic level and extends through sacral segments S4-S5

C = Incomplete: Motor function is preserved below the neurologic level, and most key muscles below the neurologic level have a muscle grade of less than 3

D = Incomplete: Motor function is preserved below the neurologic level, and most key muscles below the neurologic level have a muscle grade that is greater than or equal to 3

E = Normal: Sensory and motor functions are normal (Kirshblum et al., 2014).

The spinal cord injury causes serious injuries and permanent impairments due to incomplete documentation and transfers to tertiary institutions and creates a life threatening situation (Phalkey et al., 2011).

Spinal cord injury (SCI) is a kind of high disabling injury; it not only can lead to damage or loss of sensation and motor function, but also may lead to multiple organ dysfunction. Although some treatment methods such as cell therapy have played a beneficial clinical effect, there is no effective measure to cure SCI. Its expensive treatment cost, long recovery treatment and the loss of labor force always bring great influence to the individual and family, and also bring a heavy burden on the society. Accordingly, a coordinated multisystem approach must be taken into consideration to treat the injury itself and the accompanying complications (Anneken et al., 2010).

On the neurological examination by the completeness of the injury the severity of spinal cord trauma is clinically determined. In prognosis associated with recovery the classification of injury which completely assists to the clinician. Those with incomplete injuries have a less favorable recovery potential than patients with complete injuries persisting after the initial acute injury phase. Common two definitions of complete spinal cord injury (SCI) are used in more common (Wagner et al., 1982).

Decreased physical mobility, sensitivity deficits, genitourinary and gastrointestinal repercussions and circulatory changes make the spinal cord vulnerable to a series of serious complications and further limit the rehabilitation and social insertion processes. Among the complications, the impairment of the skin structure, the limitation of active movement, the loss of tactile and/or thermal sensitivity and long-term permanence in the same position are highlighted. Recently, the prevalence of pressure injury in individuals with SCI has increased. The prevalence rates of pressure injury vary between 25% and 50% of veterans with SCI. Pressure injuries pose a significant medical burden and are associated with high costs of care. A value of 1.3 billion was projected to be the annual cost of treating pressure injury in the SCI population. The preventive skin care activities

taught to people with SCI during rehabilitation include daily skin inspection, wheelchair pressure relief every 30 min, establishing and adhering to turning and sitting tolerance, hygiene, nutrition and equipment maintenance.

Traumatic SCI can result from many different causes – including falls, road traffic injuries, occupational and sports injuries and violence; On the other hand, non-traumatic SCI, usually involves an underlying pathology – such as infectious disease, tumor, musculoskeletal disease such as osteoarthritis and congenital problems such as spina-bifida which is a neural tube defect that arises during development of the embryo (Guest et al., 2014).

The search for new technologies for the care of the skin of people with SCI has been a challenge for health professionals. Krishnan evaluated the validity of the Spinal Cord Injury Pressure Ulcer Scale (SCIPUS) during acute care and inpatient rehabilitation following SCI by determining critical cut-off points and assessing the ability to predict risk of pressure ulceration. The authors demonstrated that SCIPUS can prevent the occurrence of pressure ulceration in the acute period (2 to 3 days); however, it was unable to predict over a longer term (5 to 21 days) (Kirshblum et al., 2014).

The cause of spinal cord injury may traumatic or non-traumatic. Auto crash, including jeep, truck and bus, most common cause of road traffic accident and falling: including jumping and being pushed accidentally, diving, medical/surgical complications: impairment of spinal cord function resulting from adverse effects of medical, surgical or diagnostic procedures and treatment, bicycle, tricycles, Pedestrian, including falling/jumping into the path of a vehicle, auto racing, glider kite, slide, swimming, bungee jumping, scuba diving, lightning, kicked by an animal, machinery accidents, tractor, bulldozer, go-cart, steamroller, train, road grader, forklift, sledding, snow tubing, tobogganing, playing ice hockey, snowboarding. Personal contact, including being hit with a blunt object, falls as a result of being pushed.

Football and other penetrating wounds: stabbing, impalement, boat and parachuting, para-sailing, etc gymnastic activities other than trampoline baseball/softball, water skiing, basketball/volleyball, high jump, bomb, grenade, dynamite and gasoline. These are

traumatic cause. The non-traumatic cause is spinal tumor, TB spine, transverse myelitis, physical assault, physical weakness etc (Chen et al., 2013).

Spinal Cord Injury condition was viewed linearly. For instance, it describes SCI as a “severe traumatic disability that occurs suddenly, affecting both sensory and motor function”. This echoes the traditional medical model which focuses purely on physical (sensory and motor) function. For years literature neglected to include aspects of the individual’s functioning other than sensory and motor functions. The impairment caused by SCI produces a unique experience in disablement for each individual. To understand this experience, one needs to consider the emotional and social factors that compliment motor and sensory aspects. This allows health professionals to deal with person in totality, constantly bearing in mind that different components are affected in varying degrees (Asher et al., 2005).

The leading causes of spinal cord injuries are the auto and motorcycle accidents. In USA a study showed that more than 40 percent spinal cord injuries occur in each year. According to the National Institute of Neurological Disorders and Stroke 1.5 percent of spinal cord injuries resulting from violent encounters, gunshot and knife wounds. Caused by fall is most common among the old age about 65. One-quarter of spinal cord injuries occurs by falls. About 8 percent of spinal cord injuries occur by the athletic activities, such as impact sports and diving in shallow water. About 1 out of every 4 spinal cord injuries occurs using of alcohol. Spinal cord injuries also caused by cancer, arthritis, osteoporosis and inflammation of the spinal cord may cause (Bellon et al., 2013).

Spinal Cord Injury (SCI) is a catastrophic event and one of the most common causes of severe disability and death following trauma. Approximately 10,000 acute spinal cord injuries occur in the United States each year. Tetraplegia, defined as loss of sensorimotor function as a result of an injury to the cervical spinal cord, accounts for approximately 55% of all SCI. The Edwin Smith Surgical Papyrus of Egypt described SCI five thousand years ago as “ailments not to be treated” due to the poor prognosis. Fortunately, this has changed and a recent study of patients with traumatic SCI resulting in tetraplegia showed that 85% of these patients were alive years after their injury.

Though much has changed over the last five thousand years, to date no one has discovered a regenerative process to repair the traumatically injured spinal cord in humans (Acute Management of Traumatic Cervical Spinal Cord Injuries 1999). A five scale subdivision was used: A = complete motor and sensory function disorder; B = motor complete and sensory incomplete function disorder; C = motor and sensory incomplete function disorder; D = useful motor function with or without auxiliary means; E = no motor or sensory function disorder which is the modified by Frankel and known as Frankel score (Capaul et al., 1994).

The epidemiological study in Japan showed that no survivors with complete tetraplegia, mostly paraplegics (89%), a significant pediatric population (17%), predominant female victims (ratio of 1:1.3). In South African society the Frankel classification was used to assess neurological recovery. Defined the recovery was as improvement from Frankel group A, B or C to Frankel group D or E during the period of rehabilitation (Hart & Williams, 1994). National Database is overall cumulative survival rate of the entire population is 10 years. The statistical the database of the patients, probability of dying was determined 10 declining somewhat thereafter to be greatest during the first post-injury year (Stover & Fine et al., 1997). Spinal cord injury is two types such as complete and incomplete. A person loses all ability to feel and voluntarily move below the neurological level of the injury which occurs in a complete injury, on the other hand there is some functioning below the level of the injury which occurs in an incomplete injury (Phalkey et al., 2011).

Individuals who sustain spinal cord injuries experience the trauma of one of the most devastating of all non-fatal injuries. The goals for these individuals are not of medical recovery, but of adaptation to the circumstances that have been drastically changed. The SCI affects the psychological well-being of the patients. This is because SCIs usually demand changes in almost every aspect of an individual's life. Personal relationships; the physical structure of the home, employment, education; social and leisure pursuits; and financial position are all influence by the injury. (Hjeltnes et al., 2008).

Complete loss of function below the level of the injury when complete spinal cord injuries occur, while incomplete spinal cord injuries are those that result in some

sensation and feeling below the point of injury. The way in which the spinal cord has been damaged is dependent upon the level and degree of function in incomplete injuries is highly individual (Weerts et al., 2016).

A person with traumatic or non-traumatic SCI the potential changes are similar regarding their ability to feel, move, control their bladder and bowel and other possible problems. Traumatic SCI are at higher risk than those with non-traumatic SCI. Non-traumatic SCI patients have a better recovery in affected areas and stay for shorter periods in hospital compared with those with a traumatic SCI who have worse prognosis and long durations. A specialized team of health care professionals it is best to have periodic reviews for anyone with SCI. Prevent and treat SCI complications help to achieve the best possible outcomes for health and well-being (Maynard et al., 1979).

Loss of function is the symptom of spinal cord injury. Impaired functioning occurs by spinal cord injury. Severe headache, backache, tingling or loss of sensation in the hand, fingers, feet, or toes, feeling of pain or pressure in the neck, partial or complete loss of control over any part of the body, impaired breathing after injury, urinary or bowel incontinence, or retention, difficulty with balance and walking, unusual lumps on the head or spine (Kang et al., 2017).

The Australian and Global Burden of Disease and Injury studies use results from injury incidence and outcome research to quantify the injury burden, with the quality of the Global Burden of Disease and Injury studies estimates being reliant on the strength of the evidence provided from these studies. Much of the existing injury outcome research is based on inception cohort studies. Use of a matched pair cohort design to control for health status preceding the injury event and isolate injury attributable post injury outcomes are rare.

The few injury outcome studies that have included randomly selected, matched non-injured comparison groups have found that, post injury, injured individuals experience higher health service use, in terms of hospital admissions, general practitioner, use of physiotherapy and use of home care services than their non-injured counterparts (Scivoletto et al., 2003).

Long-term impact on physical and mental health with paralysis is common causes of spinal cord injury. Secondary complications may focus sometime and the complications are the main cause of life changing effect (Bellon et al., 2013).

The prolong period of spinal cord injury (SCI) on the health care system imposes a need for greater efficiency in the use of resources and the management of care. Access Care of Training project is part of a broader vision to create a methodological framework to evaluate clinical practices, and in particular to develop a certification process for SCI Programs. Acute hospital care is needed after immediately following a SCI where all medical and surgical treatment is completed. After complete acute care, they should be considered for rehabilitation. Rehabilitation care is the most effective for traumatic or non-traumatic events. A research showed that specialist spinal rehabilitation unit has great outcomes for people with a SCI. Specialist rehabilitation unit are better than a general rehabilitation unit (Selassie et al., 2015).

3.1 Study design

This is a cross-sectional study and it was conducted using convenient sampling method. Cross-sectional design is the most common survey approach to focus on the past as well as present experience. Descriptive study design was chosen because the aims of the study are to know the acute care management of spinal cord injury.

3.2 Study site

The SCI registered unit of physiotherapy department of at the Centre for the Rehabilitation of the Paralyzed (CRP) in Bangladesh which is the largest spinal cord injury rehabilitation center for the patient with spinal cord injury in Bangladesh was selected. At first the standard questionnaire was developed and then collected data from SCI registered unit.

3.3 Study area

Spinal Cord Injury (SCI) Unit of CRP was selected for data collection.

3.4 Sample size

Sampling procedure for cross sectional study done by following equation-

By following

$$n = \{(z-\alpha/2)/d\}^2 \times pq = \{1.96/0.05\}^2 \times 0.53 \times 0.47 = 383$$

(Where $z=1.96$, $p= 0.53$, $q= 1-p$, $d=0.05$), (According to Ramkrishnan et al., 2011)

So total sample size will be 383.

Independent Variables

1. Socio Demographic factors, for example: Age, Sex, Education, and Occupation.
2. Types of Diagnosis
3. Types of Treatment or management.
4. Causes & location of injury.
5. Number of hospital, type of hospital and level of hospital.

Dependent variables

Spinal Cord Injury (SCI)

3.5 Study population and Sampling

The target population was the patient with Spinal Cord Injury who was admitted at CRP spinal cord injury unit, Savar, Dhaka. The target population was about 150.

3.6 Sampling technique

Purposive sampling technique was used for sample selection. Purposive sampling starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. Usually, the population is too large for the research to attempt to survey all of its members. A small, but carefully chosen sample can be used to represent the population. The sample reflects the characteristics of the population from which it is drawn.

3.7 Inclusion criteria

- Spinal cord injury patients admitted into CRP.
- The assessment which has diagnosed after admitted CRP.
- The complete and well fill out assessment for the necessary information.
- Patients took how type of pathway management of spinal cord injury.

3.8 Exclusion criteria

- Incomplete document due to lack of information
- Patients without spinal cord injury

3.9 Data collection tools

Data was collected by using Papers, Pen, Pencil, Diary, Computer and pen drive, file.

3.10 Data analysis

The data that was collected is descriptive data. The graph technique was used for analyzing data, calculated as percentages and presented this using bar and pie charts by SPSS (Statistical Package of Social Science) software version 16.0. SPSS is a comprehensive and flexible statistical analysis and data management solution. SPSS can take data from almost any type of file and use them to generate tabulated reports, charts, and plots of distributions and trends, descriptive statistics and conduct complex statistical analyses.

3.11 Ethical consideration

The research proposal was submitted to the Institutional Review Board (IRB) of Bangladesh Health Professions Institute (BHPI) and permission was obtained from the board. Bangladesh Medical Research Council (BMRC) and World Health Organization (WHO) Research guidance also were followed to conduct the study.

4.1 Socio-demographic Information

4.2 Male Female ratio

Among the total 150 participants 136 participants were male & that's percentage 90.7%, almost 90%.

4.3 Educational Status of the participants

Their educational status are different types. Among total participants 85 is highest, they attended primary school, that's percentage is 56.7%. Only 15 participants attended graduation level or more, that's percentage is 10%. 26 participants did not attended any formal school, that's percentage is 17.3%.

4.4 Occupation of the participants

Among total participants Farmers amount is 38 that is highest, it's percentage is 25.3%. It may be the result of unawareness. 23 participants are student, it's percentage is 15.3%. 31 participants are of different occupation of daily work. It included daily worker, shallow driver, garments worker etc. Its percentage is 20.7%.

4.5 Income before SCI Patients

Among total participants, 56 participants income was 6000-10000 before spinal cord injury. That's percentage is 36%. 29 participants had no income. Among them students, no worker, housewife are included. That's percentage is 22.4%. 8 participants income was 21000-35000. That means very few participants income was high ranged. That's percentage is 6.4%.

4.6 Residential area of the Participant

Among total participants 135 participants came from rural area. That's percentage is 90%.

4.7 Any remarkable disease prior to SCI

Spinal cord injury is occurring most in rural area because of lack of awareness. Among total participants only 15 participants had any kind of remarkable disease such as DM, hypertension, asthma etc. To know more about the participant's information, please see the number 01 table.

Table number 01

Variables	Category	Number	Percentage
Gender	Male	136	90.7%
	Female	14	9.3%
Educational Status			
Educational Status	No formal School	26	17.3%
	Primary	85	56.7%
	Higher secondary	23	15.3%
	Graduation or more	15	10%
Occupation of the participants			
Occupation of the participants	Farmer	38	25.3%
	Service Holder	25	16.7%
	Driver	11	7.3%
	Business man	15	10%
	No work	2	1.3%
	Housewife	5	3.3%
	Student	23	15.3%
	Daily Labour	31	20.7%
Income before SCI patients			
Income before SCI patients	0	29	22.4%
	1000-5000	14	8%
	6000-10000	56	36%
	10500-20000	43	27.2%
	21000-35000	9	6.4%
Residential			
Residential	Urban	26	17.3%
	Rural	124	82.7%
Any remarkable disease prior to SCI			
Any remarkable disease prior to SCI	Yes	15	10%
	No	135	90%

4.8 ASIA of Patients

Among the total 150 participants 100 participants were complete spinal cord injury patients that means 66.7%, almost 70%.

4.9 Skeletal level of injury

Highest number of the patients injured level is thoracic (T₁-T₁₂). 66 participants were thoracic level of spinal cord injury patient. That percentage is 44.15%. Most of patients were cervical that number 52. That percentage is 34.7%.

4.10 Neurological level of injury

Most of patients were cervical & thoracic region injured both neurological level of spinal cord. That percentage is 48.6% and 49.2%.

Table number 02

Variables	Category	Number	Percentage
ASIA of Patients	A	100	66.7%
	B	23	15.3%
	C	19	12.7%
	D	8	5.3%
Skeletal level of Injury			
Skeletal level of Injury	C1-C7	52	34.7%
	T1-T12	66	44.15%
	L1-L5	32	20.7%
Neurological level of injury			
Neurological level of injury	C1-C7	73	48.6%
	T1-T12	74	49.2%
	L1-L5	3	2.2%

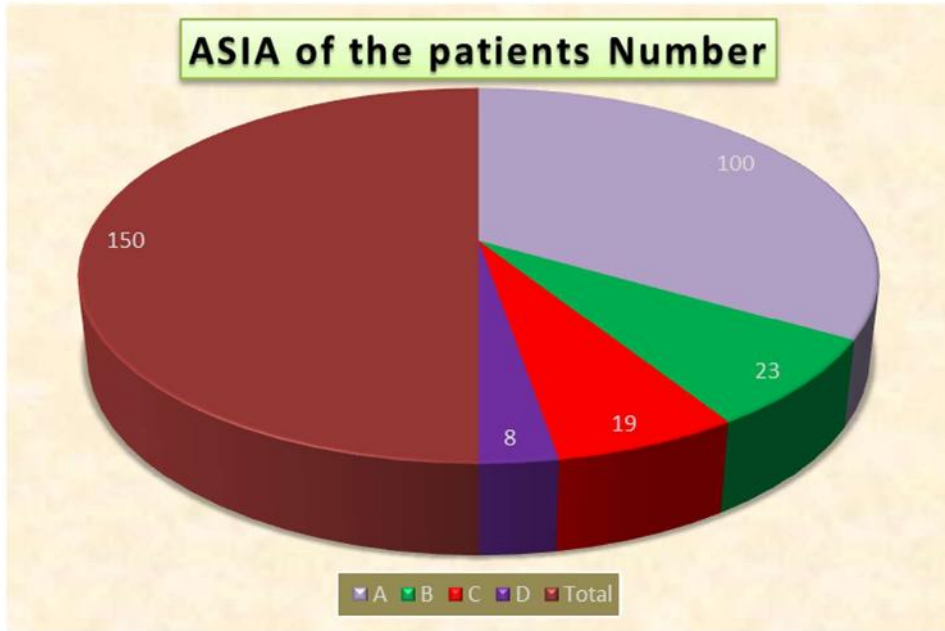


Figure number 01

4.11 Causes of injury

The leading causes of injury were Road traffic accident (RTA), almost 40% of the injured. That's percentage is 38%. This range is highest cause of injury. Similar to road traffic injury, fallen from height is so dangerous. 36 participants are victim of SCI because of it. 10 participants are suffering from SCI because of other reasons like female scarf injury, hit by ground object etc. Among total participants 57 participants were injured on road. These are major incidences in Bangladesh. 65 participants were injured because of fallen from tree and height.

4.12 First aid immediately post injury

Among total participants, only 26 participants took first aid immediately after injury but most of the participants did not get first aid management due to lack of treatment advantages availability.

4.13 Consciousness of participants

Among total participants 86 participants were conscious after injury. Rest of the participants were unconscious.

4.14 Health care providers before going to hospital

Total participants is 150. Among them 64 participants did not receive health service. 28 participants went to receive health service from register physician, others went to village doctor and drug vendor. To know more information about participants, please check the 03 table.

Table number 03

Variables	Category	Number	Percentage
Causes of injury	RTA	57	38%
	Fall from height	36	24%
	Fall from tree	29	19.3%
	Fall on heavy object	15	10%
	Other	4	2.7%
	Bull attack	2	1.3%
	Scarf injury	3	2%
	Shallow water diving	1	0.7%
	Physical assault	1	0.7%
	Jump into water from boat	1	0.7%
Location of injury	Home	46	30.7%
	Road	58	38.7%
	Work	41	27.3%
	Other	5	3.3%
First aid Immediately post injury	Yes	26	20.8%
	No	99	79.2%
Consciousness	Yes	86	68.8%
	No	39	31.2%
Health service received	Yes	61	48.8%
	No	64	51.2%

Health care providers before going to hospital	Village doctor	16	12.8%
	Drug vendor	6	4.8%
	Registered Physician	28	22.4%
	Other	9	7.2%
	Don't receive	66	52.8%
	Village doctor	16	12.8%

4.15 Number of hospital

Total participants are 150. Among them, 38 participants went to 1 hospital and then came to CRP. 51 participants went to 2 hospitals and the range is very high. That's percentage is around 40% that means 1 out of 3. Only 3 participants went to 7 hospitals. A few participants went to hospitals more than 5 and came to CRP.

4.16 Time between injury admissions to hospital

Among total participants, 83 participants went to government hospital. Among the total participants, 22 participants went for admitting hospital after 1 hour of injury. 2 participants went for admitting hospital after 8 hours of injury.

4.17 Mode of transport

Among total participants 71 used ambulance for going to hospital. 38 participants used other transport like CNG, TOMTOM, and Boat etc.

4.18 Get into vehicle

Among total participants, 135 participants got into vehicle by picking up. 3 participants got into vehicles by others like cloths.

4.19 Mode of immobilize

Within 1 hour 73 participants reached hospital. 23 participants reached hospital within 2 hours. 121 participants were not taken to immobilization treatment procedure. 114 participants are not diagnosed.

4.20 Diagnosis confirmed

Only 36 participants are diagnosed after admitted to hospital. To know about the rest of the information of participants, please check the number 04 table.

Table number 04

Variables	Category	Number	Percentage
Number of hospital	01 Hospital	38	25.3%
	02 Hospital	51	34%
	03 Hospital	31	20.7%
	04 Hospital	18	12%
	05 Hospital	5	3.3%
	06 Hospital	4	2.7%
	07 Hospital	3	2%
Time between Injury admission hospital	01 Hour	22	14.7%
	02 Hours	37	24.7%
	03 Hours	36	24%
	04 Hours	31	20.7%
	05 Hours	18	12%
	06 Hours	1	0.7%
	07 Hours	3	2%
	08 Hours	2	1.3%
Mode of transport	Rickshaw	8	5.3%
	Auto	30	20%
	Motorbike	4	2.7%
	Ambulance	71	47.3%
	Others	2	1.3%
	TOMTOM	7	4.6%
	CNG	23	15.6%
	Boat	5	3.5%

Get into vehicle	Picked up	135	90%
	Stretcher	11	7.3%
	Trolley	1	0.7%
	Others	3	2%
Duration of Journey	01 Hour	73	58.4%
	02 Hours	23	18.4%
	03 Hours	11	8.8%
	04 Hours	2	1.6%
	05 Hours	5	4%
	06 Hours	4	3.2%
	07 Hours	3	2.4%
	08 Hours	3	2.4%
	09 Hours	1	0.8%
Mode of immobilize	Yes	29	19.3%
	No	121	80.7%
Radiology:	Yes	96	64%
	No	54	36%
Diagnosis confirmed	Yes	36	24%
	No	114	76%

Injuries and fractures involving the spine can have a substantial impact on an individual's function and quality of life and can be costly to the health system, the individual, and the community. Although much previous research has examined outcomes after spinal cord injury and cervical spinal injuries, there has been a limited examination of all traumatic spinal injury resulting in hospitalization and mortality post discharge. Quantifying the burden and cost of treating spinal injury on the health-care system can assist in highlighting where resources are needed and directing injury prevention strategies. This study found that the traumatic spinal injury hospitalization rate among both younger and older individuals was increasing between 2010 and 2013 (Kirshblum and Botticello et al., 2014).

The aim of the study was to find out the acute care management of the spinal cord injury patient who admitted into CRP from March-August, 2018. Even it is not possible to know the total number of patient of spinal cord injury in Bangladesh. Currently there is lack of survey information on spinal cord injury in CRP. In this study there was about 150 samples was taken.

In the study there was 88.8% male and 11.2% female and the male female ratio was 7.9:1. In Brazil male female ratio was 3.9:1 (Gomes et al., 2016).

In USA male female ratio was 4:1 (Flack and Yunis., 2004). In Fijians male female ratio was 35:6 and in India the ratio was 7:2. Majority of victims 57.2% were women in Pakistan. The increasing proportion of older women with spinal injuries has also been found in the United States and Norway, and is likely to be a reflection of the longer life expectancy of women compared with men. Road transport incidents represented the highest average cost for spinal injuries for both younger and older individuals, whereas fall-related injuries for older people represented the highest total cost (Selassie and Saunders et al., 2015).

Transport related crashes were also found to represent one of the highest average treatment costs for spinal cord injuries in a study of transport-related and falls from heights). Therefore, potential strategies aimed at prevention of spinal injuries for older people should focus on prevention of falls and be targeted at improving home safety, such as through the removal of slip and trip hazards, and in the aged care settings. Among younger individuals, prevention measures should be aimed around road and water safety, along with prevention of falls from heights (Roth and Lovell et al., 1992).

Among total participants 62 is highest, they attended primary school, that's percentage is 49.6%. Only 15 participants attended graduation level or more, that's percentage is 12%. 26 participants did not attend any formal school, that's percentage is 20.8%.

Among total participants Farmers amount is 38 that is highest, it's percentage is 25.3%. It may be the result of unawareness. 23 participants are student, it's percentage is 15.3%. 28 participants are of other occupation. It included daily worker, shallow driver, garments worker etc. Falls were identified as the most common injury mechanism resulting in spinal injury for older individuals, whereas both road transport and fall-related injury were common for individuals aged in everywhere (Maynard et al., 1979).

Falls and road transport-related. Its percentage is 22.4%. Among total participants, 44 participants income was 6000-10000 before spinal cord injury. That's percentage is 36%. 28 participants had no income. Among them students, no worker, housewife are included. That's percentage is 22.4%. 8 participants income was 21000-35000. Total mean income 9040. That means very few participants income was high ranged. That's percentage is 6.4%. Among total participants 100 participants came from rural area. That's percentage is 80%. Spinal cord injury is occurring most in rural area because of lack of awareness. Among total participants only 15 participants had any kind of remarkable disease such as DM, hypertension, asthma etc.

Among total participants, 57 participants injury is caused by road traffic accident. That's percentage is 38%. This range is highest cause of injury. Bangladesh's road traffic system is very bad because of unawareness. Similar to road traffic injury, fallen from height is so

dangerous.33 participants are victim of SCI because of it. 10 participants are suffering from SCI because of other reasons like female scarf injury, hit by ground object etc.

Among total participants 50 participants were injured on road. These are major incidences in Bangladesh.37 participants were injured because of fallen from tree and height. Among total participants, only 26 participants took first aid immediately after injury but most of the participants did not get first aid management due to lack of treatment advantages availability. Among total participants 86 participants were conscious after injury.

Rest of the participants were unconscious. Total participants is 150. Among them 86 participants did not receive health service. 28 participants went to receive health service from register physician, others went to village doctor and drug vendor.

Among total participants, 57 participants injury is caused by road traffic accident. That's percentage is 38%.This range is highest cause of injury. Bangladesh's road traffic system is very bad because of unawareness. Similar to road traffic injury, fallen from height is so dangerous.33 participants are victim of SCI because of it. 10 participants are suffering from SCI because of other reasons like female scarf injury, hit by ground object etc. Among total participants 50 participants were injured on road. These are major incidences in Bangladesh.37 participants were injured because of fallen from tree and height. Among total participants, only 26 participants took first aid immediately after injury but most of the participants did not get first aid management due to lack of treatment advantages availability. Among total participants 86 participants were conscious after injury. Rest of the participants were unconscious like cloths. Within 1 hour 73 participants reached hospital. 23 participants reached hospital within 2 hours. 99 participants were not taken to immobilization treatment procedure. 91 participants are not diagnosed. Only 34 participants are diagnosed after admitted to hospital.

This study found road traffic accidents (38%) to be the most common cause of Traumatic Spinal Cord Injury (TSCI). The reverse is true for developed countries where RTA is the leading cause of TSCI followed by fall (Devivo et al., 2012).

All the earlier studies in Bangladesh (Razzak et al., 2011) found carrying loads on the head was the second most common cause of injury, but in this study it was the third (12.5%) most common cause. However this etiological change reflects the fact that the road safety situation in Bangladesh has been deteriorating, with an increasing number of road accidents in recent years (Biswas et al., 2012).

It was found that none of the participants were rescued by trained health personnel and no spine board was used during their transfer from the site of injury.

This finding was almost similar to the finding about Africa, where 80% of persons with SCI are brought to the emergency department by untrained personnel and about Pakistan, where no injured person was provided with spinal board during transfer. In Western countries, it is mandatory for trained health personnel to immobilize the spine before persons with potential spinal injuries are transported from the accident site to definitive care.

This study found that 71.4% of the injured were taken to their first contact physician by conventional transport and only 16.1% travelled by ambulance. Though 96.4% arrived at the first contact physician within 24 hours, there was no provision for management of their injuries. Only 30.4% reached the tertiary health facilities within 24 hours. On an average, there was a delay of 22 days before presentation to the specialized spinal center. Some of the factors responsible for the delay are lack of awareness, poverty, and the poor national health referral system.

These findings are consistent with findings in developing countries but inconsistent with those of developed countries. In India stated that 63.33% of the injured used their own conveyance and 25% went by ambulance.

In Pakistan, Reported that 22.2% were evacuated by ambulance and the rest travelled in cars, jeeps and transport vehicles. In Nigeria found that only 5.4% of the injured were transferred by ambulance, while found this to be only 4% in Vietnam. In contrast, 93% of the injured in Sweden used the services of an ambulance and in Canada 41% were transported by ground ambulance, 54% by helicopter, and 5% by fixed-wing aircraft (Capaul et al., 1994).

The basic difference in mode of transfer may be a key element responsible for the differing outcomes for persons with TSCI in the developing and developed countries. This study found that 69.9% of the participants had single and double intermediate admissions found that in Sweden only 17% had single or more intermediate admissions, while showed that 72.7% in India had double or more intermediate admissions. The study by found 10-26% pre-hospital neurological deterioration, which is similar to the figure of 10.7% found in the current study. Among the total 150 participants 100 participants were complete spinal cord injury patients that means 66.7%, almost 70%. Most of patients were cervical& thoracic region injured both skeletal and neurological level of spinal cord.

5.2 Limitations

Complete accuracy is not being possible in any research so that some limitations may exist. Regarding this study, there were some limitations or barriers to consider the result of the study as below:

- The first limitation of this study was small sample size. The data was taken only in one year.
- As the study was conducted at Centre for the Rehabilitation of the paralysed (CRP) which may not represent the whole country.
- The study was only the demography of the spinal cord injury patients, in further study would be carry out the other sectors of the Spinal cord injury.

6.1 Conclusion

Spinal cord injury (SCI) is an insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory, or autonomic function. In Bangladesh the number of spinal cord injury patient is increasing day by day. Spinal cord injury (SCI) is one of the most destructive conditions known to mankind. Although spinal cord injury is one of the most serious injuries that a person can survive, it is possible to return to a healthy, happy and productive life after even the most severe of cord injuries. In Bangladesh many of people in every year face Spinal Cord Injury and there is lack of much information. And paraplegia is more common then tetraplegia.

This study was aimed to find out the pathway of acute care management of the Spinal Cord Injury patient. For the fulfillment of the study, I was designed across-sectional study design and collected 150 data from the samples through a standard questionnaire from the registered unit of Spinal Cord Injury. From the data base, it was found that the any age is more vulnerable to have spinal cord injury (SCI). Male are predominantly more affected than female. The educational level were very poor in most the patients, and most of them are from rural areas who live with low economic level. It is difficult to stop the responsible cause of Spinal Cord Injury. Spinal Cord Injury management and rehabilitation is a long time process so it is important to create awareness and receive proper step to reduce the risk of Spinal Cord Injury.

6.2 Recommendations

The aim of the study was to find out the pathway of acute care management of the spinal cord injury in Bangladesh. I recommended the following things:

- Should take more samples for generating the result and try to make more valid and reliable.
- Should take more samples for pilot study to establish the accuracy of the questionnaire.
- Should take more time.
- Sample should collect from the only rehabilitative institute in Bangladesh.
- But research would need to be carried out considering proof of hypothesis; the method should be changed from cross sectional to case control.

REFERENCES

- Asher, D.R., Zeilig, G., Klieger, M., Adunsky, A., and Weingarden, H., (2005). Dermatological • findings following acute traumatic spinal cord injury. *Spinal Cord*, 43:175-178.
- Anneken, V., Hanssen-Doose, A., Hirschfeld, S., Scheuer, T. and Thietje, R. (2010). Influence of physical exercise on quality of life in individuals with spinal cord injury. *Spinal Cord*, 48(5):393-399.
- Biswas SK (2012). Road traffic injuries: an emerging problem in Bangladesh. *Faridpur Med. Coll. J*; 7 (1): 05.
- Bellon, K., Hayner, S.A.K., Chen, D., Mcdowell, S., Bitterman, B., and Klaas, S.J., (2013). Evidence-Based Practice in Primary Prevention of Spinal Cord Injury. *Topics in Spinal Cord Injury Rehabilitation/Winter*, 19(1):25-30.
- Brain and Spinal Cord.org, (2012). *Educate.Guide.Inspair.*, United State: Brain and Spinal Cord.
- Capaul, M., Zollinger, H., Satz, N., Dietz, V., Lehmann, D., and Schurch, B., (1994). Analyses of 94 consecutive spinal cord injury patients using ASIA definition and modified Frankel score classification. *Paraplegia*, 32:583-587.
- Chen, Y., Tang, Y., Vogel, L.C., and Devivo, M.J., (2013). Causes of Spinal Cord Injury. *Topics in Spinal Cord Injury Rehabilitation/Winter*, 19(1):1-8.
- Chhabra, H.S. and Arora, M., (2012). Demographic profile of traumatic spinal cord injuries admitted at India Spinal Injuries Center with special emphasis on mode of injury: a retrospective study. *Spinal Cord*, 50:745-754.

- Chen Y, He Y, DeVivo MJ 2016. Changing demographics and injury profile of new traumatic spinal cord injuries in the United States, 1972–2014. *Arch Phys Med Rehabil.*;97(10):1610–1619.
- Dahlberg, A., Kotila, M., Leppa, P., Kautiainen, H., Alaranta, H., (2005). Prevalence of spinal cord injury in Helsinki. *Spinal Cord*, 43:47-50.
- Devivo MJ 2012. Epidemiology of traumatic spinal cord injury: trends and future implications. *Spinal Cord.*;50(5):365–372.
- Dolan EJ, Tator CH, Endrenyi L. The value of decompression for acute experimental spinal cord compression injury. *J Neurosurg* 1999;53:749-55.
- El Masri WS (2006). Traumatic spinal cord injury: the relationship between pathology and clinical implications. *Trauma*; 8: 29–46.
- Flack, J.M. and C Yunis. 2004. Therapeutic implication of the epidemiology and timing of myocardial infarction and other cardiovascular disease. *J Hum Hypertens* 11(1):23-28.
- Forchheimer, M. and Tate, D.G. (2008). Enhancing community re-integration following spinal cord injury. *Neuro Rehabilitation*, 19(2):103-113.
- Gomes R, Moreira MCN, Nascimento EF, Rebello LEFS, Couto MT, Schraiber LB. Os homens não vêm! Ausência e/ou invisibilidade masculina na atenção primária. *Ciênc Saúde Coletiva* 2011; 16(Suppl 1): 983-92.
- Guha A, Tator CH, Endrenyi L, Piper I (1987). Decompression of the spinal cord improves recovery after acute experimental spinal cord compression injury. *Paraplegia* ;25:324-39.
- Guest, R., Perry, K. N., Tran, Y., Middleton, J., & Craig, A. (2014). A Prospective Study of the Change in Quality of Life in Adults with a Newly Acquired Spinal Cord Injury. *Int J Phys Med Rehabil*, 2(222):2.

- Hoque, M.F., Gangone, C., Reed, K.N., 2001. Spinal cord lesion in Bangladesh: an epidemiological study . *Spinal cord*37, 858- 861.
- Hjeltnes, N. and Jansen, T. (2008). Physical endurance capacity, functional status and medical complications in spinal cord injured subjects with long-standing lesions. *Spinal Cord*, 28(7):428-432.
- Kang, Y., Ding, H., Zhou, H., Wei, Z., Liu, L., Pan, D. and Feng, S., 2017. Epidemiology of worldwide spinal cord injury: a literature review. *Journal of Neurorestoration*, 6, pp.1-9.
- Kirshblum, S.C., Botticello, A.L., Dyson-Hudson, T.A., Byrne, R., Marino, R.J. and Lammertse, D.P. (2014). Patterns of Sacral Sparing Components on Neurologic Recovery in Newly Injured Persons with Traumatic Spinal Cord Injury. *Archives of physical medicine and rehabilitation*.
- Mitchell R, Stanford R, McVeigh C, Bell D, Close J 2014. Incidence, circumstances and treatment of high-level cervical spinal fracture without spinal cord injury in New South Wales, Australia over a 12 year period. *Injury* ;45:217–22.
- Maynard FM, Reynolds GG, Fountain S, et al 1979. Neurological prognosis after traumatic quadriplegia. *J Neurosurg*; 50:611 – 616.
- New, P.W. and Sundararajan, (2008). Incidence of non-traumatic spinal cord injury in Victoria, Australia: a population-based study and literature review. *Spinal Cord*, 46:406-411.
- Phalkey, R., Reinhardt, J.D., and Marx, M., (2011). Injury epidemiology after the 2001 Gujarat earthquake in India: a retrospective analysis of injuries treated at a rural hospital in the Kutch district immediately after the disaster. *Global Health Action*, doi: 10.3402.
- Popovich, P.G., Tovar, C.A., Wei, P., Fisher, L., Jakeman, L.B., and Basso, D.M., (2012). A reassessment of a classic neuroprotective combination therapy for spinal cord injured rats: LPS/pregnenolone/ indomethacin. *Experimental Neurology*, 233(2):677-685.

- Razzak ATMA, Helal SU, Nuri RP (2011). Life expectancy of persons with spinal cord injury (SCI) treated in a rehabilitation centre at Dhaka, Bangladesh. *Disability, CBR and Inclusive Development Journal*; 22(1): 114-123.
- Roth E, Lovell L, Heinemann A, Lee M, Yarkony G. The older adult with a spinal cord injury. *Paraplegia* 1992;30:520–6.
- Scivoletto G, Morganti B, Ditunno P, Molinari M (2003). Effects on age on spinal cord lesion patients' rehabilitation. *Spinal Cord*;41:457–64.
- Selassie A, Cao Y, Saunders LL 2015. Epidemiology of traumatic spinal cord injury among persons older than 21 Years: a population-based study in South Carolina, 1998–2012. *Top Spinal Cord Inj Rehabil*;21(4): 333–344.
- Shingu, H., Ohama, M., Ikata, T., Katoh, S., and Akatsu, T., (1995). A nationwide epidemiological survey of spinal cord injuries in Japan from January 1990 to December 1992. *Paraplegia*, 33:183-188.
- Schilero, G.J., Bauman, W.A. and Radulovic, M., 2018. Traumatic Spinal Cord Injury: Pulmonary Physiologic Principles and Management. *Clinics in chest medicine*, 39(2), pp.411-425.
- Wang CM, Chen Y, DeVivo MJ, Huang CT 2001. Epidemiology of extraspinal fractures associated with acute spinal cord injury. *Spinal Cord*;39(11):589–594.
- Wagner FC Jr., Chehrazi B. Early decompression and neurological outcome in acute cervical spinal cord injuries. *J Neurosurg* 1982; 56:699 – 705.
- Weerts E, Wyndaele JJ (2016). Accessibility to spinal cord injury care worldwide: the need for poverty reduction. *Spinal Cord*;49(7):767

APPENDIX

Patient

Questionnaire

CODE NO:

Acute care management of spinal cord injury: patient perspective

Name of interviewer:
interview:

Date of

Name of patient:
Bed No:

Ward No:

Part 1:

Patient details

1. Gender: 1. Female

2. Male

Age:

2.

Address:

.....

3. Occupation:

4. Education:

5. Income before SCI:

6. Residential setting: 1. Urban

2. Rural

7. Diagnosis/injury: Skeletal level:
C, D, E

Neurological Level:

ASIA: A, B,

8. Date of injury:

9. Cause of injury:

10. Date of admission at CRP:

11. Any remarkable disease condition prior to SCI

(eg: DM, HTN, Asthma).
.No.....

Part 2: Pre-hospital

12. Location of injury: 1. Home 2. Road 3. Work
4. Other

13. Did you receive first aid immediately post injury? 1. Yes 2. No

If so, what was the first aid?

Eg: bandaging, managing wounds, checking airways.

14. Were you conscious immediately after your injury? 1. Yes 2. No

If not, when did you regain consciousness?: after

15. Were you seen by health care providers before going to the hospital?

1. Village doctor 2. Drug vendor 3. Registered Physician 4. Other (Please specify).....

If so, what did they advise? (Management)

.....

Note (if any):

16. Patient Journey (complete the boxes needed only, cross the unused boxes)

Place of injury		F 1	Pvt-----Gov:
Name:			
DOA:	DOD	F 2	Pvt-----Gov:
Name:			
DOA:	DOD:	F 3	Pvt-----Gov:
Name:			
DOA:	DOD:	F 4	Pvt-----Gov:
Name:			
DOA:	DOD:	F 5	Pvt-----Gov
Name:			
DOA:	DOD:	F 6	Pvt-----Gov
Name:			
DOA:	DOD:	F 7	Pvt-----Gov:
Name:			
DOA:	DOD:	F 8	Pvt-----Gov
Name:			
DOA:	DOD:	F 9	Pvt-----Gov
Name:			
DOA:	DOD:	F 10	Pvt-----Gov

Name:

DOA: DOD: F 10 Pvt-----Gov

Name:

DOA: DOD: F 11 Pvt-----Gov

Name:

DOA: DOD: F 12 Pvt-----Gov

Name:

DOA: DOD: F 13 Pvt-----Gov

Name:

DOA: DOD: F 14 Pvt-----Gov

Name:

DOA: DOD: F 15 Pvt-----Gov

Name

DOA: DOD: CRP

(Please use additional paper if needed)

DOA: Date of Admission DOD: Date of Discharge Pvt: Private
Hospital/Clinic Gov: Government Hospital/Clinic

Information on Patient Journey (Complete the boxes needed only, cross the unused boxes)

17.1 Patient Journey

Facility 1

Name of Hospital:

Type of Hospital:

Address:

DOA:

DOD:

How much time between injury onset and admission to hospital?-----

Which mode of transport used: 1. Rickshaw 2. Auto 3. Motorbike 4. Ambulance 5.
Other.....

How did you get onto this vehicle: 1. Picked up 2. Stretcher 3. Trolley 4. Other.....

Duration of journey to hospitalHours

Was there any effort made to immobilise you at any point?
Yes:.....No.....

X ray / MRI / CT scan:

When:

Diagnosis confirmed: Yes No

17.2 Patient Journey

Facility 2

Name of Hospital:

Type of Hospital:

Address:

DOA:

DOD:

How much time between injury onset and admission to hospital?-----

Which mode of transport used: 1. Rickshaw 2. Auto 3. Motorbike 4. Ambulance 5.
Other.....

How did you get onto this vehicle: 1. Picked up 2. Stretcher 3. Trolley 4.
Other.....

Duration of journey to hospitalHours

Was there any effort made to immobilise you at any point?
Yes:.....No.....

X ray / MRI / CT scan:

When:

Diagnosis confirmed: Yes No

17.3 Patient Journey

Facility 3

Name of Hospital:

Type of Hospital:

Address:

DOA:

DOD:

How much time between injury onset and admission to hospital?-----

Which mode of transport used: 1. Rickshaw 2. Auto 3. Motorbike 4. Ambulance 5.
Other.....

How did you get onto this vehicle: 1. Picked up 2. Stretcher 3. Trolley 4.
Other.....

Duration of journey to hospitalHours

Was there any effort made to immobilise you at any point?
Yes:.....No.....

X ray / MRI / CT scan:

When:

Diagnosis confirmed: Yes No

17.4 Patient Journey

Facility 4

Name of Hospital:

Type of Hospital:

Address:

DOA:

DOD:

How much time between injury onset and admission to hospital?-----

Which mode of transport used: 1. Rickshaw 2. Auto 3. Motorbike 4. Ambulance 5.

Other.....

How did you get onto this vehicle: 1. Picked up 2. Stretcher 3. Trolley 4.

Other.....

Duration of journey to hospitalHours

Was there any effort made to immobilise you at any point?

Yes:.....No.....

X ray / MRI / CT scan:

When:

Diagnosis confirmed: Yes No

17.5 Patient Journey

Facility 5

Name of Hospital:

Type of Hospital:

Address:

DOA:

DOD:

How much time between injury onset and admission to hospital?-----

Which mode of transport used: 1. Rickshaw 2. Auto 3. Motorbike 4. Ambulance 5.

Other.....

How did you get onto this vehicle: 1. Picked up 2. Stretcher 3. Trolley 4.

Other.....

Duration of journey to hospitalHours

Was there any effort made to immobilise you at any point?

Yes:.....No.....

X ray / MRI / CT scan:

When:

Diagnosis confirmed: Yes No

17. 6 Patient Journey

Facility 6

Name of Hospital:

Type of Hospital:

Address:

DOA:

DOD:

How much time between injury onset and admission to hospital?-----

Which mode of transport used: 1. Rickshaw 2. Auto 3. Motorbike 4. Ambulance 5.
Other.....

How did you get onto this vehicle: 1. Picked up 2. Stretcher 3. Trolley 4.
Other.....

Duration of journey to hospitalHours

Was there any effort made to immobilise you at any point?
Yes:.....No.....

X ray / MRI / CT scan:

When:

Diagnosis confirmed: Yes No

(Please use additional paper if needed)

Part 3:

Inpatient care (Final hospital where you treated prior to CRP)

DOA:

DOD:

18. Type of Hospital: 1. Private: 2. Govt: Name of Hospital:.....

19. How long did you wait before you were seen by a doctor?.....

20. How soon were you imaged following injury? (Xray, MRI):.....

21. How soon before you were diagnosed?-(when you were diagnosed/ How soon they were told they had SCI):

.....

22. Were you told of the health care management plan?.....

23. How were you managed?

Immobilisation (Restricted/damaging movements)-----

Surgery

Rehabilitation

24. Was surgery recommended? If no, skip to next question.

What kind of surgery?.....

Were the risks/complications of surgery explained to you?.....

Were the expected outcomes of surgery explained to you? (Improve neuro condition? Stabilise fracture only?).....

25. Did a medical professional provide any prognosis for neurological recovery?

.....

26. During your stay in the hospital, were you or your family given any advice on the following: (If yes tick the appropriate option/options)

1. Pain management 2. Feeding 3. Toileting 3. Positioning in bed 4. Manual Handling for transfer

5. Mobility 6. Other.....

27. On discharge, were you given any advice on how to manage at home with the following?

1. Pain management 2. Feeding 3. Toileting 3. Positioning in bed 4. Manual Handling for transfer

5. Mobility 6. Other.....

28...Did anyone explain the following risks or complications that may occur in addition to your injury?

UTI 2. Pressure sores 3. Chest infections 4. Contractures 5. DVT 6. Other

37. Who advised you to attend CRP?.....

38. Did you come to CRP directly from the hospital or from home?.....

39. How were you transported from Hospital/ home to CRP:

40. How long were you at home before being admitted to CRP? (applicable/not applicable):

If patients came from home to CRP. Did you develop any of these complications while at Home?

1. UTI 2. Pressure sores 3. Chest infections 4. Contractures 5. DVT 6. Other(specify).....

41. In your opinion did your sensation change from immediately post injury to admission to CRP

1. Improve 2. No difference 3. Worsened

42. In your opinion did your movement change from immediately post injury to admission to CRP

1. Improve 2. No difference 3. Worsened

Part 5.

43. Healthcare costs before you reached CRP:

Total cost related to your injury prior to CRP admission.....BDT

Hospital

Medicine or other

Surgery (if applicable)

Equipments

Transport

Other (specify)

.....

44. Sources of money for SCI management

Personal savings Family support support from job place Support from

friends Support from government Support from any organization

Selling property or other things Loans Other (specify

Note (if any):