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"Complications during the Inpatient Rehabilitation of Traumatic Spinal Cord Injury Patients in Gaza Strip"

Prepared by

Khalied Sh. Zeyada

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Supervised by

Dr. Yousef ALjeesh & **Dr Ashraf Eljedi**

RN, BSN, MSN, Dr.PH ***RN, BSN, MSN, Dr.PH***

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نتيجة الحكم على أطروحة ماجستير

بناءً على موافقة عمادة الدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحث/**خالد شعبان حسن زيادة** لنيل درجة الماجستير في كلية *التربية*/ قسم **الصحة النفسية المجتمعية-علوم التأهيل** وموضوعها:

"Complications during the Inpatient Rehabilitation of Traumatic Spinal Cord Injury Patients in Gaza Strip"

وبعد المناقشة العلنية التي تمت اليوم السبت 16 ربيع آخر 1430هـ، الموافق 2009/04/11م الساعة العاشرة صباحاً، اجتمعت لجنة الحكم على الأطروحة والمكونة من:

د. يوسف الجيش	مشرفاً ورئيساً
د. أشرف الجدي	مشرفاً
د. سمير قوته	مناقشاً داخلياً
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وبعد المداولة أوصت اللجنة بمنح الباحث درجة الماجستير في كلية *التربية*/قسم الصحة النفسية المجتمعية-علوم التأهيل.

واللجنة إذ تمنحه هذه الدرجة فإنها توصيه بتقوى الله ولزوم طاعته وأن يسخر علمه في خدمة دينه ووطنه.

والله ولي التوفيق ،،،

عميد الدراسات العليا

د. زياد إبراهيم مقداد

P.O. Box 108, Rimal, Gaza, Palestine fax: +970 (8) 286 0800 فاكس
public@iugaza.edu.ps
tel: +970 (8) 286 0700 تلفون
www.iugaza.edu.ps
ص.ب. 108 الرمال، غزة، فلسطين

Abstract

Complications are common following SCI and its occurrence has negative effect for the patient, rehabilitation team and for the community as a whole.

The overall aim of this study was to know the incidence of the most common complications during inpatient rehabilitation among patients with traumatic spinal cord injury in Gaza strip. Specific objectives were to examine the effect of socio-demographic characteristic on the incidence of the complications during the inpatient rehabilitation**,** to examine the effect of patient's degree and level of injury on the incidence of the most complications and to describe the effect of Israeli assaults on the incidence of traumatic spinal cord injury in Gaza strip.

Study Design: Retrospective study**.**

Setting: EL-Wafa Medical Rehabilitation and Specialized Surgery Hospital (EWMRSSH) at Gaza strip, Palestine.

Methods: Retrospective review of 81 files of all surviving TSCI subjects who were admitted to EWMRSSH to the first time from January 2002 to December 2007 was carried out. Ten of the most common complications were considered The incidence of these complications were assessed three times: at admission, during inpatient rehabilitation and at discharge.

Results: There is a net dominance of young males as the male / female ratio is 8/1 and the subjects who are 15-20 years old constitute the largest portion of the study population. The leading cause of TSCI is gun shot (65.4%) followed by falling down (28.4%). Most of the gun shot result from Israeli assault (43.2%) and mainly directed to the upper part of the body. About half of the study population (49.4%) has complete SCI, (79%) were paraplegic. The median LOS for all TSCI subjects is 74 days, and the mean is 80.96 days. The most common complications detected at admission was flaccidity (59.3%) followed by PU (41.0%) and UTI (39.5%) and the most common complications detected during inpatient was pain (58.8%) followed by UTI (56.8%) and GC (40.7%).

Conclusion: Complications are common following SCI, so educational programs for rehabilitation team need to focus on the prevention and early recognition of these complications.

Key Words: Traumatic Spinal Cord injury, Complications, Inpatient Rehabilitation.

ملخص الدراسة

المضاعفات شائعة بعد إصابة الحبل الشوكي ولها تأثير سئ على المريض وعلى فريق إعادة التأهيل.

الهدف العام لهذه الأطروحة هو وصف معدلات حدوث المضاعفات الأكثر شيوعا أثناء إعادة التأهيل الداخلي لمصابي الحبل الشوكي في قطاع غزة.

أما الأهداف الخاصة فهي فحص تأثير الخصائص الديموغرافية و الاجتماعية على حدوث المضاعفات الأكثر شيوعا أثناء إعادة التأهيل الداخلي لمصابي الحبل الشوكي في قطاع غزة، و لفحص مدى تأثير درجة و مستوى إصابة الحبل الشوكي على معدلات حدوث المضاعفات، و لوصف تأثير اعتداءات الاحتلال الإسرائيلي على معدلات حدوث إصابات الحبل الشوكي في قطاع غزة.

تصميم الدراسة: دراسة وصفية ذات اثر رجعي.

مكان الدراسة: مستشفى الوفاء للتأهيل الطبي و الجراحة التخصصية في قطاع غزة- فلسطين.

أسلوب الدراسة: أجريت هذه الدراسة على عينة مكونة من 81 مريض من مصابي الحبل الشوكي تم إعادة تأهيلهم بعد الإصابة للمرة الأولى في مستشفى الوفاء للتأهيل الطبي و الجراحة التخصصية من يناير/2002 حتى ديسمبر/ 2007 . تم متابعة عشرة مضاعفات من الأكثر شيوعا أثناء إعادة التأهيل الداخلي. تم متابعة هذه المضاعفات على ثلاث مراحل: عند دخول المستشفى و إثناء الإقامة في المستشفى و عند الخروج من المستشفى.

أشارت نتائج الدراسة أن غالبية عينة الدراسة هم من الذكور الشباب، حيث كانت نسبة الذكور للإناث هي 8: 1 و أن الفئة العمرية (15-20) هي الفئة الأكثر وجودا في عينة الدراسة.

السبب الرئيسي لإصابات الحبل الشوكي هو الطلق الناري بنسبة (65.4%) تلاه في الرتبة السقوط من علو بنسبة (28.4%)، و معظم إصابات الطلق الناري كانت من اعتداءات الاحتلال الإسرائيلي بنسبة (43.2%) و كان معظمها موجه للجزء العلوي للجسم.

ما يقارب نصف أفراد العينة (49.4%) تعاني من قطع كامل في الحبل الشوكي و(79%) من أفراد العينة تعاني من شلل سفلي، ومتوسط مدة الإقامة داخل المستشفى لجميع مصابي الحبل الشوكي الذين تم إعادة تأهيلهم هي 74 يوما.

أكثر المضاعفات حدوثا عند دخول المستشفى كانت ارتخاء العضلات بنسبة (59.3%) و من ثم قرحة الفراش بنسبة (41%) و من ثم التهابات المسالك البولية بنسبة (39.5%)، و كانت أكثر المضاعفات حدوثا أثناء الإقامة في المستشفى الألم بنسبة (58.8%) و من ثم التهابات المسالك البولية بنسبة (56.8%) و من ثم مضاعفات الجهاز الهضمي بنسبة(40.7%).

و ختاما: المضاعفات شائعة بعد إصابة الحبل الشوكي لذلك نوصي بعمل برامج تثقيفية لفريق إعادة التأهيل لمنع حدوث هذه المضاعفات و اكتشافها مبكرا.

الكلمات الدالة: إصابة الحبل الشوكي، المضاعفات، إعادة التأهيل الداخلي.

Dedication

I dedicate this work to

my mother,

my brothers and sisters,

to my wife, my son and my daughter,

who has shown unconditional love and support from beginning to end.

Acknowledgements

" No feast comes to the table on its own feet ".

So it is with this thesis, which required the caring attention of many minds and the efforts of many hands. I wish, then, to express my gratitude and thanks to the following:

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ABBREVIATIONS

The following abbreviations, listed in alphabetical order, are used in this thesis:

AD	**Autonomic dysreflexia**
ASIA	**American Spinal Injury Association**
B.C	**Before Chirst**
CIHI	**Canadian Institute for Health Information**
Cont	**Contracture**
DA	**Diving accident**
DVT	**Deep venous thrombosis**
ENS	**Early Notification System**
EWMRSSH	**El-Wafa Medical Rehabilitation and Specialized Surgery Hospital**
FD	**Falling down**
FHO	**Falling of heavy object**
FIM	**Functional Independence Measure**
Flac	**Flaccidity**
GC	**Gastrointestinal Complications**
LOS	**Length of stay**
MOH	**Ministry of Health**
MPDL	**Movimiento por la Paz, el Desarme la Libertad**
PU	**Pressure Ulcers**
RC	**Respiratory complications**
RJRC	**Royal Jordanian Rehabilitation Centre**
RTA	**Road Traffic Accident**
SCI	**Spinal cord injury**
SIU	**Spinal injuries unit**
Spac	**Spacticty**
TSCI	**Traumatic spinal cord injury**
UNRWA	**United Nations Relief and Works Agency**
US	**United state**
USA	**United state of America**
UTI	**Urinary tract infection**
WHO	**World Health Organization**

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Chapter One

Introduction

Chapter One: Introduction

1.1Overview

Spinal cord injury (SCI) is a catastrophic event and one of the most common causes of sever disability following trauma (Murthy, 2007). In the First World War 90% of patients who suffered a SCI died with one year of wounding and only about 1% survived more than 20 years (Grundy & Swain, 2002).

Despite noteworthy advances in the prevention and treatment of SCI, a variety of distressing complications can occur both during the acute phase and long after injury. Such pathological situations can create substantial medical problems as well as psychosocial and financial hardship (Aito, 2003).

1.2 Historical Background

Throughout man's history, SCI has been a catastrophic condition, and the prognosis a very gloomy one (Lin et al., 2003).

The earliest description of SCI was found in the Edwin Smith Surgical Papyrus, written in about 2500 before Christ (B.C.). He described a case of SCI 'one having a dislocation in a vertebra in his neck, while he is unconscious of his two legs and his two arms, and his urine dribbles. Prior to the early 1940s, 80–90% of people with spinal cord injuries died within weeks. Some with chronic ill-health did manage to live for 2–3 years before they eventually succumbed to sepsis, mainly from the urinary tract and pressure sores. Improvement in outcome began when Sir Ludwig Guttmann founded the first spinal injury unit at Stoke Mandeville in 1944. By the late 1940s, such patients had been enabled to move back out into the community and could hope to live for 10 years. Since that time, during the first 12 years after injury, cumulative survival in the United State (US) has risen to about 88% of what would be expected in the absence of injury, with even better relative survival rates for younger patients, those with paraplegia and those with incomplete neurology (Inman, 1999).

1.3 Economic Consequences

Although SCI has a fairly low incidence (30/million/yr) compared to other diseases, its economic consequences are quite profound. These consequences include direct costs, which include acute, rehabilitative, and long-term medical care, as well as indirect costs such as lost wages (Grabois et al., 2000**)** .

Clearly, in the months and years following the acute trauma, ongoing complications create huge additional expenses, and present new problems and challenges to SCI survivors and their health care providers (Jhonson et al., 1996).

In United State of America (USA) the average yearly health care and living expenses and the estimated lifetime costs that are directly attributable to SCI vary greatly according to severity of injury. Attributable costs in the first year were $741,425 for high tetraplegia (C1-C4), $478,782 for low tetraplegia (C5-C8) and $270,913 for paraplegia (Spinal Cord Injury Information Network, 2008).

In population-based cohort study followed individuals with SCI from date of injury to 6 years post injury. Attributable costs in the first year were $121,600 per person with a complete SCI, and $42,100 per person with an incomplete injury (Dryden et al., 2005).

Another study which examined the cost incurred by a of 115 survivors during the first 2 years following their injuries catalogued $2 million in expenses which were directly attributable to secondary medical complications (Jhonson group et al., 1996).

The researcher concluded from the previous reports that the prevention and treatment of SCI,s complications is the corner stone in facilitating rehabilitation process and community reintegration. This was pointed by Jhonson et al., (1998) when concluded that long-term spinal cord injury survivor's complications and prevention and treatment of those complications is an important, costly, and seemingly under-addressed problem.

1.4 Demography of Palestine

According to Ministry of Health (MOH), 2006 Palestine constitutes the southwestern part of a huge geographical unity in the eastern part of the Arab world, which is Belad El-Sham. Palestinian region stretches from Ras Al-Nakoura in the north to Rafah in the south. The entire area of Palestine is about 27,000 sq. Km, including Tabariya, El-Hoola lakes and half of the area of Dead Sea. Now, Palestine comprises two areas separated geographically: the West Bank and Gaza Strip

Gaza Strip is a narrow piece of land lying on the coast of the Mediterranean sea. Its position on the crossroads from Africa to Asia made it a target for occupiers and conquerors over the centuries. The last of these was Israel who occupied the Gaza strip from Egyptians in 1967. In August, 2005 the Israel evacuated the occupied Gaza Strip, including all existing Israeli settlements (22) and all military installations which redeployed outside the Gaza Strip. After this process it should be no longer for permanent presence of Israeli security forces in the areas of Gaza Strip territory which have been evacuated (MOH, 2006).

Gaza Strip is very crowded place with area 365 sq. Km and constitute 6.1% of total area of Palestinian territory land. Gaza Strip comprises the following main five governorates:

North of Gaza constituted 17% of the total area of Gaza strip and 1.0% of total area of Palestinian territory area with area 61 sq. Km

Gaza City constituted 20.3% of the total areas of Gaza strip and 1.2% of total area of Palestinian territory area with area 74 sq. Km.

Mid-Zone constituted about 15% of the totalarea of Gaza Strip and 1.0% of total area of Palestinian territory area with area 58 sq.

Khan-younis constituted about 30.5% of the total area of Gaza strip and 1.8% of total area of Palestinian territory area with area 108 sq. Km.

Rafah constituted about 16.2% of the total area of Gaza strip and 1.1% of total area of Palestinian territory area with area 64 sq. Km (MOH, 2006).

1.5 The Palestinian Population in Palestine

The population number in Palestine is estimated at 3.7 million in mid year 2005. Out of total number 2.3 million in West Bank and 1.3 million in Gaza Strip with percentage (63%) and (37%) respectively (MOH, 2006).

1.5.1 Palestinians Refugees

According to the United Nations Relief and Works Agency (UNRWA) Statistics in 2005, the total number of registered refugees in the Arabic countries including Palestine is 4,255,120 individuals. The total number of the refugees in Palestine is estimated to be 1,649,187 with percentage of 38.7% from total number of refugees and they constitute 43.8% of total population in Palestine They are estimated 687,542 in West Bank with percentage 29% from total population in West Bank, and 961,645 in Gaza Strip with percentage 69% from the total population in Gaza Strip (MOH, 2006).

1.5.2 Population under 15 and above 65 years

In 2005, the percentage of population under 15 years old is 46.3% of the total population in Palestine (44.2% in West Bank and 49.1% in Gaza Strip). The percentage of Palestinians who are 65 years and more in Palestine is 2.8% (3.1% in West Bank and 2.5% in Gaza Strip) (MOH, 2006).

1.5.3 Sex Ratio in Palestine

In 2005, The estimated number of males in Palestine is 1,905,642 compared with 1,856,363 females; the sex ratio in Palestine is 102.7. In Gaza Strip, the number of males 703,532 compared with 686,257 females, the sex ratio is 102.5 (MOH, 2006).

1.6 AL Aqsa Intifada (28/09/2000 – 31/12/2005)

The Israeli authorities continued their policy of invasions of the Palestinian occupied territories using tanks, bulldozers and military warships and fighter planes, helicopters as well the policy of political assassinations. It also continued to pursue its policy unfair and designed explicitly to the bulldozing of agricultural land, uprooting trees and destroying houses and the displacement of families and the confiscation of Palestinian land in order to complete building a wall of apartheid. These attacks are clear violation of the international human rights standards (MOH,2006).

Martyrs

The total number of martyrs killed reached 3,844 at the rate of (102,2 per 100,000 people), of whom 204 were females with a rate of (11.0 per 100,000 people) and 3,640 males with a rate of (191.0 per 100,000 people).

Wounded

The total number of wounded Palestinians reached 54,548 at a rate (12.1 per 1,000 people), of whom 4,369 wounded female at a rate (2.4 per 1,000 people) while the number of male injuries reached 41,179 at a rate of (21.6 per 1,000 people)

Distribution of the martyrs and wounded by age group

The Israeli war machine did not distinguish between expectant mothers, infants and elderly it also targeted those among young ages and children.

The distribution of the martyrs and wounded by age group were:

-Children less than 14 years, wounded reached 18% among all, and 9% of martyrs.

-Children (14–19) were between wounded and martyrs 26% and 18%respectively.
-Adult (20-29) were between wounded and martyrs 45.5% and 32.8% respectively.

-Age 30-39 years old, were between wounded and martyrs 12% and 12.7% respectively.

-Also these were 88 martyrs and 870 wounded recorded among the elderly and elderly above 60 years old (MOH, 2006).

1.7 Significance of the Study

In U.S., it is estimated that the annual incidence of SCI, not including those who die at the scene of the accident, is approximately 40 cases per million population or approximately 11,000 new cases each year (Spinal Cord Injury Information Network, 2008).

Each year in Australia, about 300-400 new cases of SCI from traumatic and non-traumatic causes are added to an estimated prevalence SCI population of about 9,000 (Cripps, 2006).

In Qatar, it is estimated that the annual incidence of traumatic spinal cord injury (TSCI) is 1.25 cases per 100,000 population per year (Quinones et al.,2002).

In Jordan, the estimated incidence of TSCI is 18 per million per year, which may be an underestimate due to the relatively small population (1.4 million) and the number of patients analyzes (Otom et al.,1997).

In Gaza Strip, there is truly no reliable information about the incidence and prevalence of SCI. Movimiento por la Paz, el Desarme la Libertad (MPDL), (2002) made screening and registration of disabled in the northern and middle Governorates of Gaza Strip, and found the estimated prevalence of SCI according to the total population surveyed is approximately 25 cases per 100,000 population. Spinal cord injuries were also significantly impacted by two Intifadas. Exactly 20.00% of all the cases of spinal cord injury found were the result of either the first or second Intifadas.

To the best our knowledge this is one of the first attempts to study health problems of TSCI patients during inpatient rehabilitation in Gaza Strip.

So this research is needed to provide further information about the incidence of the most common complications during inpatient rehabilitation, to highlight about cost effective for the client, the family and community, and to highlight about the importance of primary prevention of TSCI.

1.8 Objectives of the Study

1.8.1 General Objective

The aim of this study is to know the incidence of the most common complications during inpatient rehabilitation of patients with TSCI in Gaza strip.

1.8.2 Specific Objectives

(1) To identify the most common complications do persons with TSCI experience at admission and during the inpatient rehabilitation in El -Wafa Medical Rehabilitation and Specialized Surgery Hospital (EWMRSSH).

(2) To examine the effect of socio-demographic characteristic (age, sex, residency) on the incidence of the complications during the inpatient rehabilitation.

(3) To describe the effect of Israeli assaults on the incidence of TSCI in Gaza strip.

(4) To examine the effect of patient's completeness of injury, level of injury and types of the management of TSCI (surgical versus conservative) on the incidence of the most complications at admission and during the inpatient rehabilitation.

(5) To examine the effect of patient's completeness of injury, level of injury and types of the management of TSCI (surgical versus conservative) on the length of stay (LOS) of inpatient rehabilitation.

(6) To explore possible correlations with the time lapse from injury to admission and the incidence of most common complications at admission.

1.9 Operational Definitions of Study Terms

1.9.1 Traumatic Spinal Cord Injury(TSCI)

A direct or indirect trauma to spinal cord resulting complete or incomplete cut of the spinal cord. Complete cut injuries result in total loss of motor and sensory ability, incomplete injuries result in the loss of some of both or one of them.

1.9.2 Complications

Secondary conditions that are strictly related to the TSCI, which is developed following the acute trauma to spinal cord.

1.9.3 Rehabilitation

The process of restoration of skills by a person who has had an injury so as to regain maximum self-sufficiency and function in a normal or as near normal manner as possible.

1.9.4 Inpatient Rehabilitation

The rehabilitation that took place when the patient admitted to the -Wafa Medical Rehabilitation and Specialized Surgery Hospital (EWMRSSH) until discharge.

Chapter Two

Conceptual Framework

Chapter Two: Conceptual Framework

Despite noteworthy advances in the prevention and treatment of spinal cord injuries (SCI), a variety of distressing complications can occur both during the acute phase and long after injury (Aito et al., 2003). This was demonstrated by Haisma et al., (2007) when he concluded that there are association between the risk factors and the occurrence of a complication. He found that the most frequently risk factors were age, tetraplegia and completeness of the lesion.

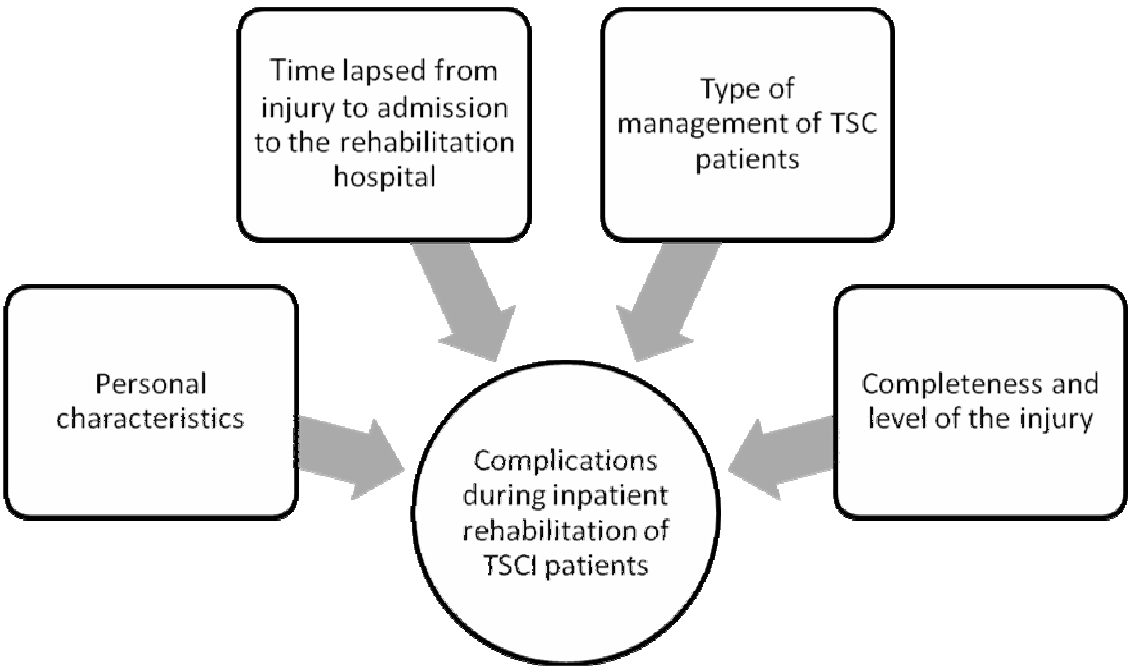
Aito et al., (2003) explained that the longer the delay from injury to admission to the structures, the greater the incidence of the complications, especially the increase in the incidence of pressure sores, heterotopic ossifications and urinary complications was particularly marked. Also he found that the incidence of complications that occurred during hospitalization was significantly higher in complete versus. incomplete lesions especially pressure sores, heterotopic ossifications, respiratory and urinary complications.

Klotz et al., (2002) concluded that the rate of complications may increase due to the ever-increasing survival rate among subjects of increasingly higher level of neurogenic lesions, and aging of the existing populations.

Ball & Sekhon , (2006) demonstrate that there is evidence that the incidence of medical complications is lower, or at least no greater, with early surgical treatment

For the purpose of this study and based on literature review, the researcher has developed conceptual model from the above mentioned studies to support, guide, and direct the research process to make research findings meaningful and applicable**.**

Figure (2.1) Conceptual Framework Diagram



As shown in the above diagram, the researcher pointed that there many potential risk factors as personal characteristics , the level and completeness of the injury, time lapsed from injury to admission to the rehabilitation hospital and the type of management of SCI, have association with the incidence of complications during and after inpatient rehabilitation.

2.1 Overview of Spinal Cord Injury

2.1.1 What is SCI ?

The spinal cord extends from the foramen magnum to the level of the second lumbar vertebrae. It composed of cervical, thoracic, lumbar, and sacral segment, which are named according to the area of the vertebral column from which there nerves enter and exist (Seeley et al., 2000). The spinal cord consists of nerve fibers that carry messages between the brain and various parts of the body. In many ways the spinal cord is like a telecommunications cable. It connects the main communication centre (the brain) to branch offices (parts of the body) by telephone lines (nerve fibers). When the spinal cord is damaged the nerves above the level of the injury continue to work, however, below the level of the injury communication is disrupted which can result in loss of movement, sensation (feeling), bowel and bladder control. The injury may also impact on the person's breathing, sexual function and ability to control body temperature (Dorsett, 2001).

2.1.2 Neurological Classification

The neurologic level and completeness of injury are important factors that assist in predicting neurologic recovery and, therefore, functional outcome after SCI (McKinley et al., 2008) . American Spinal Injury Association (ASIA) standards for assessing and classifying SCI are used to facilitate more accurate communication between clinicians and investigators. The ASIA neurological examination consists of sensory and motor examinations, which are used to determined the neurological levels as well as the completeness of the SCI (Umphred, 1995).

2.1.2.1 ASIA Impairment Scale

The ASIA Impairment Scale classifies the completeness of SCI as follows:-

A- Complete; no sacral motor or sensory sensation in segments S4-5**.**

B- Sensory incomplete; preservation of sensation below the level of injury, extending through sacral segments S4-5.

C- Motor incomplete; voluntary anal sphincter contraction or sensory sacral sparing with sparing of motor function distal to 3 levels below the motor level of injury, with the majority of key muscles having a strength grade of less than 3.

D- Motor incomplete; voluntary anal sphincter contraction or sensory sacral sparing with sparing of motor function distal to 3 levels below the motor level of injury, with the majority of key muscles having a strength grade of 3 or greater.

E- Normal; normal motor and sensory recovery (Maynard et al., 1997).

2.1.2.2 Neurological Levels

Tetraplegia (quadriplegia):- This term refers to impairment or loss of motor and/or sensory function in the cervical segments of the spinal cord due to damage of neural elements within the spinal canal. Tetraplegia results in impairment of function in the arms as well as in the trunk, legs and pelvic organs (Maynard et al., 1997).

Paraplegia:- This term refers to impairment or loss of motor and/or sensory function in the thoracic, lumbar or sacral (but not cervical) segments of the spinal cord, secondary to damage of neural elements within the spinal canal. With paraplegia, arm functioning is spared, but, depending on the level of injury, the trunk, legs and pelvic organs may be involved (Maynard et al., 1997).

2.1.3 Causes of SCI

In US, the National Spinal Cord Injury Statistical Center (NSCISC) reported that motor vehicle crashes account for (42%)of reported SCI cases. The next most common cause of SCI is falls (27.1%), followed by acts of violence (primarily gunshot wounds) (15.3%), and recreational sporting activities (7.4%) (NSCISC, 2006).

In Pakistan falling down (FD) account for (57.85%) of TSCI, followed by RTA (25.2%), and gun shot (8.4%) (Rathore et al., 2008). In Arabia Saudi the most common causes of TSCI are RTA (80%), fall (9.4%) and gun shot (6.4%) (Al Jadid et al., 2004).

In general the most common causes of TSCI around the world are RTA and FD and incidence of the most common causes followed local factors in each area around the world.

2.1.4 Incidence of TSCI

The worldwide annual incidence of TSCI has been reported to be 15 to 40 cases per million individuals (Piao, 2007). Daily US accidents result annually in over 20,000 cases of TSCI associated with complete and permanent paraplegias and quadriplegias (Sosa et al., 2005).

In Qatar, it is estimated that the annual incidence of TSCI is 1.25 cases per 100,000 population per year (Quinones et al., 2002).

In Jordan, the estimated incidence of TSCI is 18 per million per year, which may be an underestimate due to the relatively small population (1.4 million) and the number of patients analyzes (Otom et al.,1997).

In Gaza Strip, there is truly no reliable information about the incidence and prevalence of SCI. Movimiento por la Paz, el Desarme la Libertad (MPDL), (2002) made screening and registration of disabled in the northern and middle Governorates of Gaza Strip, and found the estimated prevalence of SCI according to the total population surveyed is approximately 25 cases per 100,000 population. Spinal cord injuries were also significantly impacted by two Intifadas. Exactly 20.00% of all the cases of spinal cord injury found were the result of either the first or second Intifadas.

2.1.5 Demographics Data

2.1.5.1 Age at Injury

The occurrence of SCI is highest among persons in the 16-30 age group. In fact, more injuries occurred in this age group than in all other age groups combined. Mean age for all patients was 33 years (NSCISC, 2006).

In India, the mean age of males was 35 years (range 13-56 years) and the mean age of females was 31 years (range 16-38 years). The mean age of the total study group was 34 years (range 13-56 years) (Pandey et al., 2007). In Jordan, the mean age of was 33 years and the most affected age group was 21-30 years (35.8%) (Otom et al., 1997).

2.1.5.2 Gender

Male/Female ratio among different series demonstrate that TSCI is net male dominant. In US, the NSCISC reported that Male/Female was 8.1/1, in Jordan 5.8/1, in Turkey 4.5/1 and in Pakistan 6.7/1 (NSCISC, 2006; Otom et al.,1997; Karacan et al.,2000; Rathore et al.,2008).

2.1.5.3 Marital Status at Time of Injury

It is not surprising, given the young age at which most injuries occur, that over half the patients in the database were single (never married).The percentage of patients who were single at time of injury 51.6%. The percentage of married patients 32.2%, while the percentage of divorced patients 9.2%, separated 3.8% and widowed 2.5% (NSCISC, 2006).

2.1.5.4 Educational Levels at Time of Injury

The percentage of patients with an eighth grade education 9.8%, 9-11 grade 25%, high school 48.2%, association 1.9%, bachelor 6.1%, master 1.3% and doctorate 0.8% (NSCISC, 2006).

2.1.5.5 Occupational Status

The NSCISC, (2006) reported that at admission, almost two-thirds (64.2%) of the patients were reported as employed in the competitive labor market while 15% were students and 16.3% were unemployed at injury.

2.2 Management of SCI

Comprehensive medical treatment for the patient with SCI begins at the scene of the injury. Increase recognition of the potential for further cord injury has led to use of immediate spine immobilization.. This is the most likely explanation for the decreased percentage of complete SCIs seen by the early 1980s (Grabois et al., 2000). The objects of SCI management are to prevent further spinal cord damage by appropriate reduction and stabilization of the spine, to prevent secondary neural injury and to prevent medical complications (Grundy & Swain, 2002). There are mainly two approaches to the management of SCI, non-operative and surgical.

2.2.1 Non-Operative (conservative) Management of SCI

Non-operative management of spinal injuries was championed by Sir Ludwig Guttman in the 1940s at the Stoke Mandeville Hospital in England. He advocated the use of postural techniques combined with bed rest to achieve reduction and spontaneous fusion of the spine. At that time, surgical management consisted of laminectomy and surgical results were often worse than conservative management (Ball & Sekhon, 2006).

McKinley et al., (2004) conducted a retrospective study to compare neurologic, medical, and functional outcomes of patients with acute SCI undergoing early (<24 h and 24-72 h) and late (>72 h) surgical spine intervention versus those treated nonsurgically (conservative). The result concluded that ASIA motor index improvements (from admission to 1-y follow-up) were more likely ($P < .05$) in the nonsurgical groups, as compared with the surgical groups.

2.2.2 Surgical Management of SCI

Surgical intervention for SCI aims to decompress, realign and stabilize. The surgery is for the most part not on the actual spinal cord but rather the bony and ligamentous structures surrounding the cord. Cord compression is alleviated and potential cord injury is prevented. In addition to the immediate benefits of decompression and possible reduction in the magnitude and impact of secondary injury

mechanisms, surgery may also prevent the morbidity associated with deformity and inadequate decompression (Ball & Sekhon, 2006).

There is absence of the superiority for any methods of SCI management. This was pointed out by Murthy, (2007) when reported that almost every aspect of the management of SCI is controversial, due in part to a lack of good-quality evidence.

2.3 Complications

Patients with SCI are confronted with motor and sensory deficits and dysfunction of bladder and bowel, leading to a fundamental change of life. Until the Second World War the majority of patients with SCI died due to complications, often leading to fatal infections (Schönherr, 2003). As time goes by, the major risk is the occurrence of secondary complications, often causes of morbidity and death, leading to an increase in the number of rehospitalisations, an increase in direct and indirect costs and a general worsening in the persons quality of life (Klotz et al., 2002).

2.3.1 Pain

Although loss of function is considered the most significant consequence of SCI, pain is a debilitating accompaniment that imposes significant burden on individuals who have already suffered substantial emotional and physical trauma. SCI-related pain is heterogeneous; several subtypes are presumed to exist, each with different pathophysiology and likely different treatment approaches (Sawatzky et al., 2008). Pain following SCI has been recognized as a significant problem in the literature for over half a century. Prevalence estimates have varied widely, with most reports suggesting this to be an extremely common condition (60%-90%) (Richards, 2005).

2.3.2 Respiratory Complications

Respiratory dysfunction is a major cause of morbidity and mortality in SCI, which causes impairment of respiratory muscles, reduced vital capacity, ineffective cough, reduction in lung and chest wall compliance, and excess oxygen cost of breathing due to distortion of the respiratory system. (Brown et al., 2006). In research article summary Berlly & Shem, (2007) demonstrated that eighty percent of deaths in patients hospitalized with cervical SCI are secondary to pulmonary dysfunction, with pneumonia the cause in 50% of the cases. The number of respiratory complications

during the acute hospital stay contributes significantly to the length of hospital stay and cost. Four factors (use of mechanical ventilation, pneumonia, the need for surgery, and use of tracheostomy) explain nearly 60% of hospital costs and may be as important a predictor of hospital cost as level of injury. Atelectasis (36.4%), pneumonia (31.4%), and ventilatory failure (22.6%) are the most common complications during the first 5 days after injury.

2.3.3 Pressure Ulcers

Following SCI, areas of insensate, denervated (neurogenic) skin undergo physiological changes, making it more susceptible to breakdown. The major risk factors for pressure ulcers in the SCI population include immobility, completeness of SCI, urinary incontinence, older age, cognitive impairment, anemia, and hypoalbuminemia (Grabois et al., 2000). In the United Kingdom (UK) Thirty-two per cent of patients already had pressure ulcers on admission to the spinal injuries unit (SIU), while a total of 56% experienced an ulcer at some stage between injury and discharge from the SIU (Ash, 2002) .

2.3.4 Deep Venous Thrombosis (DVT)

Virchow's triad, which describes three predisposing factors to the development of deep venous thrombus (DVT), includes stasis, endothelial injury, and presence of a hypercoaguable state. Newly injured patients with SCI satisfy all of these conditions and are at increased risk of developing a DVT. The incidence of DVT is highest during the first 7 to 10 days after SCI. Patients with neurologically complete injuries are at higher risk than those with incomplete injuries (Cooper, 2006).

Rathore et al., (2008) conducted prospective observational study to assess the prevalence of symptomatic DVT in the Pakistan earthquake survivors with SCI. Earthquake survivors (n=187) with acute SCI were followed for 10 weeks for clinical signs and symptoms suggestive of DVT. The result reveals that seventeen patients were clinically suspected to have a DVT and ultrasound was positive in nine (4.8%).

2.3.5 Contracture

Among those people who have a SCI, quadriplegics are at a higher risk for contractures than paraplegics, possibly because quadriplegics are less active and less able to move their joints independently. Contractures are one of the complications of SCI that are less likely to occur, or to occur with less severity, if the person is cared for by health care professionals familiar with SCI. Contracted joints can lead to other serious complications. They may cause pain, leg swellings, circulation problems, pressure sores, even fractures of the joints or bones (Lawrence, 1996).

Preventing contracture is one of the main aims of effective spasticity management (Aspen Reference Group, 2006). Contracture occurs in 4.5% of patients during the acute and initial rehabilitation phases as a result of spasticity. Following SCI, daily range of motion exercises, proper body positioning, and patient education must occur to prevent contracture (Umphred,1995).

2.3.6 Urinary Tract Infection (UTI)

UTI is responsible for major morbidity and mortality in SCI patients. Several factors appear to be responsible for an increased risk of infection in the neurogenic bladder. Incomplete voiding, elevated intravesical pressure and catheter use contribute to an increased risk of symptomatic urinary tract infection. Frequent exposure to antibiotics increases the risk of infection by resistant organisms. UTIs interfere with rehabilitation, and may lead to secondary urologic complications (García & Esclarín, 2003).

In 37 Italian Rehabilitation Centers and Spinal Units, situated all over Italy, Aito et al., (2003) reported that the incidence of UTI at admission was 5.6%, and during hospitalization was 8.8%.

2.3.7 Spasticty

SCI results in the development of abnormalities of muscle tone and reflexes, as well as abnormal motor function. Spasticity is an upper motor neuron disorder characterized by a velocity- dependent increase in resistance to passive movement (Grabois, 2000).

In review article about spasticity after spinal cord injury, Adams & Hicks, (2005) reported that spasticity has the potential to negatively influence quality of life through restricting activities of daily living, inhibiting effective walking and self-care, causing pain and fatigue, disturbing sleep, compromising safety, contributing to the development of contractures, pressure ulcers, infections, negative self-image, complicating the role of the caretaker, and impeding rehabilitation efforts. It has been estimated that 53% of SCI report spasticity secondary to SCI (Walteret al., 2002).

2.3.8 Gastrointestinal Complications

During the first three weeks of hospitalization, gastrointestinal complications developed in about 6% of the patients, with the most common complications being ileus, peptic ulcer disease and gastritis. All these complications are more common in cervical level injuries than thoracic or lumber level injuries and the increased risk of gastrointestinal hemorrhage and gastritis is though to be due to loss of sypathatic innervations and unopposed parasympathetic of acid secretion. Other gastrointestinal complications in the acute period include gastric dilation, superior mesenteric artery syndrome and pancreatitis (Kaplan, 2006).

2.3.9 Autonomic Dysreflexia (AD)

Two to three months post-injury the cord-injured person with a lesion level above the fifth thoracic segment may develop AD, characterised by sympathetically mediated vasoconstriction in muscular, skin, renal and presumably gastrointestinal vascular beds induced by an afferent peripheral stimulation below lesion level. The reaction might cause cerebrovascular complications and has effects on metabolism. Some of the autonomic disturbances are transient and a new balance is reached months post-injury, while others persist for life (Karlsson, 2006).

The precipitating factors of AD can be any noxious stimuli below the level of the lesion, such as bladder distension, urinary tract infection, faecal impaction, pressure sores etc. Anything that would have been painful, uncomfortable, or physically irritating before the injury may cause AD after the injury (Lakhey et al., 2004).

In a study about assessment of AD in patients with spinal cord injury, Curt et al., (1997) assessed the incidence of AD among SCI patients. He reported that none of

the paraplegic patients, but 59% (13/22) of tetraplegic patients (91% of the complete, 27% of the incomplete patients) presented signs of AD during urodynamic examination. So that AD is three times more prevalent in tetraplegics with a complete injury, in comparison to those with an incomplete injury.

2.3.10 Flaccidity

Lower motor neuron lesion result in flaccid paralysis with no spinal reflex activity below the lesion. This occurs most often at injuries at L1 and below. Flaccidity can cause the following problem: joint hypermobility or in instability, muscle imbalance, muscle atrophy, poor postural control, and dependent edema (Umphred, 1995).

Various degrees of transient neurological disability may occur as a result of a phenomenon known as spinal shock. Spinal shock results from physiological transection of the spinal cord, which commonly lasts 24–48 hours. During this time, flaccid paralysis occurs below the level of spinal cord injury, and all reflexes below this level are absent. Following recovery from spinal shock, return of reflex arcs below the level of injury (such as the bulbocavernosus reflex and the "anal wink") occurs. (Shah & Kelly, 2003).

There are two types of flaccidity, transient and permanent flaccidity. Transient flaccidity which occur following spinal shock stage. Permanent flaccidity which occur following lower motor neuron lesion .

2.4 Rehabilitation

When people sustain SCI they need prolonged meticulous care that starts with hospitalization and extend long after discharge. The predominant approach that underpins health care for SCI persons is rehabilitation (Magenuka, 2006). Rehabilitation has been defined by the World Health Organization as a progressive, dynamic, goal-oriented and often time-limited process, which enables an individual with an impairment to identify and reach his/her optimal mental, physical, cognitive and social functional level (Eng & Miller, 2006). The philosophy of rehabilitation is to reduce disabilities and handicaps resulting from impairments caused by trauma or disease (Jongjit et al., 20004). The core features of rehabilitation was described as follows: co-ordinated, multidisciplinary teamwork, by a team interested in disability, who actively involves the patient and family in the process, which is set in an explicitly recognized framework encompassing all aspects of illness (Schönherr, 2003).

2.4.1 Goals of SCI Rehabilitation

The aim of rehabilitation is to teach patients with SCI how to achieve an optimal independent and satisfying lifestyle in their own community (Schönherr, 1999). Rehabilitation goals vary according to the level of injury and the extent of damage to the cord. When the injury is complete, the functional outcome depends to a large degree on the level of injury. The lower the cord level, the more voluntary movement is preserved and the greater the expectations for independence (Dillingham & Belandres, 1998). In SCI, the goals of rehabilitation include ‘optimizing physical function, facilitating social independence, minimizing medical complications, enhancing emotional adaptation, and promoting reintegration into the community (Inman, 1999).

2.4.2 Importance of Early Admission

Patients need to be transferred to specialist units for SCI at the earliest opportunity so that they can achieve the greatest degree of functional independence possible, for it appears that delay causes more medical complications prolonging rehabilitation (Inman, 1999). Aito et al., (2003) concluded that optimal rehabilitation care, with regard to the prevention of complications during the acute phase, entails early admission to a specialized multidisciplinary facility.

2.4.3 Inpatient Rehabilitation

For those who have experienced a TSCI, inpatient rehabilitation is an important part of reintegration into daily activities following an acute stay in hospital (Canadian Institute for Health Information, 2006). SCI rehabilitation involves a multitude of services and health professionals and is initiated in the acute phase and continues with extensive and specialized inpatient services during the sub-acute phase. Inpatient rehabilitation is an important stepping stone towards regaining and learning new skills for independent living. Here patients engage in an intensive full day program with services which may include nursing, physical therapy, occupational therapy, respiratory management, medical management, recreation and leisure, psychology, vocational counseling, driver training, nutritional services, speech pathology, social worker, sexual health counseling, assistive device prescription and pharmaceutical services. Rehabilitation continues with planning for discharge back to the community and finally, re-integration into former or new roles and activities within the community. Family and peers have important roles throughout the rehabilitation process (Eng & Miller, 2006).

2.4.3.1 El Wafa Medical Rehabilitation and Specialized Surgery Hospital(EWMRSSH)

EL-Wafa Medical Rehabilitation and Specialized Surgery Hospital (EWMRSSH) which is the only specialized center in Gaza Strip that has the capability to provide the appropriate inpatient rehabilitation care for SCI patients. EWMRSSH was established in 1996 in response to the urgent need of community as the first and only rehabilitation hospital in Gaza Strip at that time, where all disabled including the injured of 1987 Intifada, forced to travel to rehabilitation centers in the West Bank or inside hospitals in occupied area of 1948 to receive medical rehabilitation services , and the consequences of security restrictions that make many of them prefer disability or even death to travel for treatment, in addition to the suffering of their families in obtaining the necessary clearances for travel, and the social and psychological hardships suffered by the injured, away from his family and his friends, who was supposed to. The hospital consists of 52 inpatient beds (23 in female department and 29 in male department). The hospital is composed of many departments, the largest are the medical and nursing department, other important departments are: physiotherapy, occupational therapy, cognitive rehabilitation, Play therapy unit**,** Social

service unit, counseling and psychological rehabilitation unit**,** outpatient specialist clinics, and other paramedical services like the x-rays unit, the laboratories services, and the pharmacy (Source:www.Elwafa.org).

2.4.4 Length of Stay (LOS)

length of stay (LOS) in inpatient rehabilitation is the number of days between admission to and discharge from an inpatient rehabilitation program (Canadian Institute for Health Information, 2006). The documentation of rehabilitation LOS as an outcome measure has escalated in recent decades. This has enabled researchers and clinicians to evaluate and compare the efficiency and effectiveness of rehabilitation interventions against national and international benchmarks. (Tooth et al., 2003). Rehabilitation LOS can vary according to the extent and neurological level of injury to the cord. In addition, other factors such as other injuries sustained at the time of the accident and the health and age of the patient may also contribute to differences in LOS (Cripps, 2006). In Australia, the median rehabilitation LOS for the total group was 83.0 days. Rehabilitation LOS was significantly longer for patients with complete tetraplegia compared to incomplete tetraplegia or incomplete/complete paraplegia (Tooth et al., 2003). SCI has the longest inpatient rehabilitation length of stay over all other rehabilitation patient groups except for burns (Eng & Miller, 2006).

Chapter Three

Literature Review

Chapter Three: Literature Review

Complications are common following SCI and its occurrence has negative effect for the patient, family, rehabilitation team and for the community as a whole. So that the researcher consider the prevention, early detection and treatment of these complications are the cornerstone for successful rehabilitation process and for successful community reintegration as early as possible.

This chapter discusses the literature review conducted about the incidence of the complications during the rehabilitation phases and the relation of these complications with socio-demographic characteristic of SCI patients, with the type SCI management (conservative versus the surgical management) and with the length of stay (LOS) during the inpatient rehabilitation.

3.1Causes and Socio-Demographic Characteristic of TSCI.

3.1.1 Causes of TSCI.

Table (3.1) Mode of injury-a comparison of different series

Series	RTA	FD	GUN SHOT
Otom et al., (1997) (Jordan)	44.4%	21.3%	25.8%
Pandey et al., (2007) (Indian)	43.33%	48.33%	1.6%
Al Jadid et al., (2004) (Arabia Saudi)	80%	9.4%	6.4%
Karacan et al., (2000) (Turkey)	48.8%	36.5%	1.9%
Rathore et al., (2008) (Pakistan)	25.2%	57.85:%	8.4%

Table (3.1) shows the different causes of TSCI in different studies around the world. The most common causes were RTA, FD and gun shot.

3.1.2 Age

Table (3.2) The most affected age group of TSCI among different series

Series	The most affected age group	Mean of population age
Otom et al., (1997) (Jordan)	21-30 years (35.8%)	33 year
Singh et al., (2003) (Indian)	20-29 years (42.03%)	35.4year
Karacan et al., (2000) (Turkey)	20-29 years (30.9%)	35 years
Rathore et al., (2008) (Pakistan)	20-30 years	28.3 years
Schonherr et al., (1996) (Netherlands)	21-30 years (40%)	*
Oconnor & Murray, (2005) (Ireland)	20-29 years	*

Table (3.2) shows the different age groups among different studies around the world.

3.1.3 Gender

Table (3.3) Male/Female ratio among different series

Series	Male/Female
Otom et al., (1997) (Jordan)	5.8/1
Pandey et al., (2007) (Indian)	5.7/1
Quinones et al., (2002) (Qatar)	5/1
Al Jadid et al., (2004) (Arabia Saudi)	5/1
Deconinck., (2003) (Afghanistan)	9:1
Rathore et al., (2008) (Pakistan)	6.7/1

Table (3.3) shows the male/ female ratio among different series. All of these studies found that SCI is males dominant.

3.2 SCI management

Pandey et al., (2007) examined the various factors responsible for a delay in the presentation of spinal injury patients to the specialized spinal trauma units. Sixty patients of TSCI admitted for rehabilitation between August 2005 and May 2006 were enrolled into the study and their data was analyzed. The result of the study showed that eighty-five percent of the spinal cord injured patients were males and the mean age was 34 years (range 13-56 years). Twenty nine (48.33%) of the spinal injuries occurred due to fall from height. In 38 (62.5%) cases the mode of transportation of the spinal cord injured patient to the first visited hospital was by their own conveyance and the attendants of the patients did not have any idea about precautions essential to prevent neurological deterioration. Seventeen (28.33%) patients were given injection solumedrol with conservative treatment, 35 (60%) patients were given only conservative treatment and seven patients were operated (11.66%) upon at initially visited hospital. Of the seven patients operated five were fixed with posterior Harrington instrumentation (71.42%) and two (28.57%) were operated by short segment posterior pedicle screw fixation..

Fehling & Perrin, (2005) carried out evidence-based literature review to provide updated evidence-based recommendations regarding spinal cord decompression in patients with acute SCI through medline search of experimental and clinical studies showing the effect of decompression on neurologic outcome following SCI. After reviewed of 66 articles they concluded that there are currently no standards regarding the role and timing of decompression in acute SCI, urgent decompression in acute cervical SCI remains a reasonable practice option and can be performed safely and there is emerging evidence that surgery within 24 hours may reduce length of intensive care unit stay and reduce post-injury medical complications. They recommend urgent decompression of bilateral locked facets in a patient with incomplete tetraplegia or in a patient with SCI with neurologic deterioration.

Kishan et al., (2005) conducted literature review article to demonstrate the impact of operative timing after traumatic spinal injuries. They found that there are multiple laboratory investigations (in animal models) and many clinical studies suggest better neurological outcomes with early surgical intervention. Also found that conclusive evidence (well-designed randomized, controlled studies), however, is

lacking, partly due to the logistics involved in executing such an investigation and found that early surgery also appears to decrease the incidence of complications, reduces hospital stay, and helps reduce costs associated with acute management. They concluded that early surgical treatment is beneficial in terms of reducing complications, length of stay, and hospital costs. Further studies are needed to clearly demonstrate the impact of operative timing on neurological outcome.

In conference meeting about controversies in the management of TSCI, El Masri, (2006) demonstrate that that surgery should be performed on those individuals with spinal column damage but without SCI in order to facilitate early discharge. He maintained, however, that only 10-15% of patients with SCI require surgery, and he reiterated the lack of compelling evidence that surgical intervention results in superior neurological outcome. The biomechanical instability of the spinal column can be equally well maintained by conservative measures, such as 4-6 weeks' bed rest followed by 4-6 weeks' mobilization in a brace. Surgery may cause hypoxia, hypotension and hypothermia, which could lead to further neurological damage. Surgery also entails additional risks such as infection and bleeding. There is evidence to show that the majority of patients with clinically incomplete SCI managed conservatively will make a significant recovery, with 47-80% regaining the ability to walk, depending on the level and density of the lesion. There is no such evidence for long-term outcome after surgical management.

Also in the same conference, Webb, (2006) proposed that surgery should be performed for biomechanical reasons, as to correct deformity and/or to stabilize an unstable injury. Surgery for unstable injuries allows early mobilization and earlier discharge: patients with no neurological deficit can be discharged about 6 days after surgery, whereas they require several weeks of immobility if managed conservatively. For patients with a neurological deficit, there is no conclusive evidence to show that this deficit is improved by surgery. However, animal studies show that early decompression improves neurological outcome and suggest a window of opportunity in the first 4-6 hours. In the clinical setting, this is often not practical, therefore, surgery is performed at the earliest safe opportunity. Further studies in humans are required in order to establish an evidence base for the surgical management of SCI.

3.3 Rehabilitation length of stay (LOS) of SCI.

Eastwood et al., (1999) conducted longitudinal, exploratory study of patients with SCI to describe changes in acute and rehabilitation length of stay (LOS) for persons with TSCI, describe predictors of LOS, and explore year-1 anniversary medical and social outcomes. A total of 3,904 persons discharged from eighteen Model Spinal Cord Injury Centers across the US between 1990 and 1997 who had follow-up interviews at 1 year post injury. The result of study revealed that acute rehabilitation LOS declined from 74 days to 60 days. Discharges to nursing homes and re-hospitalizations increased between 1990 and 1997. Linear regression showed that lower admission motor Functional Independence Measure (FIM) scores, year of discharge from the Model System, method of bladder management, tetraplegia, race, education, marital status, discharge disposition, and age were related to longer LOS.

Tooth et al., (2003) carried out retrospective, descriptive study to describe patients' length of stay (LOS), functional status and discharge setting after rehabilitation, how degree of impairment(complete / incomplete paraplegia / tetraplegia) impacts on these outcomes and to compare actual LOS with estimated LOS. Retrospective chart review of 167 patients with TSCI admitted to Spinal Injuries Unit of major Metropolitan hospital in Brisbane, Australia. The outcomes of the study indicate that the median rehabilitation LOS was 83 days and mean discharge FIM trade mark scores 102 for all patients. These differed by impairment (incomplete paraplegia LOS 43, FIM 117; complete paraplegia LOS 96, FIM 109; incomplete tetraplegia LOS 64, FIM 100; complete tetraplegia LOS 206, FIM 78). Patients discharged to the community (non care facility) ranged from 93% with incomplete paraplegia to 73% with complete tetraplegia. The results of the study revealed that rehabilitation outcomes differed substantially by impairment.

Canadian Institute for Health Information (CIHI) examined demographics, length of stay (LOS) in inpatient rehabilitation, functional improvement during inpatient rehabilitation, discharge destination after inpatient rehabilitation and changes in vocational status from admission to follow-up, for clients who have received inpatient rehabilitation following a TSCI during inpatient rehabilitation. Retrospective review of data of 107 patients with TSCI from the National Rehabilitation Reporting System (NRS) at the CIHI. The results of the study revealed that almost 80% of TSCI

clients who have participated in inpatient rehabilitation are males and 67% are under the age of 51. Also it revealed that there are a progressive decrease in the number of clients undergoing inpatient rehabilitation for traumatic spinal cord injuries with increasing age for both females and males. The median LOS for all TSCI clients is 59 days. Clients with complete quadriplegia have the highest median LOS, at 101 days. Clients with incomplete paraplegia have a lower LOS, at 49 days, although clients who fall into the other TSCI group have the lowest median LOS, at 29 days. The median LOS for complete paraplegia was 67 days and the median LOS for incomplete quadriplegia 64 days (CIHI, 2006).

Gupta et al., (2008) conducted retrospective comparative study of 2 years duration to compare neurological and functional outcome and LOS of persons with traumatic vs. non-traumatic spinal cord lesion after in-patient rehabilitation. Seventy-six in-patients with spinal cord lesion: traumatic (38 patients, M/F=34:4) and non-traumatic (38 patients, M/F=16:22) were admitted for in-patient multidisciplinary neurorehabilitation at Neurological rehabilitation department of a tertiary research center in Bangalore, Karnataka, India. ASIA impairment scale, LOS, and admission and discharge--Barthel Index scores in both the groups were recorded, compared and analyzed. The outcome of the study demonstrate that LOS for rehabilitation was higher for traumatic group as compared to non-traumatic group, although statistically not significant (P>0.05).

Post et al., (2005) carried out retrospective study to the length of stay (LOS) and functional outcome of SCI in the Netherlands and its determinants. Data of 157 patients from eight rehabilitation centers were available. The result of the study indicates that mean age was 40.0 years and 76.4% were traumatic injuries, 39.8% had tetraplegia, and 69.9% had a motor complete SCI. Median LOS was 240 days. The study concluded that level and completeness of injury, bed rest because of pressure sores, and LOS were predictors of motor FIM scores and duration of SCI rehabilitation in the Netherlands is long compared with the literature.

Cifu et al., (1999) conducted retrospective study to examine the effects of age at injury on lengths of stay, treatment costs, and outcomes using a matched sample of tetraplegic SCI patients. Three hundred seventy-five adult patients with tetraplegic SCI admitted between 1988 and 1996 to sixteen medical centers in the federally sponsored Spinal Cord Injury Model Systems Project, were assessed at acute care admission, inpatient rehabilitation admission, and inpatient rehabilitation discharge. Differences were examined by separating the sample into three age categories (18 to 34, 35 to 64, and 65 years old) matched for American Spinal Injury Association (ASIA) Motor Impairment Classification and level of neurologic preservation bilaterally. Analyses revealed equivalent lengths of stay and charges for all age groups. There were no age-related differences in ASIA and FIM Motor scores at acute care and inpatient rehabilitation admission. Younger patients' scores on the FIM Motor subscale improved significantly more than did middle and older patients'. The two younger groups of patients had a more significant improvement than did older patients, as indicated by ASIA Motor Index scores. When taking lengths of stay into account, the FIM motor scores of the youngest group of patients improved more quickly than those of the two older groups. Furthermore, the younger and middle age groups demonstrated greater treatment efficiency than the older patient group based on ASIA Motor Index score ratios. Younger patients were least likely to be discharged to institutional settings.

3.4 Complications of SCI Patients during the Acute and Rehabilitation Phases.

Prospective 2 years survey from 1 February 1997 to 31 January 1999, conducted to assess the incidence of complications during the acute stage of spinal cord lesions and the possible correlations between them and the type of care and rehabilitation provided. The study population 588 patients was drawn from the Italian Group for the Epidemiological Study of Spinal Cord Injuries study (1997-1999), which involved the participation of 37 Italian Rehabilitation Centers and Spinal Units, situated all over Italy and only patients admitted within 60 days from the traumatic injury were considered. Six of the most common complications were considered at admission and during hospitalization: trophic skin changes, heterotopic ossifications, urinary complications, respiratory complications, deep-vein thrombosis and pulmonary embolism. The result of the study indicate that the incidence of the complications at admission were: trophic skin changes 23.3%, heterotopic ossifications 3.4% , urinary complications 5.6%, respiratory complications 10.5%, 3.4% deep-vein thrombosis and pulmonary embolism 1%. The incidence of the complications during hospitalization was: trophic skin changes 6.3%, heterotopic ossifications 3.9%, urinary complications 8.8%, respiratory complications 9.5%, deep-vein thrombosis 5.3% and pulmonary embolism 1.9% (Aito et al., 2003).

In a survey study about Medical complications during acute rehabilitation following SCI: Current experience of the Model Systems conducted by Chen et al., (1999). Data of 1,649 persons with new SCI from eighteen Model System SCI Centers located in urban, public medical centers around the United States were collected and analyzed to examine the frequency of common secondary medical complications during acute rehabilitation in persons with new SCI admitted between 1996 and mid-1998. Outcomes indicate that pressure ulcers occur with high frequency and were found to have developed in 23.7% of patients during rehabilitation. In addition, autonomic dysreflexia and atelectasis /pneumonia also occur with relative frequency during rehabilitation. Conversely, deep vein thrombosis and pulmonary embolism have decreased, most likely because of greater awareness of their potential to develop, as

well as improved methods of prophylaxis. Cardiopulmonary arrest and gastrointestinal hemorrhage occur with relatively small frequency.

Another multicenter longitudinal study to assess the occurrence and risk factors for complications following SCI during and after inpatient rehabilitation. Hisma et al., (2007) assessed 212 persons with a SCI admitted to specialized rehabilitation centers at the start of active rehabilitation, 3 months later, at discharge and 1 year after discharge**.** Most subjects reported neurogenic and musculoskeletal pain, or had spasticity at each assessment. During the year after discharge, complications remained common: urinary tract infections and pressure sores affected 49% and 36% of the population, respectively. The degree of pain decreased, whereas the degree of spasticity increased significantly during inpatient rehabilitation. Overall, increased age, increased body mass index, traumatic lesion, tetraplegia, and complete lesion all increased the risk of complications.

Tauqir et al., (2007) carried out cross-sectional retrospective study covering a 2-month period was conducted on 194 SCI patients from an earthquake that struck Northern Pakistan on October 8, 2005, which admitted to the surgical/neurosurgical wards of Rawalpindi Medical College and allied hospitals (Holy Family Hospital, Rawalpindi General Hospital, and District Headquarter Hospital) and Melody Relief and Rehabilitation Center, Islamabad. The outcomes of the study indicate that the male-to-female ratio was approximately 1:3 (n = 50 [26%] and n = 144 [74%], respectively). The majority (78% [n = 151]) were 16 to 39 years of age; 62% (n = 120) had lumbar-level injuries, 25% (n = 48) had thoracic-level injuries, 9% (n = 18) had thoracolumbar-level injuries, and a few had cervical- or sacral-level injuries. Forty-six percent (n = 90) had American Spinal Injury Association type A injuries; 4% (n = 8) were graded B, 11% (n = 21) were graded C, 9% (n = 18) were graded D, and 14% (n = 27) were graded E. Twenty percent (n = 39) developed pressure ulcers, of which 38% (n = 15) had grade 1, 36% (n = 14) had grade 2, 23% (n = 9) had grade 3, and 3% (n = 1) had grade 4. All patients developed urinary tract infections; 15% (n = 30) had bowel complaints; 2% (n = 3) developed deep-vein thrombosis (1 died of pulmonary embolism); and 0.05% (n = 1) developed wound infection.

Jhonson et al., (1998) investigates in prospective study the frequency of both medical and non-medical complications reported by the population based cohort of SCI

survivors reported to the Colorado Spinal Cord Injury Early Notification System (ENS). Persons reported to the ENS between January 1986 and December 1993, were solicited to participate in comprehensive follow up interviews at first, third and fifth year post injury. The medical complications of spasticity or pain were reported by more than 25% of the participants, and the pressure sores were reported by more than 10% of the participants. The chief non-medical complications were financial concerns and transportation problems.

Raissi et al., (2007) conducted retrospective study for SCI patients after the 2003 earthquake in Bam, Iran, to assist in the organization of rehabilitation programs during future disasters. Eight months after the disaster, 61 SCI patients in Bam, Baravat, and surrounding villages were visited and a questionnaire is completed during each visit. The result of the study revealed that the patients' mean age was 31.9 years. Twenty-nine (53.7%) patients were female, and 25 (46.3%) were male. Fifty-two (96.3%) patients had pain syndromes, which had started from 3 days to 8 months after injury. Thirty-three (61%) patients used clean intermittent catheterization, and 29 (53.7%) did not have bowel programs. Nineteen (35.2%) patients had pressure sores.

3.5 Summary of Literature

Several literatures have specifically studied the incidence of complications among SCI during and after inpatient rehabilitation. Most of these studies only followed only the incidence of medical complications and dealing with limited number of these complications range from 3-7 complications. In general most of these studies reported that pressure ulcer and urinary tract infection were the most common complications.

Most of these studies reported the incidence and socio-demographic characteristic of SCI patients and focusing on the leading causes of this catastrophic injury. All of these studies found that SCI is young males dominant and the most common causes are RTA and FD.

There were controversies in the management of traumatic spinal cord injury and there were lack of evidence about the superiority of surgical management or conservative management.

Patients' LOS varies among the most of these studies which reflect that LOS depends on many factors as socio-demographic characteristic of SCI patients.

Chapter Four

Methodology

Chapter Four: Methodology

This chapter describes the materials and methods that were used in this research. The adopted methodology to accomplish this study used the following techniques: review of literature related to main subject, the information about the research plan and design, research population, study setting and its period, questionnaire design and content, statistical data analysis, content validity, and pilot study.

4.1 Study Plan

The first step of the study research was to determined the most common complications were confronted by TSCI patients during inpatient rehabilitation. We asked 27 expert persons in EWMRSSH about the most common complications by internal need assessment (annex 1). According to literature review and the result of internal need assessment the researcher used 10 complications.

The second step of the research thesis proposed identifying and defining the problems and establishment objectives of the study and development research plan.

The third step of the research study included a summary of the comprehensive literature review. Literatures related to TSCI rehabilitation, TSCI incidence and spinal cord anatomy were reviewed.

The fourth step of the research focused on the modification of the questionnaire design, through review some of subjects files by using the proposed questionnaire (pilot study), and the questionnaire was modified based on the results of the pilot study.

The fifth step of the research focused on reviewing of the subjects' files to collect the data by using the questionnaire. This questionnaire was used to collect the required data in order to achieve the research objective.

The sixth step of the research was data analysis and discussion, and the final phase includes the conclusions and recommendations.

Figure (4.1) The Methodology Flow Chart.

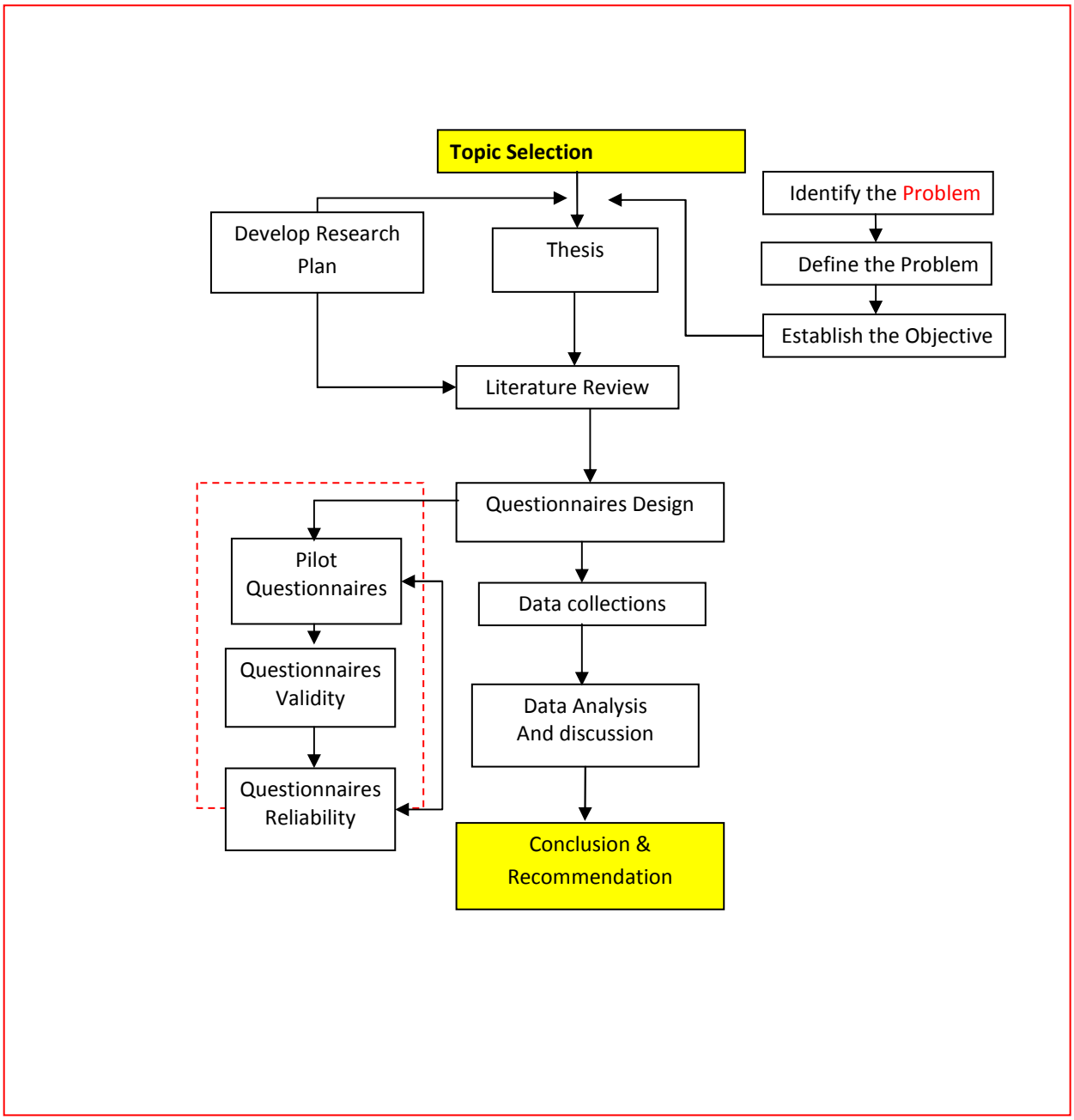


Figure (4.1) shows the methodology flowchart, which leads to achieve the study objectives.

4.2 Study Design

Retrospective study design was carried out to establish the objectives of this study.

4.3 Study Setting and Period of Study

The study carried out in Gaza Strip at EWMRSSH which is the only specialized center in Gaza Strip that has the capability to provide the appropriate care for SCI patients . The study carried out between the period of 25th, Octoper, 2007 until 28th, January, 2009.

4.4 Study Population

The population for this study consisted of males and females with TSCI admitted to EWMRSSH from 2002-2007 because the files before 2002 were incomplete files . The study population (files) 91 subjects was recruited from EWMRSSH archive. 10 subjects for pilot study were excluded from the population.

4.5 Sample Size

Sample size was the population of the study after excluded of 10 subjects of piloting study, so that sample size was 81 subjects. The whole population were chosen due to the small of study population and to be the sample more representative.

4.6 Sampling method

Subjects had been chosen on a non prop-convince sampling method. Every subject admitted to EWMRSSH fulfilling the criteria was included in this sample.

4.7 Ethical consideration

An approval to conduct the study is obtained from EWMRSSH (Annex 2).

4.8 The Inclusion Criteria

- Male and female subjects with TSCI
- An age range of 15 -65 year old was chosen to avoid the possible confounding effect at a young and older age.
- All surviving TSCI subjects who were admitted to EWMRSSH during the above period.
- EWMRSSH must be the first and only hospital which the TSCI subjects admitted for rehabilitation.
- There is no history of other disease (chronic or progressive disease).
- The accident of TSCI occurred in Gaza strip.

4.9 The Exclusion Criteria

- Subjects with history of other disease (chronic or progressive disease).
- Subjects who has non-TSCI.
- The accident of TSCI occurred out Gaza strip.
- Subjects below 15 years and above 65 years.
- Subjects who have history of hospitalization for rehabilitation hospital before admitted EWMRSSH during the above period.

4.10 Instrument Design and Content

After reviewing the literature and after interviewing experts who were dealing with similar subject at different levels, all the information that could help in achieving the study objectives were collected, reviewed and formalized to be suitable for the study. After many stages of brain storming, consulting, amending, and reviewing executed by the researcher with the supervisor, an instrument was designed into closed ended questions (Annex 3).

The instrument design composed of three sections to accomplish the objectives of the research, as follows:

1. The first section contained **Demographic data**: as age, gender, educational level, occupation,…etc
2. The second section contained the **Medical information**: as cause of injury, level and degree of TSCI, period of inpatient rehabilitation, date of injury,…etc

3. The third section contained the medical complications: which include detailed information about the occurrence of 10 medical complications at admission, during inpatient rehabilitation and at discharge.

4.11 Piloting the Instrument

The pilot sample of 10 subjects (files) reviewed to examine clarity and suitability of the questions included in the instrument before starting data collections and to find the weakness areas in the instrument component. After the pilot study some questions were modified and some were totally removed. The pilot subjects were excluded from the study population.

4.12 Data Collection

Data collected through indirect method which included a retrospective chart review of all TSCI patients admitted to EWMRSSH January 2002 to December 2007. Indirect method were chosen because most of the patients will be unable to remember the important data of the study.

4.13 Data entry and Analysis

The researcher entered the data after a continuous help and support from experts statisticians using Statistical Package for the Social Sciences (SPSS).The data of 81 questionnaires were entered for analysis.

The researcher analyzed the data with help and support of many experts of statisticians and they recommended the usage of:

1. Spearman Correlation Coefficient for measuring the internal consistency.
2. Spearman brown coefficient used for measuring reliability of the paragraphs of the questioners.
3. Split half method used for measuring reliability of the paragraphs of the questioners.
4. Chi-Square test χ^2 to test if there is a significant a agreement in ranking among different perception.

4.14 Validity of the Questionnaire

Validity refers to the degree to which an instrument measures what it is supposed to be measuring (Pilot & Hungler, 1999). Validity has a number of different aspects and assessment approaches. There are two ways to evaluate instrument validity: content validity, and statistical validity.

4.14.1 Content Validity of the Questionnaire

Content validity test was conducted by consulting fourth experts. The fourth experts did agree that the questionnaire was valid and suitable enough to measure the concept of interest with some amendments.

4.14.2 Statistical Validity of the Questionnaire

To insure the validity of the questionnaire, we used a statistical validity, which include criterion-related validity, and construct validity.

4.14.2.1Criterion Related Validity

Criterion-related validity test (Spearman test) is the first statistical test which measures the correlation coefficient between each paragraph in one field and the whole field.

Table (1) to table (8) show the correlation coefficient and p-value for each field paragraph. The p- values are less than 0.05 or 0.01, so the correlation coefficients of this field are significant at $\alpha = 0.01$ or $\alpha = 0.05$, so it can be said that the paragraphs of this field are consistent and valid to be measure what it was set for.

Table (4.1) Spearman coefficient correlations - Pressure Ulcer (PU)

Item No.	Paragraph	Spearman coefficient	p-value
1	Did the patient has (PU) at admission?	.831(**)	0.000
2	Did he has (PU) during inpatient?	.269(**)	0.008
3	Did the patient has (PU) at discharge?	.599(**)	0.000

* Correlation coefficient is significant at the $\alpha = 0.05$

* * Correlation coefficient is significant at the α = 0.01

Table (4.2) Spearman coefficient correlations - Urinary Tract Infection (UTI)

Item No.	Paragraph	Spearman coefficient	p-value
1	Did he has (UTI) at admission?	.528(**)	0.000
2	Did he has (UTI) during inpatient?	.677(**)	0.000
3	Did he has (UTI) at discharge?	.439(**)	0.000

* Correlation coefficient is significant at the α = 0.05

* * Correlation coefficient is significant at the α = 0.01

Table (4.3) Spearman coefficient correlations - Respiratory Complications (RC)

Item No.	Paragraph	Spearman coefficient	p-value
1	Did he has (RC) at admission?	.714(**)	0.000
2	Did he has (RC) during inpatient?	.935(**)	0.000
3	Did he has (RC) at discharge?	.276(**)	0.007

* Correlation coefficient is significant at the α = 0.05

* * Correlation coefficient is significant at the α = 0.01

Table (4.4) Spearman coefficient correlations - Spacticity

Item No.	Paragraph	Spearman coefficient	p-value
1	Did he has spacticity at admission?	.505(**)	0.000
2	Did he has spacticity during inpatient?	.818(**)	0.000
3	Did he has spacticity at discharge?	.422(**)	0.000

* Correlation coefficient is significant at the α = 0.05

* * Correlation coefficient is significant at the α = 0.01

Table (4.5) Spearman coefficient correlations - Flaccidity

Item No.	Paragraph	Spearman coefficient	p-value
1	Did he has flaccidity at admission?	.891(**)	0.000
2	Did he has flaccidity during inpatient?	.226(*)	0.024
3	Did he has flaccidity at discharge?	.318(**)	0.002

* Correlation coefficient is significant at the α = 0.05

* * Correlation coefficient is significant at the α = 0.01

Table (4.6) Spearman coefficient correlations - Pain

Item No.	Paragraph	Spearman coefficient	p-value
1	Did he has pain at admission?	.487(**)	0.000
2	Did he has pain during inpatient?	.862(**)	0.000
3	Did he has pain at discharge?	.299(**)	0.004

* Correlation coefficient is significant at the α = 0.05

* * Correlation coefficient is significant at the α = 0.01

Table (4.7) Spearman coefficient correlations - Deep Venous Thrombosis (DVT)

Item No.	Paragraph	Spearman coefficient	p-value
1	Did he has (DVT) at admission?	.833(**)	0.000
2	Did he has (DVT) during inpatient?	.503(**)	0.000
3	Did he has (DVT) at discharge?	.472(**)	0.000

* Correlation coefficient is significant at the α = 0.05

* * Correlation coefficient is significant at the α = 0.01

Table (4.8) Spearman coefficient correlations - Gastrointestinal Complications (GC)

Item No.	Paragraph	Spearman coefficient	p-value
1	Did he has (GC) at admission?	.489(**)	0.000
2	Did he has (GC) during inpatient?	.823(**)	0.000
3	Did he has (GC)) at discharge?	.405(**)	0.000

* Correlation coefficient is significant at the α = 0.05

* * Correlation coefficient is significant at the α = 0.01

4.14.2.2 Structure Validity of the Questionnaire

Structure validity is the second statistical test that used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one filed and all the fields of the questionnaire.

Table (9) the correlation coefficient for each filed and the whole questionnaire. The p-values are less than 0.01, so the correlation coefficients of all the fields are significant at α = 0.01, so it can be said that the fields are valid to be measured what it was set for to achieve the main aim of the study.

Table (4.9) Spearman coefficient correlations – ALL fields

Field No.	Field	Spearman coefficient	p-value
1	**Pressure Ulcer (PU)**	.508(**)	0.000
2	**Urinary Tract Infection (UTI)**	.705(**)	0.000
3	**Respiratory Complications (RC)**	.342(**)	0.001
4	**Spacticity**	.187(*)	0.048
5	**Flaccidity**	.444(**)	0.000
6	**Pain**	.399(**)	0.000
7	**Deep Venous Thrombosis (DVT)**	.289(**)	0.005
8	**Gastrointestinal Complications (GC)**	.348(**)	0.001

* Correlation coefficient is significant at the $\alpha = 0.05$

* * Correlation coefficient is significant at the $\alpha = 0.01$

4.15 Reliability of the Questionnaire

The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measuring (Pilot & Hungler, 1999). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability.

Reliability can be equated with the stability, consistency, or dependability of a measuring tool. The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient. It is difficult to make the reliability of the questionnaire by repeated the test to the same sample of people on two occasion because the retrospective nature of the study depend on collecting the data through indirect method from subjects files. Therefore two tests can be applied in order to measure the consistency of the questionnaire. The first test is the Half Split Method and the second is Cronbach's Coefficient Alpha.

4.15.1 Split Half Techniques

This method depends on finding Pearson correlation coefficient between the means of odd questions and even questions of each field of the questionnaire. Then, correcting the Pearson correlation coefficients can be done by using Spearman Brown correlation coefficient of correction.

The corrected correlation coefficient (consistency coefficient) is computed according to the following equation: Consistency coefficient = 2r/(r+1), where r is Pearson correlation coefficient. The normal range of corrected correlation coefficient (2r/ r+1) is between 0.0 and + 1.0 As shown in Table No.(10), the corrected correlation coefficient value is between 0.0 and +1.0 and the significant (α) is less than 0.05 so the corrected correlation coefficient is significance at α = 0.05.The reliability coefficient for all paragraphs equal 0.753, which mean that the results ensure the reliability of the questionnaire.

Table (4.10) Split Half Technique

Fields	Correlation	Spearman-Brown coefficient	p- value	Significance / Not Significance
All paragraphs	0.604	0.753	0.000	**

* * Correlation coefficient is significant at the α = 0.01

4.15.2 Cronbach's Alpha

This method is used to measure the reliability of the questionnaire between each field and the mean of the whole fields of the questionnaire (Pilot and Hungler, 1999). The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency. As shown in Table (11) the reliability coefficient for all paragraphs equal 0.676, which mean that the results ensures the reliability of the questionnaire.

Table(4.11) Cronbach's Alpha

Field	No. of Items	Cronbach's alpha
All paragraphs	24	0.676

Thereby, it can be said that the researcher proved that the questionnaire was valid, reliable, and ready for collecting data for the population sample.

4.16 Limitations of the Study

- One should bear in mind that study investigated only medical complications, whereas TSCI subjects also has psychosocial complications beyond the scope of this investigations.
- Subjects had been chosen on a non prop-convience sampling method, so this sample is not representative of all TSCI subjects in Gaza Strip.
- No Statistics resources of disabled persons in Palestinian territories, especially about TSCI persons.
- The researcher was obliged to take the total population as a sample due to low number of the total population.
- The data has been collected through retrospective review of subjects' files, but the true incidence of complications can neither be tracked nor understood without much longer prospective study.
- 60.8% of the population had admitted for hospitals out side Gaza Strip (Israel, Egypt, Jordan) after injury and before admission to the rehabilitation hospital, which limit the generalization of the results.

Chapter Five

Results

Chapter five: Result

This chapter describes the results that have been obtained through retrospective review of 81 files in a descriptive way. For this purpose the statistical package for social sciences (SPSS) was used. It highlights about demographic characteristic, medical information and the incidence of complications at admission, during and after inpatient rehabilitation.

Files of 21 subjects were excluded for several reasons: 7 cases has age less than 15 years, 11 has previous history of rehabilitation before admission, 2 cases in which the accident of SCI occurred out Gaza strip and 1 case has missing file.

5.1 Demographic Characteristics of the Study Population:

5.1.1 Age

This study included males and females who are 15 to 65 years old.

Table(5.1) Distribution of the study population by mean age and mode age

Age	All cases	Male	Female
Mean	26.4	25.6	32.8
Mode	20.0	20.0	15.0
Std. Deviation	11.3	10.4	16.2

Table (5.1) shows that the mean age for all subjects (male and female) are(26.4), the mean age for males (25.6) and the mean age of females (32.8). The mode age for all subjects (male and female) is 20 years old, the mode age for males (20) years old and the mode age of females (15) years old.

Figure (5.1) Distribution of the study population by age group

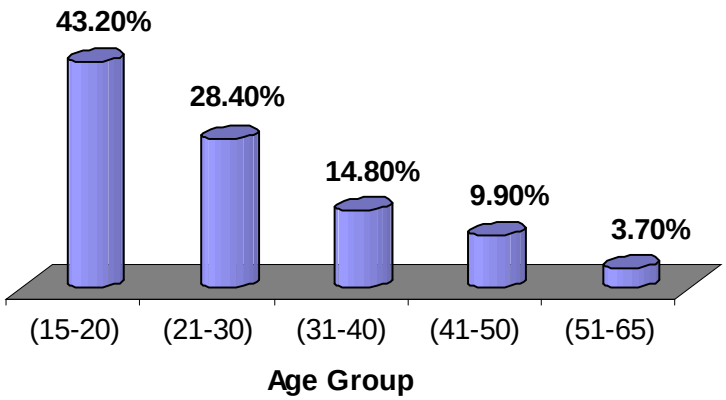


Figure (5.1) shows that the rate of occurrence for each age group was as follows 15-20 years is 35 patients (43.2%), 21-30 years is 32 patients (28.4%), 31 – 4 0 years is 12 patients (14.8%), 41-50 years is 8 patients (9.9%), 51-65 years is 3 (3.7%).

Subjects who are 15-20 years old constitute the largest portion of the study population. There are significant statistical relationships between the age groups and the number of cases for each age group as evidence by Chi-Square = 40.67and P-value = 0.000<0.05 .Figure (5.1) shows a progressive decrease in the number of subjects undergoing inpatient rehabilitation for traumatic spinal cord injuries with increasing age.

5.1.2 Gender

Figure (5.2) Different between males and females

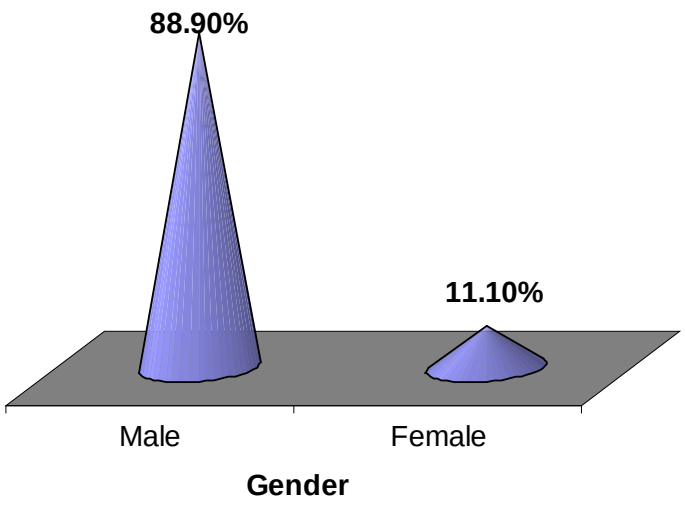


Figure (5.2) shows that there were 72 males (88.9%) and 9 females (11.1) with TSCI, the male /female ratio being 8: 1.

5.1.3 Living area

Figure (5.3) Distribution of the study population by Geographical

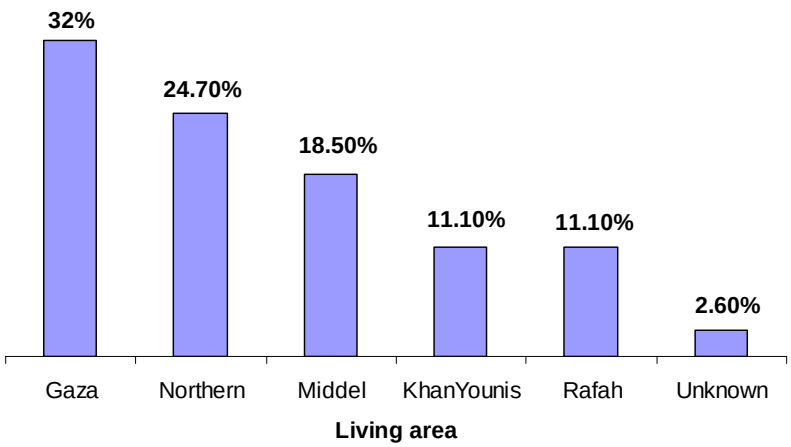


Figure (5.3) shows that Gaza governorate constitute the large portion of the population 26 subjects (32 %), northern governorate 20 subjects (24.7%) , middle governorate 15 subjects (18.5%) , Khan Younis governorate 9 subjects (11.1%), and Rafah governorate 9 subjects (11.1%).

5.1.4 Martial status

Table (5.2) Distribution of the study population by martial status

Martial status	Frequency	Percent
Married	30	37.05%
Single	30	37.05%
Unknown	21	25.9%
Total	81	100.0%

Table (5.2) shows the martial status of the population. The study population was divided equally between being single or being married before injury .The marital status of 21 subjects unknown.

5.1.5 Level of education

Figure (5.4) Distribution of the study population by educational level

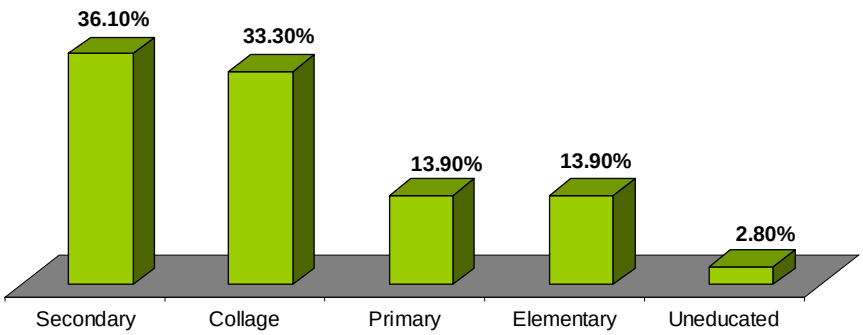


Figure (5.4) shows the level of education of the study population. Educational level of 45 subjects of the study unknown, only 36 subjects of the study has known educational level. The secondary level represented the majority of the study populations, followed by college level.

5.2 Medical information

5.2.1 Seasonal distribution

Figure (5.5) Seasonal distribution of the study population

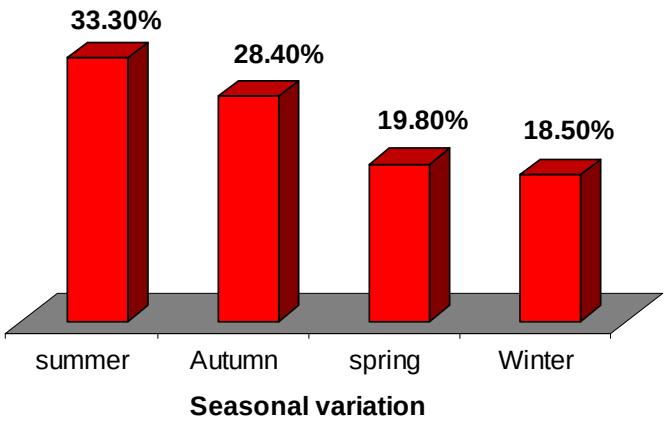


Figure (5.5) shows that an increase of frequency of TSCI in Summer (33.3%), followed by Autumn (28.4%), Winter (18.5%) and Spring (19.75%). Seasonal variation is observed.

5.2.2 Causes of Traumatic Spinal Cord Injury (TSCI)

Figure (5.6) Causes of TSCI

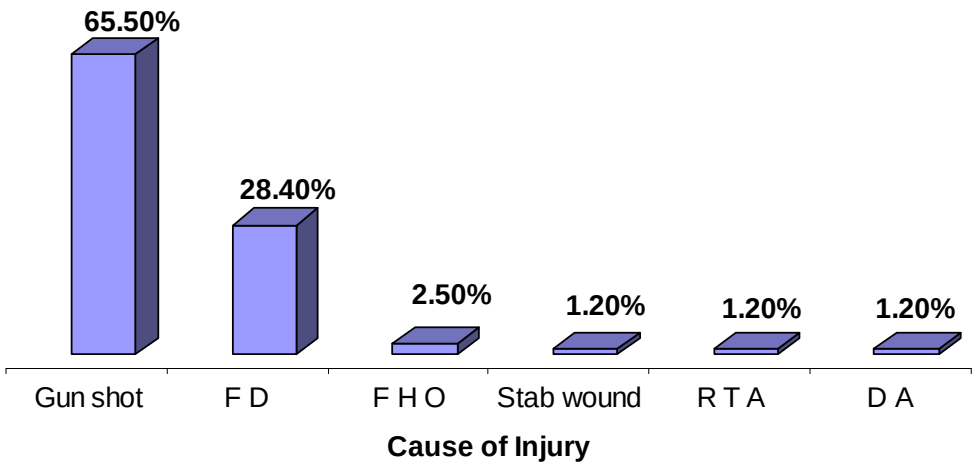


Figure (5.6) shows the incidence of different causes of TSCI. The leading cause of TSCI is gun shot (bullet and explosive) accounting for 65.5%, falling down (FD) 28.4%, falling of heavy object (FHO) 2.5%, road traffic accident (RTA)1.2%, stabbing wound 1.2% and diving accident (DA)1.2% .There are one case of falling down result from suicidal attempt.

5.2.3 Israeli Assaults

Figure (5.7) Number of TSCI that result from Israeli assault

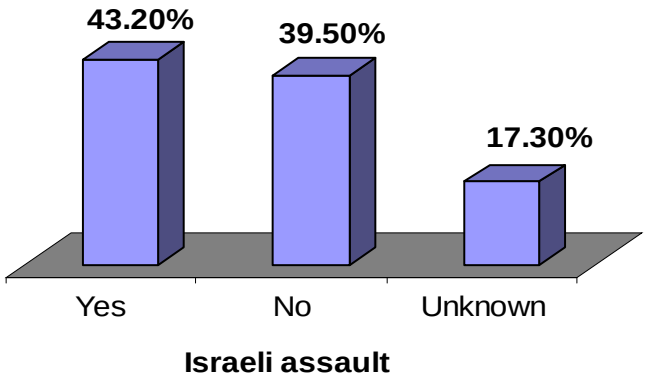


Figure (5.7) shows that in 35 (43.2%) subjects the cause of injury result from Israeli assaults (34 cases gun shot, 1 case falling of walls), and 14 cases of gun shot of unknown origin.

5.2.2 Associated Injuries

Table (5.3) The incidence of types of associated injuries

Type of associated injuries	Frequency	Valid Percent
Intrathoracic injuries	21	25.9%
Intraabdominal injuries	13	16%
More than one injury	10	12.4%
Fracture	4	4.9%
Closed head injury	2	2.5%
Total	50	61.7%

Table (5.3) shows that 50 subjects (61.7%) associated injuries are identified. The most prevalent is intrathoracic injuries (include ribs fracture) 21 subjects, followed by Intraabdominal injuries 13 subjects, more than one injury 10 subjects, fracture 4 subjects and closed head injury 2 subjects.

About 10 subjects which has more than injury, consist of 2 subjects has intrathoracic and intraabdominal injuries, 2 subjects has intrathoracic, intraabdominal injuries and fractures of limbs, 3 subjects has intrathoracic injuries and fractures of limbs and 3 subjects has intrabdominal injuries and fractures limbs.

There are 43 subjects (86%) of the associated injuries result from gun shot, 32 (64%) of the associated injuries result from Israeli gun shot and 44 (88%) subjects of the associated injuries affect the upper part of the body.

5.2.3 Completeness of TSCI

Figure (5.8) The incidence of different types TSCI

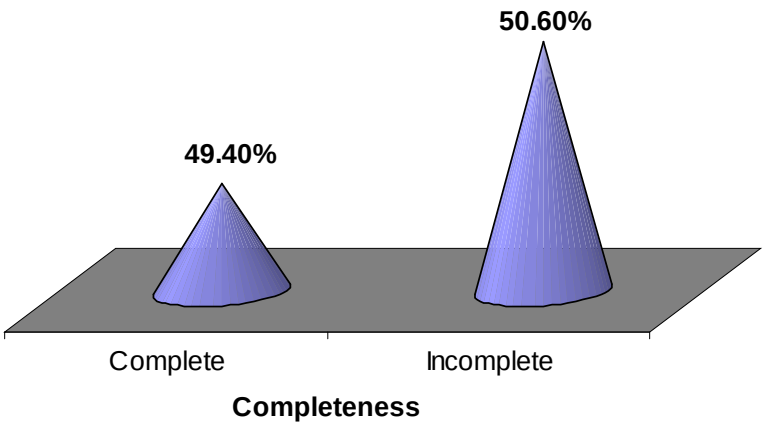


Figure (5.8) shows about half of the study population 40 subjects (49.4 %) has complete TSCI .

Figure (5.9) Distribution of the study population by ASIA impairment scale

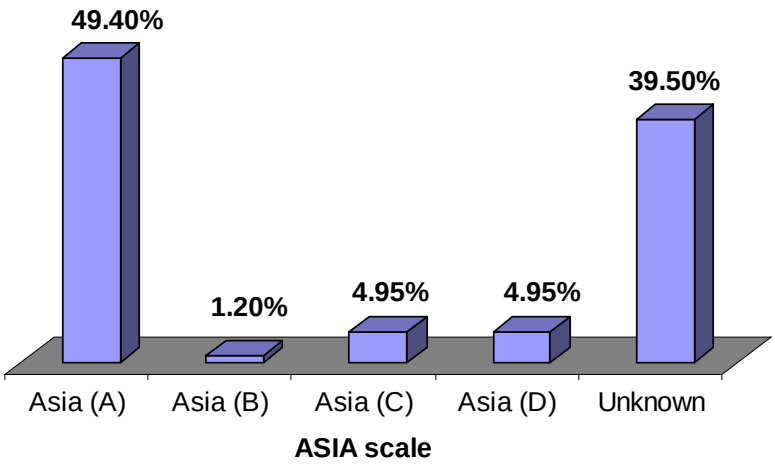


Figure (5.9) shows that 40 subjects (49.4%) has complete SCI ASIA (A), 1 subject (1.2%) has incomplete SCI ASIA (B) , 4 subjects (4.9%) has incomplete SCI ASIA (C) , 4 subjects (4.9%) has incomplete SCI ASIA (D) and 32 subjects (39.5%) has incomplete SCI with unknown ASIA scale.

5.2.4 Levels of TSCI

Figure(5.10) The incidence of different levels TSCI

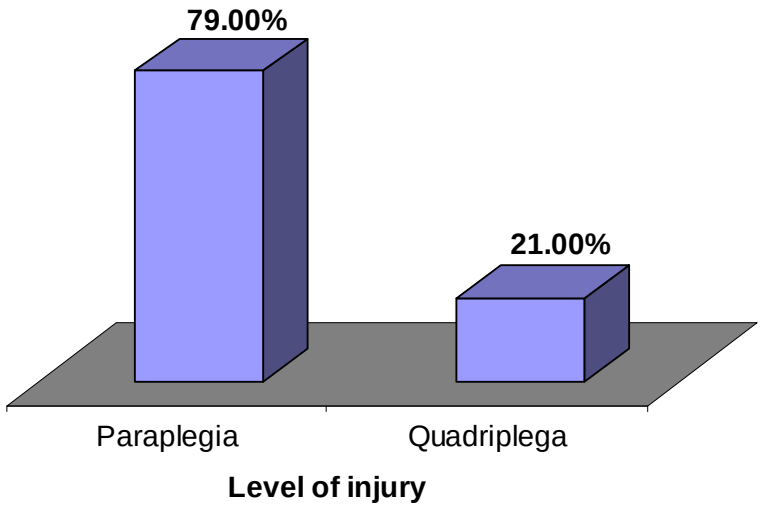


Figure (5.10) shows that there were 64 (79%) paraplegic and 17 (21%) quadriplegic. There were 48 subjects (75%) of paraplegia result from gun shot, 30 subjects (46.8%) result from Israeli gun shot.

Figure (5.11)The incidence of different levels of bony injury SCI

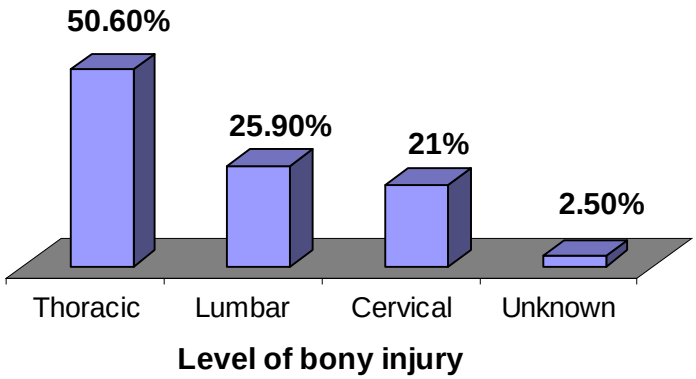


Figure (5.11) shows that the most prevalent level of bony injury is thoracic 41 (50.6%), followed by lumber 21 (25.9%) and cervical 17 (21%).

5.2.5 Management of Traumatic Spinal Cord Injury

There two ways for management of TSCI .One way include non operative management (conservative management) and the other includes operative management (surgical management).

Figure (5.12) The incidence of different types of management of TSCI

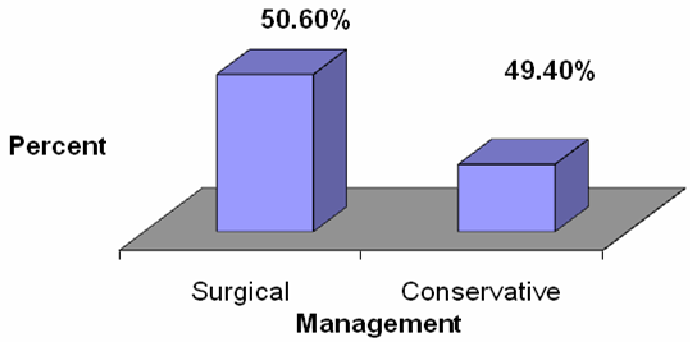


Figure (5.12) shows that 41 subjects (50.6%) of the study poplation treated by surgical management (as decompression and surgical fixation) and 40 (49.4%) treated by conservative management.

Figure (5.13) The incidence of subjects has admitted for hospitals out side Gaza Strip

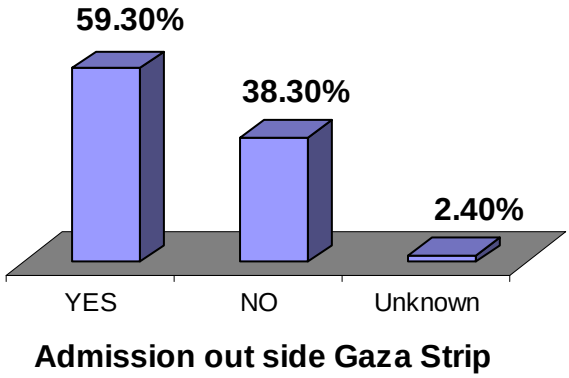


Figure (5.13) shows that 48 (60.8%) of the subjects admitted for hospitals out side Gaza Strip (Egypt, Jordan, Israel) for surgical or conservative management and 31 (39.2%) of the subjects admitted in Gaza hospitals.

Figure (5.14) The incidence different types of surgical management

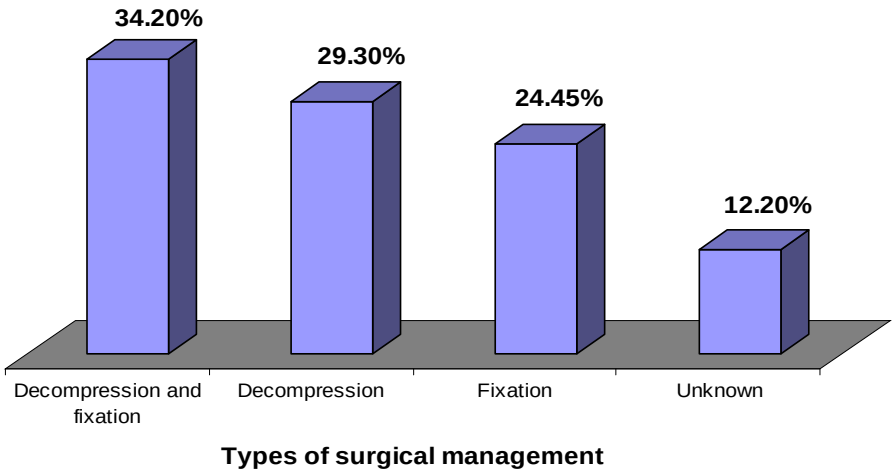


Figure (5.14) shows that 12 subjects have surgical decompression (mostly with laminectomy followed by corporectomy), 10 have subjects surgical fixation (mostly with Harington followed by transpedicular screws) and 14 cases have surgical decompression and surgical fixation together and unknown 5 cases.

Figure (5.15) The frequency of different facilities where the surgical management done

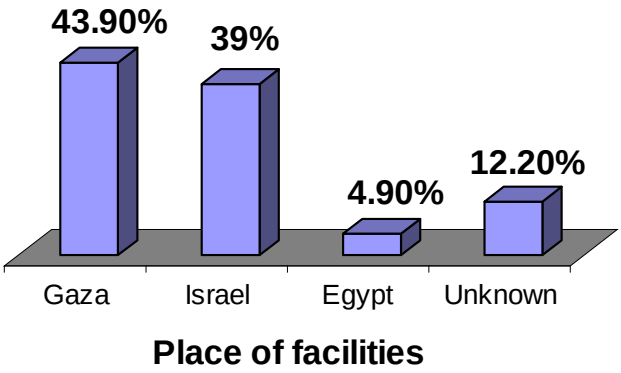


Figure (5.15) shows that the surgical management of SCI is done in different facilities .In 18 (43.9%) of subjects has surgical management is done in Gaza strip, 16 (39 %) subjects in Israel and 2 (4.9%) subjects in Egypt. This reflects the political situation in Gaza Strip that lives under the Israeli occupation that prevents the progress of health care services.

5.2.6 Inpatient Rehabilitation Stay

This section presents information related to the inpatient rehabilitation stay.

The length of stay (LOS) in inpatient rehabilitation is the number of days between admission to and discharge from an inpatient rehabilitation program. To determine the mean of period of inpatient rehabilitation LOS we include only 50 subjects who have completed rehabilitation. The median LOS for all TSCI subjects is 74 days, and the mean is 80.96 days.

Table (5.4) Mean LOS for subjects has surgical management versus non-surgical

Surgical management	N	Mean	Std. Deviation
Yes	24	72.88	43.37
No	26	88.42	44.87
Significance	P-value = 0.22 > 0.05		

Table (5.4) shows that the mean LOS for subjects has surgical management is 72.88 days and for subjects has non surgical management 88.42 days. There is no statistical difference between the mean of period of inpatient rehabilitation for who has surgical management versus non surgical management as evidence by T= -1.244, and P-value = 0.22 > 0.05.

Table (5.5) Mean LOS for paraplegic versus quadriplegic

Level of injury	N	Mean	Std. Deviation
Paraplegia	42	77.48	42.64
Quadriplegia	8	99.25	51.94
Significance	P-value = 0.207 > 0.05		

Table (5.5) shows that the mean LOS for paraplegia 77.48 days and 99.25 days for quadriplegia. There is no statistical difference between the mean of period of inpatient rehabilitation for level of injury (Paraplegia and Quadriplegia) as evidenced by T= -1.279 P-value=0. 207>0.05.

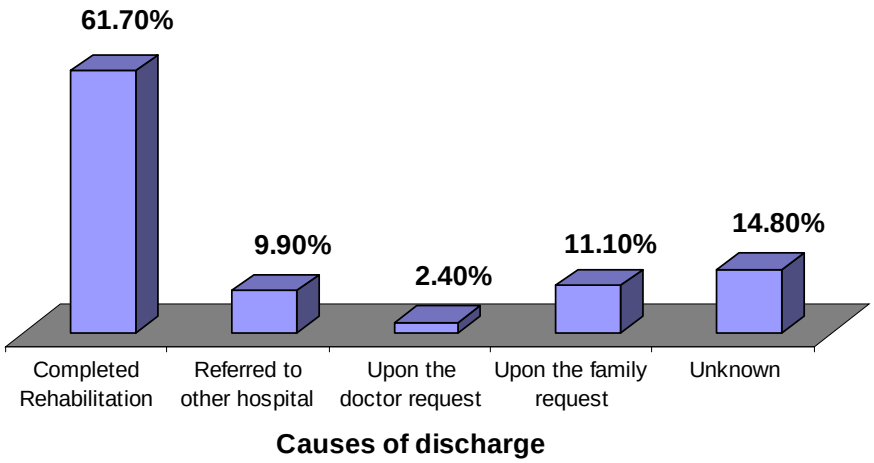
Table (5.6) Mean LOS for complete lesion clients versus incomplete

Type of lesion	N	Mean	Std. Deviation
Complete	27	81.63	30.94
Incomplete	23	80.17	57.08
Significance	P-value = 0.909 > 0.05		

Table (5.6) shows that the mean LOS complete lesion 81.63 days and 80.17 days for incomplete lesion .There is no statistical difference between the mean of period of inpatient rehabilitation for Type of lesion (Complete and Incomplete) T= -114and P-value=0.909>0.05.

5.2.7 Causes of discharge

Figure (5.16) The incidence of different cause of discharge



There are different causes for discharging during inpatient rehabilitation. Figure (5.16) shows that in 50 subjects discharge were due completed rehabilitation, 9 subjects upon the family request, 8 subjects referred to other hospital and 2 cases upon the doctor request.

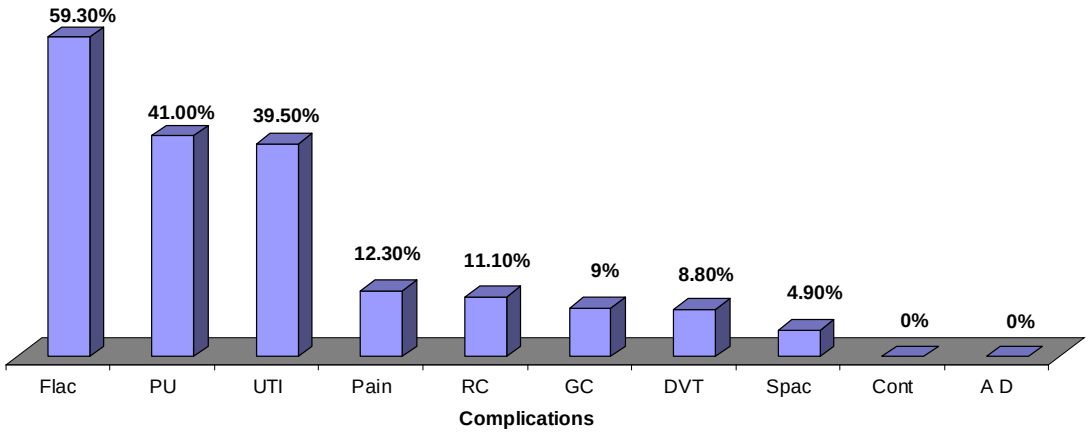
5.3 Complications

Complications have considerable impact on those with SCI. Complications may interfere with the start of active rehabilitation, can form a disappointing set-back during rehabilitation, and frequently lead to re-hospitalization. In order to optimize the individual rehabilitation process and outcome, it is important to predict and prevent complications or to recognize and treat them (Haisma et al 2007).

This section presents information about the incidence of complications at admission, during and at discharge from inpatient rehabilitation.

5.3.1Complications at admission

Figure (5.17) The incidence of complications at admission.



Figure(5.17) shows the most common complications detected at admission was flaccidity (Flac), which present in 59.3%, (79.1% of the flaccidity present in lower limbs, 14.6% all over the body, 2.1% in upper limbs and 4.2% in right lower limb), pressure ulcer (PU) present in 41%, urinary tract infection (UTI) which present in 39.5%, pain present in12.3% (4 cases naturopathic pain and 6 cases musculoskeletal pain), RC 11.1% (7 cases tracheotomy and 2 cases chest tube), GC 9% (5 cases constipation and 2 cases colostomy), DVT 8.8% (5 cases present in left lower limb, 1 case in right lower limb and 1 case in both lower limbs) and spacticity (Spas) were observed on admission in 4.9% of the patients. There were no any cases of contracture (Cont) or autonomic dysreflexia (AD) detected on admission.

Figure (5.18) The anatomical location and grade of PU at admission

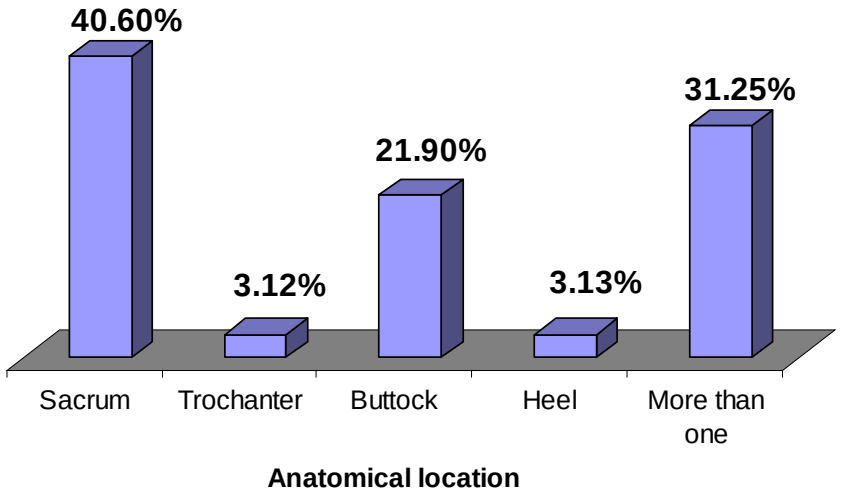


Figure (5.18) shows that the most common location of PU at admission was sacrum 40.6% and the most common grade of PU at admission was grade 2. There were 10 cases (37.6%) has more than one PU.

Figure (5.19) Bladder management program at admission

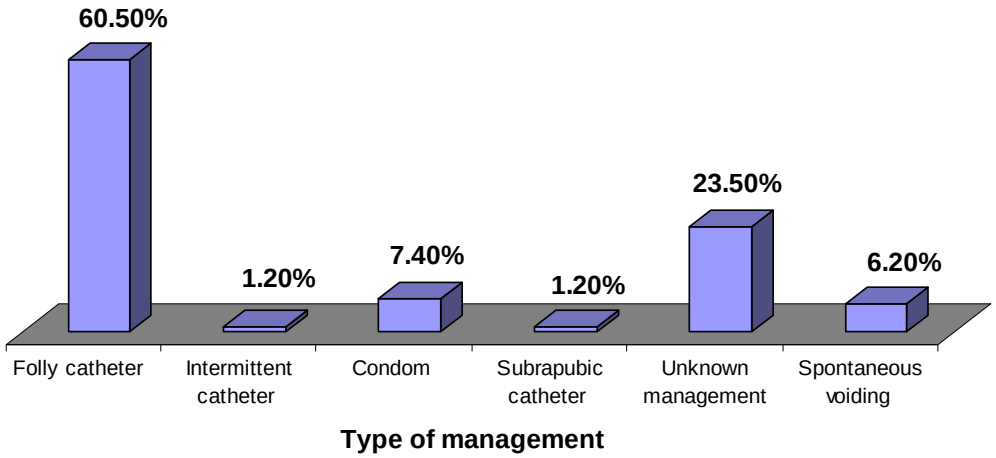


Figure (5.19) shows that the most common method for bladder management at admission was folly catheter 60.5% followed by condom 7.4%.

5.3.2 Occurrence of complications at admission with regard the type of lesion (complete versus incomplete)

5.3.2.1 Flaccidity

Table (5.7) Occurrence of flaccidity at admission with regard the type of lesion

Flaccidity	complete		incomplete	
	Freq.	%	Freq.	%
Yes	28	58.3%	20	41.7%
No	12	37.5%	21	62.5%
Significance	P-value =0.052		Chi square =2.003	

Table (5.7) shows that the incidence of flaccidity were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.052 and Chi square 2.003.

5.3.2.2 Pressure Ulcer(PU)

Table (5.8) Occurrence of PU at admission with regard the type of lesion

PU	complete		incomplete	
	Freq.	%	Freq.	%
Yes	22	68.8%	10	31.3%
No	18	34.8%	31	65.2%
Significance	P-value= 0.005		Chi square = 8.715	

Table (5.8) shows that the incidence of PU at admission was strongly influenced by the type of lesion (more frequent in complete lesion more than incomplete ones) as evidence by P-value= 0.005 and Chi square = 8.715.

5.3.2.3 Urinary Tract Infection (UTI)

Table (5.9) Occurrence of UTI at admission with regard the type of lesion

UTI	complete		incomplete	
	Freq.	%	Freq.	%
Yes	19	63.3%	11	36.7%
No	21	38.6%	30	61.4%
Significance	**P-value=0.054**		**Chi square =4.356**	

Table (5.28) shows that the incidence of UTI were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.054 and Chi square 4.356.

5.3.2.4 Pain

Table (5.10) Occurrence of pain at admission with regard the type of lesion

Pain	complete		incomplete	
	Freq.	**%**	**Freq.**	**%**
Yes	3	30%	7	70%
No	37	52.9%	34	47.1%
Significance	**P-value=0.19**		**Chi square =2.817**	

Table (5.10) shows that the incidence of pain were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.19 and Chi square 2.817.

5.3.2.5 Respiratory Complications (RC)

Table (5.11) Occurrence of RC at admission with regard the type of lesion

RC	complete		incomplete	
	Freq.	%	Freq.	%
Yes	6	66.7	3	33.3%
No	34	47.2%	38	52.2%
Significance	P-value= 0.229		Chi square =1.210	

Table (5.11) shows that the incidence of RC on admission were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.229 and Chi square 1.210.

5.3.2.6 Gastrointestinal Complications (GC)

Table (5.12) Occurrence of GC at admission with regard the type of lesion

GC	complete		incomplete	
	Freq.	%	Freq.	%
Yes	1	14.3%	6	85.7%
No	39	51..4%	35	48.6%
Significance	P-value = 0.052		Chi square =4.435	

Table (5.12) shows that the incidence of GC on admission were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.052 and Chi square 4.435.

5.3.2.7 Deep Venous Thrombosis (DVT)

Table (5.13) Occurrence of DVT at admission with regard the type of lesion

DVT	Complete		Incomplete	
	Freq.	%	Freq.	%
Yes	5	71.4%	2	28.6%
No	35	47.3%	39	52.7%
Significance	P-value =0.222		Chi square=2.459	

Table (5.13) shows that the incidence of DVT on admission were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.222 and Chi square 2.459.

Spacticty 5.3.2.8

Table (5.14) Occurrence of spacticty at admission with regard the type of lesion

Spacticty	complete		incomplete	
	Freq.	%	Freq.	%
Yes	1	25%	3	75%
No	39	50.6%	38	49.4%
Significance	P-value= 0.3177		Chi square =1.001	

Table (5.14) shows that the incidence of spacticty on admission were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.3177 and Chi square 1.001.

5.3.3 Occurrence of complications at admission with regard type of management(surgical versus non-surgical)

5.3.3.1 Flaccidity

Table (5.165) Occurrence of flaccidity at admission with regard Type of management

Flaccidity	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	20	41.7%	28	58.3%
No	21	63.6%	12	36.4%
Significance	P-value = 0.052		Chi square =2.006	

Table (5.15) shows that the incidence of flaccidity were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.052 and Chi square 2.006.

5.3.3.2 Pressure Ulcer (PU)

Table (5.16) Occurrence of PU at admission with regard the type of management

PU	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	12	37.5%	20	62.5%
No	29	59.2%	20	40.8%
Significance	P-value = 0.046		Chi square =4.579	

Table (5.16) shows that the incidence of PU was strongly influenced by the type of management (more frequent in conservative management than surgical management) as evidence by P-value 0.046 and Chi square 4.579.

5.3.3.3 Urinary Tract Infection (UTI)

Table (5.17) Occurrence of UTI at admission with regard the type of management

UTI	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	18	60%	12	40%
No	23	45.1%	28	54.9%
Significance	P-value=0..195		Chi square =1.768	

Table (5.17) shows that the incidence of UTI were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.195 and Chi square 1.768.

5.3.3.4 Pain

Table (5.18) Occurrence of pain at admission with regard the type of management

Pain	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	4	40%	6	60%
No	37	52.1%	34	47.9%
Significance	P-value=0.473		Chi square =1.290	

Table (5.18) shows that the incidence of pain were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.473 and Chi square 1.290.

5.3.3.5 Respiratory Complications (RC)

Table (5.19) Occurrence of RC at admission with regard the type of management

RC	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	5	55.6%	4	44.4%
No	36	50%	36	50%
Significance	P-value = 0.753		Chi square =0.075	

Table (5.19) shows that the incidence of RC on admission were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value = 0.753 and Chi square 0.075.

5.3.3.6 Gastrointestinal Complications (GC)

Table (5.20) Occurrence of GC at admission with regard the type of management

GC	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	5	71.4%	2	28.6%
No	36	48.6%	38	51.4%
Significance	P-value = 0.249		Chi square =2.187	

Table (5.20) shows that the incidence of GC on admission were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value = 0.249 and Chi square =2.187.

5.3.3.7 Deep Venous Thrombosis (DVT)

Table (5.21) Occurrence of DVT at admission with regard the type of management

DVT	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	5	71.4%	2	28.6%
No	36	48.6%	38	51.4%
Significance	P-value=0.249		Chi square =2.189	

Table (5.21) shows that the incidence of DVT on admission were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.249 and Chi square 2.189.

5.3.3.8 Spacticty

Table (5.22) Occurrence of spacticty at admission with regard the type of management

Spacticty	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	3	75%	1	25%
No	38	49.4%	39	50.6%
Significance	P-value = 0.317		Chi square =0.951	

Table (5.22) shows that the incidence of spacticty on admission were not significantly influenced by the type of management (surgical versus conservative) as evidence P-value 0.317 and Chi square 0.951.

5.3.4 The effect of time lapsed from injury to admission on the incidence of complications at admission

5.3.4.1 Pressure Ulcer (PU)

Table (5.23) Occurrence of PU at admission with regard the time lapsed from injury to admission

COMPLICATION	Time lapsed from injury to admission		Total
	≤ 29 days	> 29 days	
PU	13	19	32
	40.6%	59.4%	100.0%
P-value =0.288	Chi square =1.13	df= 1	

Table (5.23) shows that the incidence of PU at admission were not significantly influenced by the time lapsed from injury to admission as evidence by P-value =0.288 and Chi square =1.13.

5.3.4.2 Urinary Tract Infection (UTI)

Table (5.24) Occurrence of UTI at admission with regard the time lapsed from injury to admission

COMPLICATION	Time lapsed from injury to admission		Total
	≤ 29 days	> 29 days	
UTI	10	20	30
	33.3%	66.7%	100.0%
P-value =0.068	Chi square = 3.33	df=1	

Table (5.24) shows that the incidence of UTI at admission were not significantly influenced by the time lapsed from injury to admission as evidence by P-value =0.068 and Chi square =3.33.

5.3.4.3 Respiratory Complications (RC)

Table (5.25) Occurrence of RC at admission with regard the time lapsed from injury to admission

COMPLICATION	Time lapsed from injury to admission		Total
	≤ 29 days	> 29 days	
RC	3	6	9
	33.3%	66.7%	100.0%
P-value =0.317	Chi square = 1	df= 1	

Table (5.25) shows that the incidence of RC at admission were not significantly influenced by the time lapsed from injury to admission as evidence by P-value= 0.317 and Chi square =1.

5.3.4.4 Spacticity

Table (5.26) Occurrence of spacticity at admission with regard the time lapsed from injury to admission

COMPLICATION	Time lapsed from injury to admission		Total
	≤ 29 days	> month	
Spacticity	2	2	4
	50%	50%	100.0%
P-value =1	Chi square =0.00	df= 1	

Table (5.26) shows that the incidence of spacticity at admission were no significantly influenced by the time lapsed from injury to admission as evidence by P-value= 1 and Chi square = 0.00.

5.3.4.5 Flaccidity

Table (5.27) Occurrence of flaccidity at admission with regard the time lapsed from injury to admission

COMPLICATION	Time lapsed from injury to admission		Total
	≤ 29 days	> 29 days	
Flaccidity	30	18	44
	30.5%	69.5%	100.0%
P-value =0.083	Chi square =3	df=1	

Table (5.27) shows that the incidence of flaccidity at admission were not significantly influenced by the time lapsed from injury to admission as evidence by P-value= 0.083 and Chi square = 3**.**

5.3.4.6 Pain

Table (5.28) Occurrence of pain at admission with regard the time lapsed from injury to admission

COMPLICATION	Time lapsed from injury to admission		Total
	≤29 days	> 29 days	
Pain	4	6	10
	40%	60%	100.0%
P-value =0.527	Chi square =0.4	df=1	

Table (5.28) shows that the incidence of pain at admission were not significantly influenced by the time lapsed from injury to admission as evidence by P-value=0.527 and Chi square =0.4.

5.3.4.7 Deep Venous Thrombosis (DVT)

Table (5.29) Occurrence of DVT at admission with regard the time lapsed from injury to admission

COMPLICATION	Time lapsed from injury to admission		Total
	≤29 days	> 29 days	
DVT	3	4	7
	42.9%	57.1%	100.0%
P-value = 0.705	Chi square =0.143		df= 1

Table (5.29) shows that the incidence of DVT at admission were not significantly influenced by the time lapsed from injury to admission as evidence by P-value= 0.705 and Chi square = 0.143.

5.3.4.8 Gastrointestinal Complications (GC)

Table (5.30) Occurrence of GC at admission with regard the time lapsed from injury to admission

COMPLICATION	Time lapsed from injury to admission		Total
	≤ 29 days	> 29 days	
GC	5	2	7
	71.4%	28.6%	100.0%
P-value =0.257	Chi square =1.286		df= 1

Table (5.30) shows that the incidence of GC at admission were not significantly influenced by the time lapsed from injury to admission as evidence by P-value=0.257 and Chi square =1.286.

5.3.5 Complications during inpatient

Figure (5.20)The incidence of complications during inpatient

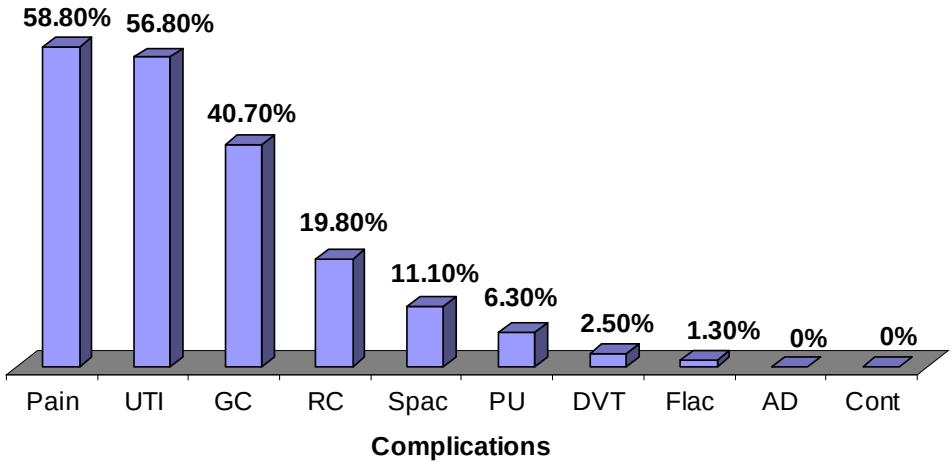


Figure (5.20) shows that the most common complications detected during inpatient was pain which present in 58.8% (2 cases neuropathic pain and 45 cases musclosketal pain) of the study population followed by UTI 56.8%, GC 40.7%, RC 19.8% (11 cases pneumonia, 2 cases dysapnea, 2 cases cough and 1 case massive pulmonary embolism), Spacticty (Spac) 11.1% (7 cases lower limbs, 1 case left lower limb and 1 case right lower limb), PU 6.3%, DVT 2.5% and flaccidity (Flac)1.3%. There were no any cases of contracture (Cont) or autonomic dysreflexia (AD) detected during inpatient

Figure (5.21) Bladder management program during inpatient rehabilitation

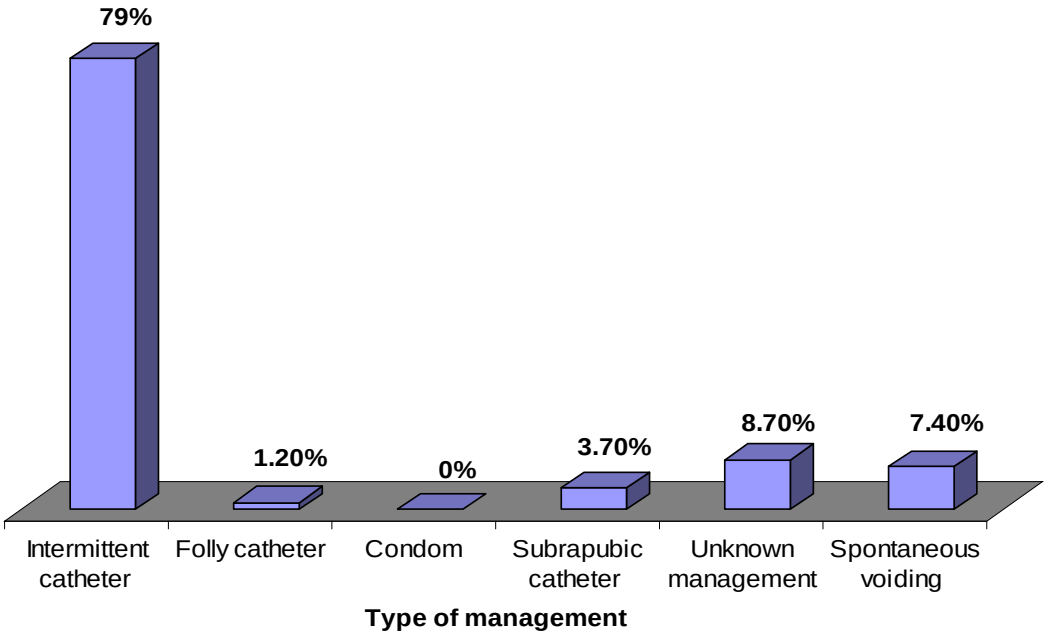


Figure (5.21) shows that the most common method for bladder management during inpatient was intermittent catheter 79%, 3 cases of subrapubic catheter and only 1 case of folly catheter.

5.3.6 Occurrence of complications during inpatient with regard the type of lesion (complete versus incomplete)

5.3.6.1 Pain

Table (5.31) Occurrence of pain during inpatient with regard the type of lesion

Pain	complete		incomplete	
	Freq.	%	Freq.	%
Yes	24	51.1%	23	48.9%
No	16	47.1%	18	52.9%
Significance	P-value = 0.722		Chi square =1.097	

Table (5.31) shows that the incidence of pain during inpatient were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.722 and Chi square 1.097.

5.3.6.2 Urinary Tract Infection(UTI)

Table (5.32) Occurrence of UTI during inpatient with regard the type of lesion

UTI	complete		incomplete	
	Freq.	%	Freq.	%
Yes	27	58.7%	19	41.3%
No	13	37.1%	22	62.9%
Significance	P-value = 0.055		Chi square =3.834	

Table (5.32) shows that the incidence of UTI during inpatient were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.055 and Chi square 3.834.

5.3.6.3 Gastrointestinal Complications (GC)

Table (5.33) Occurrence of GC during inpatient with regard the type of lesion

GC	complete		incomplete	
	Freq.	%	Freq.	%
Yes	20	60.6%	13	39.4%
No	20	41.7%	28	58.3%
Significance	P-value = 0.094		Chi square =3.516	

Table (5.33) shows that the incidence of GC during inpatient were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.094 and Chi square 3.516.

5.3.6.4 Respiratory Complications (RC)

Table (5.34) Occurrence of RC during inpatient with regard the type of lesion

RC	complete		incomplete	
	Freq.	%	Freq.	%
Yes	7	43.8%	9	56.3%
No	33	50.8%	32	49.2%
Significance	P-value = 0.226		Chi square =0.25	

Table (5.34) shows that the incidence of RC during inpatient were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.226 and Chi square 0.25.

5.3.6.5 Spacticty

Table (5.35) Occurrence of spacticty during inpatient with regard the type of lesion

Spacticty	complete		incomplete	
	Freq.	%	Freq.	%
Yes	4	44.4%	5	55.6%
No	36	50%	36	50%
Significance	P-value = 0.753		Chi square =0.099	

Table (5.35) shows that the incidence of spacticty during inpatient were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.753 and Chi square 0.099.

5.3.6.6 Pressure Ulcer (PU)

Table (5.36) Occurrence of PU during inpatient with regard the type of lesion

PU	complete		Incomplete	
	Freq.	%	Freq.	%
Yes	4	80%	1	20%
No	36	47.4%	40	52.6%
Significance	P-value = 0.157		Chi square =2.004	

Table (5.36) shows that the incidence of PU during inpatient were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.157 and Chi square 2.004.

5.3.6.7 Deep Venous Thrombosis (DVT)

Table (5.37) Occurrence of DVT during inpatient with regard the type of lesion

DVT	complete		incomplete	
	Freq.	%	Freq.	%
Yes	1	50%	1	50%
No	39	49.4%	40	50.6%
Significance	P-value = 0.986		Chi square =0.964	

Table (5.37) shows that the incidence of DVT were not significantly influenced by the type of lesion (complete versus incomplete) as evidence by P-value 0.618 and Chi square 0.986.

5.3.6.8 Flaccidity

Table (5.38) Occurrence of flaccidity during inpatient with regard the type of lesion

Flaccidity	complete		incomplete	
	Freq.	%	Freq.	%
Yes	1	100%	0	0%
No	39	48.8%	41	51.2%
Unknown	0		0	0%

Table (5.38) shows that the incidence of flaccidity were not significantly influenced by the type of lesion (complete versus incomplete) as evidence P-value 0.308 and Chi square 2.001.

5.3.7 Occurrence of complications during inpatient with regard the type of management (surgical versus non-surgical)

5.3.7.1 Pain

Table (5.39) Occurrence of pain during inpatient with regard the type of management

Pain	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	28	59.6%	19	40.4%
No	13	38.2%	21	61.8%
Significance	P-value =0.047		Chi square =3.42	

Table (5.39) shows that the incidence of pain during inpatient was significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.047 and Chi square 3.421.

5.3.7.2 Urinary Tract Infection (UTI)

Table (5.40) Occurrence of UTI during inpatient with regard the type of management

UTI	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	18	40.0%	28	60%
No	23	65.7%	12	34.3%
Significance	P-value =0.018		Chi square =5.42	

Table (5.40) shows that the incidence of UTI during inpatient was not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.018 and Chi square 5.42.

5.3.7.3 Gastrointestinal complication(GC)

Table (5.41) Occurrence of GC during inpatient with regard the type of management

GC	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	13	39.4%	20	60.6%
No	28	58.3%	20	41.7%
Significance	P-value =0.094		Chi square =3.801	

Table (5.41) shows that the incidence of GC during inpatient were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.094 and Chi square 3.801.

5.3.7.4 Respiratory complication (RC)

Table (5.42) Occurrence of RC during inpatient with regard the type of management

RC	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	8	50%	8	50%
No	33	50.8%	32	49.2%
Significance	P-value =0.956		Chi square =0.032	

Table (5.42) shows that the incidence of RC during inpatient were not significantly influenced by the type of management (surgical versus conservative) as evidence by Chi square 0.032 and P-value 0.956.

5.3.7.5 Spacticity:

Table (5.43) Occurrence of spacticty during inpatient with regard the type of management

Spacticty	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	4	44.4%	5	55.6%
No	37	51.4%	35	48.6%
Significance	P-value =0.694		Chi square =0.188	

Table (5.43) shows that the incidence of spacticty during inpatient were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.694 and Chi square 0.188.

5.3.7.6 Pressure ulcer (PU)

Table (5.44) Occurrence of PU during inpatient with regard the type of management

PU	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	2	40.0%	3	60%
No	39	51.3%	37	48.7%
Significance	P-value =0.624		Chi square =0.272	

Table (5.44) shows that the incidence of PU during inpatient and were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.624 and Chi square 0.272.

5.3.7.7 Deep venous thrombosis (DVT)

Table (5.45) Occurrence of DVT during inpatient with regard the type of management

DVT	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	2	100%	0	0.0%
No	39	49.4%	40	50.6 %
Significance	P-value =0.157		Chi square =2.943	

Table (5.45) shows that the incidence of DVT were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.157 and Chi square 2.943.

5.3.7.8 Flaccidity

Table (5.46) Occurrence of flaccidity during inpatient with regard the type of management

Flaccidity	surgical		Non-surgical	
	Freq.	%	Freq.	%
Yes	1	100%	0	0%
No	40	50%	40	50%
Significance	P-value =0.320		Chi square =2.003	

Table (5.46) shows that the incidence of flaccidity were not significantly influenced by the type of management (surgical versus conservative) as evidence by P-value 0.320 and Chi square 2.003.

5.3.8 The Incidence of Complications at Discharge

Figure (5.22) The incidence of complications at discharge

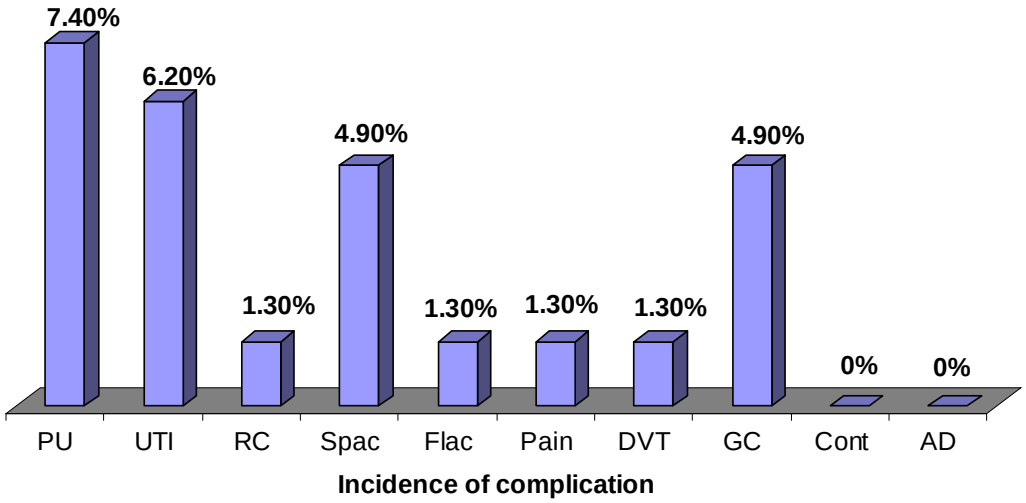


Figure (5.22) shows that the most common complications detected at discharge was PU 7.4% (6 cases) followed by UTI 6.2% (5 cases), spacticty (Spac) 4.9% (4 cases), GC 4.9% (4cases), RC 1.3% (1cases), flaccidity (Flac) 1.3% (1cases), pain 1.3% (1 cases) and DVT 1.3% (1cases). There were no any cases of contracture (Cont) or AD detected at discharge from inpatient rehabilitation.

Chapter Six

Discussion, Conclusion

&

Recommendations

Chapter Six: Discussion, Conclusion, and Recommendations

This chapter explains the different findings of the study and clarifies the relations and results in a clear manner. It aims at giving clear picture of the characteristics of the study population, medical information and the incidence of complications during inpatient rehabilitation.

6.1 Demographic Characteristic of the Study Population

6.1.1 Age

Table (6.1) The most affected age group of TSCI population and the mean of population age among different series

Series	The most affected age group	Mean of population age
Otom et al., (1997) (Jordan)	21-30 years (35.8%)	33 year
Singh et al., (2003) (Indian)	20-29 years (42.03%)	35.4year
Karacan et al., (2000) (Turkey)	20-29 years (30.9%)	35 years
Rathore et al., (2008) (Pakistan)	20-30 years	28.3 years
Schonherr et al., (1996) (Netherlands)	21-30 years (40%)	*
Oconnor & Murray, (2005) (Ireland)	20-29 years	*
Present study	15-20 years (43.2%)	26.4years

The result of the study shows that TSCI is present in all age groups. Table (6.1) shows that the most affected population in this study ages between 15-20 years comprising 43.2% of the study population, which is not consistent with other studies around the world because the most affected population ages between 20-30 years. This difference because the population in Gaza Strip is very young and the age group between 15-20 years the most prone group for Israeli assault .In this study there are 17 (20%) cases has gun shot due to Israeli assault, ages between 15-20 years.

6.1.2 Gender

Males with TSCI 72 cases (88.9%) of the population and females with TSCI 9cases (11.1%) of the population.

Table (6.2) Male/Female ratio among different series

Series	Male/Female
Otom et al., (1997) (Jordan)	**5.8/1**
Pandey et al., (2007) (Indian)	**5.7/1**
Quinones et al., (2002) (Qatar)	**5/1**
Al Jadid et al., (2004) (Arabia Saudi)	**5/1**
Deconinck., (2003) (Afghanistan)	**9:1**
Rathore et al., (2008) (Pakistan)	**6.7/1**
Present study	**8/1**

Table (6.2) shows that the male / female ratio 8/1 which is consider from the highest ratios around the world but is expected in Gaza strip because men are more prone for Israeli assault as there are only 3 female cases has TSCI due to Israeli assault but there are 32 male cases. This was pointed out by Kuhn, et al (1983) when he concluded that sex ratio reflects the socioeconomic and cultural status of the society.

6.2 Medical Information

6.2.1 Date of Injury

Seasonal variation is observed and frequency of TSCI showed an increase in summer. This result is consistent with previous findings that frequency of TSCI showed an increase in summer. First study was conducted by Karacan et al., (2000) about Traumatic Spinal Cord Injuries in Turkey: a Nation-Wide Epidemiological Study, and second study was conducted by Singh et al., (2003) about Traumatic Spinal Cord Injuries in Haryana :an Epidemiological Study. These studies showed an increased of TSCI cases in summer. Signifying increased movement of people in this season and in winter people remained confined to their homes (Karacan et al., 2000).

6.2.2 Causes of Traumatic Spinal Cord Injury

Table (6.3) Mode of injury-a comparison of different series

Series	RTA	FD	GUN SHOT
Otom et al., (1997) (Jordan)	44.4%	21.3%	25.8%
Pandey et al., (2007) (Indian)	43.33%	48.33%	1.6%
Al Jadid et al., (2004) (Arabia Saudi)	80%	9.4%	6.4%
Karacan et al., (2000) (Turkey)	48.8%	36.5%	1.9%
Rathore et al., (2008) (Pakistan)	25.2%	57.85:%	8.4%
Present study	1.23%	28.4%	65.4%

Regarding the causes of TSCI table (6.3) shows that gun shot in this study comprised the highest percentage and this does not consistent with other studies around the world. In most studies the most common cause is Road Traffic Accident (RTA) followed by Falling Down (FD). Mode of injury in SCI is dependent on local factors (Singh et al., 2003).This fact is true in Gaza Strip because Palestinian people at high risk for gun shot injury due to Israeli assault

In the other hand, table (6.3) shows that RTA compromised the lowest percentage. This dose not consistent with other studies around the world in which RTA are the most common cause. Socio-economic, cultural and political may play role in

decrease the incidence of RTA. The usage of motor vehicle is not common as it is in other area of the world. Political situation no high ways and divided Gaza strip into three separated area by Israel may decrease the incidence of RTA.

Regarding to the Israeli assaults there were 35 cases of the population (43.2%) has TSCI, most of these injuries are gunshot (34 cases). These result reflect the political situation in Gaza Strip in which Palestinians' people live under the Israeli occupation which allow them to be continuously exposed to Israeli assaults (gunshot injury and explosive injury). This result is consistent with MPDL, (2002) which made screening and registration of disabled in the northern and middle Governates of Gaza Strip, found that Israeli military operations during the two Intifadas have had an impact on the level of the disability in the West Bank and Gaza. Twenty percent (20.00%) of all the cases of SCI (traumatic and non-traumatic) was due to either the first or second Intifada. This result is also consistent with previous study conducted by Naser, (2004) about description of the current sexual rehabilitation services and Information Provided to paraplegic males of the Gaza Strip aged between 16 and 45 years, in which stated that one major reason for increasing incidence of spinal cord injuries was the first Intifada against the Israeli occupation.

6.2.3 Israeli Assaults and the Site of Injury

Table (6.4) Israeli gun shot related to site of injury

Site of injury	cervical		Thoracic		Lumbar	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Israeli gun shot	4	11.8%	24	70.6%	6	17.6%

Table (6.4) shows that 82.4 % of Israeli gun shot directed to the upper part of the body which include 70.1% thoracic and 11.8% cervical. This result support the fact that Israeli soldiers try to kill as much as possible of Palestinian people or to cause sever disability for them. This fact is demonstrated by Palestinian Central Bureau of Statistics (2001), when concluded that the majority of Al- Aqsa Intifada injuries are concentrated on the upper parts of the body especially the head.

6.2.4 Associated Injuries

The incidence of associated injuries is 61.7% of the study population. The most frequent injury is intrathoracic injuries 25.9%, intraabdominal injuries 16%, more than injuries 12.4%, fracture 4.9% and closed head injuries 2.5%. The incidence of associated injuries and the incidence of the most frequent injuries which consider from the highest rates is not consistent with the most other studies.

The difference of the incidence of the associated injuries and the incidence of the most prevelant associated injuries (intrthoracic and interabdominal injuries) due to the difference in the most common causes of TSCI among different series as present in table (6.3). The presence of 12.4% of the population has more than one associated injuries in the same time reflect the fact that gun shot in the upper part of the body cause more than one associated injury.

6.2.5 Rehabilitation Length of Stay (LOS)

The documentation of rehabilitation LOS as an outcome measure has escalated in recent decades. This has enable research and clinicians to evaluate and compare the efficiency and effectiveness of rehabilitation intervention against national and international benchmarks, but some caution is needed when directly comparing LOS between different countries because LOS can be driven by other factors such as health systems management and financial considerations (Tooth et al., 2003).

In the recent study the median rehabilitation LOS 74 days and the mean 80.96 days which does not consistent with other studies. As the mean rehabilitation LOS 36 days in USA (Spinal Cord Injury Information network, 2008) and in Canada the median LOS for all TSCI 54 days (Canadian Institute for Health Information, 2006). This difference in LOS which appear to be longer from previous studies may be that many of the patients with SCI being discharged into nursing care facilities instead of home and my be in USA and Canda offer better quality of car in comparison to Gaza which make short hospitalization.

6.2.6 Rehabilitation Length of Stay (LOS) and Type of Lesion.

The level of lesion (paraplegia and quadriplegia) and type of lesion (complete and incomplete) were not significantly associated with LOS (P> 0.05), it was generally not consistent with results reported from other studies.

In retrospective study conducted by Tooth et al., (2003) about Rehabilitation Outcomes in Traumatic Spinal Cord Injury in Australia: Functional Status, Length of Stay and Discharge Setting, demonstrate that rehabilitation LOS was significantly longer for patients with complete tetraplegia compared to incomplete tetraplegia or incomplete/complete paraplegia.

The absence of significant relationship between LOS and type of lesion may be for the high incidence of associated injuries (comorbidity) 61.7% of the population which may some effect on LOS. The length of clinical rehabilitation which seemed to be dependent on the lesion characteristics and related comorbidity (Groot et al., 2006).

6.3 Complications

SCI is often followed by complications, which add to the detrimental effect that loss of motor, sensory and autonomic function have on a person's health, social participation and quality of life. Complications may interfere with the start of active rehabilitation, can form a disappointing set-back during rehabilitation, and frequently lead to re-hospitalization (Hisma et al., 2007).

6.3.1 Complications at Admission

6.3.1.1 Flaccidity

The result of the study shows the most common complications detected at admission was flaccidity, which present in 59.3%. There are no recent previous studies about the incidence of flaccidity, so it is difficult to discuss this result. The high incidence of flaccidity at admission may be due to misdiagnosis by rehabilitation team. So that further studies needed to follow this complications.

6.3.1.2 Pressure Ulcer (PU)

Pressure ulcers are one of the most common and potentially serious complications of (SCI). If they develop, they may interfere with the initial rehabilitation and reintegration into the community, as well as being a source of morbidity and mortality (Delisa., 2004). The incidence of PU at admission was 41% of the study population. The incidence of PU is consistent with the result from developing countries like Pakistan. On the other handthe incidence PU at admission inconsistent with the result from developed countries like Italia. This difference may be to the factors such as health systems management and financial considerations.

6.3.1.3Urinary Tract Infection (UTI)

Bacteriuria (UTI) is almost universal in patients with SCIs. This infection may be asymptomatic colonization, but tissue invasion of urinary tract occurs in most patients initially during hospitalization and rehabilitation and may be a recurrent problem for most of these patients through the lives (Montgomire, 1997).

In our study the incidence of UTI at admission 39.5% which does not consistent with previous studies. This difference may be due to the type of

management that patients received during the acute stage and before admission to the rehabilitation hospital.

In a multicenter longitudinal study in Netherlands about Complications Following Spinal cord Injury: Occurrence and Risk Factors in a Longitudinal study During and After Inpatient Rehabilitation, Haisam et al., (2007) assessed 212 participants admitted to specialized rehabilitation centers. The researchers conducted that the incidence of UTI at admission 49% of the total participants.

In a retrospective study in Kuwait about Spinal Cord Injury Patients in the Physical Medicine and Rehabilitation Hospital, Kuwait – A Nine-Year Retrospective Study, Raibuet et al., (2001) conducted that the incidence of UTI at admission 59.57% of the total subjects (traumatic and non-traumatic).

6.3.1.4 Pain

Pain is described by SCI patients as the worst problem, far more disabling than the loss of motor and sensory function(Norrbrink et al., 2003).

Sawatzky et al., (2008) in review article about Classification and measurement of pain in the spinal cord-injured population, concluded that data concerning the prevalence, causes, characteristics and treatment of chronic pain in the SCI literature are accumulating but are not yet definitive. Prevalence rates for SCI-related pain range between 48 and 94% of the SCI population, depending on population characteristics (for example, acute, chronic) and measurement factors (for example, pain intensity, and interference). Also Norrbrink et al., (2003) support the previous fact in a study about Gender related differences in pain in spinal cord injured individuals, concluded that reports of pain prevalence differ between 34 and 94%, but it is most often described as present in around 60 – 65% of the SCI populations. This variability depend on the population assessed, the type of survey but also on the definition of pain. Several studies have described pain prevalence, risk factors, pain and medical variables and psychosocial scores in SCI populations, but since results vary from study to study there is no consensus. In our study the incidence of pain at admission is 12.3% of the study population. The lack of consistency with the previous studies may be due to the definition of pain, the type of survey and on the population assessed.

6.3.1.5 Respiratory Complications (RC)

Respiratory complications continue to be one of the leading causes of morbidity and mortality in people with spinal cord injury, especially among cervical and higher thoracic injuries. This continues to be the case despite recent advances in SCI patient care where acute and long-term mortality rates have been significantly reduced (Regan et al., 2006).

Aito et al., (2003) in prospective 2 years study about Complications During the Acute Phase of Traumatic Spinal Cord Lesions, assessed six of most common complications on admission to rehabilitation hospitals and during inpatient rehabilitation. The incidence of respiratory complications on admission was 10.5% and this is consistent with our study which showed that the incidence of respiratory complications on admission 11.1%.

6.3.1.6 Gastrointestinal (GI)

In a retrospective study in Kuwait about Spinal Cord Injury Patients in the Physical Medicine and Rehabilitation Hospital, Kuwait – A Nine-Year Retrospective Study, Raibuet et al., (2001) conducted that the incidence of GI complications at admission 18.3% of the total subjects (traumatic and non-traumatic).

The low incidence (9%) of GI complications on admission in our study probably reflects the effective of medical management in the acute stage before and after admission to the rehabilitation hospital.

6.3.1.7 Deep Venous Thrombosis (DVT)

Patients with an SCI are traditionally felt to be at a high risk for developing DVT. The dangerous of DVT is in the possibility of pulmonary embolism, which may prove fatal, and chronic venous insufficiency in the long term (Rathore et al.,2008).

In a retrospective study in Kuwait about Spinal Cord Injury Patients in the Physical Medicine and Rehabilitation Hospital, Kuwait – A Nine-Year Retrospective Study, Raibuet, T. et al conducted that the incidence of DVT at admission 4.25% of the total subjects (traumatic and non-traumatic).

In prospective study in Pakistan about the Prevalence of Deep Vein Thrombosis in a Cohort of Patients with Spinal Cord Injury Following the Pakistan Earthquake of October 2005, Rathore et al., (2008) conducted that the incidence of DVT at admission 4.8% of the total subjects.

In the above two studies the incidence of DVT on admission occur in low relative frequency might be due to great awareness of their potential to develop, as well as improved methods of prophylaxis (Chen et al., 1999).

In our study the incidence of DVT on admission are 8.8%, which does not consistent with the above two studies. The high incidence of DVT on admission may be for two reasons. First, on admission only of 41 cases (50.6%) of study population had history of prophylactic medication for DVT. Secondly, 60.8% of the population had admitted for hospitals out Gaza Strip (Israel, Egypt, Jordan) after injury and before admission to the rehabilitation hospital, which offer different quality of care.

2.3.1.8 Spasticity

In a study about a database of self-reported secondary medical problems among veterans affairs spinal cord injury patients: its role in clinical care and management, Walter, et al (2002) collect the data from 99 SCI patients. It has been estimated that 53% of SCI report spasticity secondary to SCI. In our study the incidence of spasticity on admission was (4.9%). There is clearly inconsistency with the previous study. The inconsistency may be primarily due to the methodological differences because we collected data through retrospective review of patients' files on admission to the rehabilitation hospital. Also it could be due to the effectiveness of spasticity management in the acute stage.

2.3.1.9 Contracture

Cardenas et al., (1998) examine the occurrence of contractures in acute SCI and clarify possible contributing factors. The records of 482 patients admitted between 1990 and 1995 with acute SCI to a model SCI system were reviewed. The result of the study revealed that 44 (9%) patients (33 male, 11 female) developed contractures during their initial hospitalization. There were 30 tetraplegic and 14 paraplegic patients. Thirty-four patients had complete and 10 patients had incomplete lesions. The

percentage of occurrence of contractures among patients admitted to the model system on the day of injury was 7.6% and among those admitted between 2 and 60 days of the injury was 15% (P = 0.05). Patients with a pressure ulcer (14.1%) were significantly more likely to have a contracture than patients without a pressure ulcer (7.1%) (P = 0.05). Contractures were also more common in patients with spasticity requiring medication; 12.7% of patients with spasticity compared to 7.8% without spasticity, had contractures (P < 0.05).

Our study showed that, the incidence of contracture on admission and during inpatient rehabilitation is 0%. The absence of any cases of contracture reflects the effective management of spasticity, as the incidence of spasticity on admission 4.9% and during inpatient 11.1%. Spasticity can accelerate formation of contractures if it is not well controlled. Preventing contracture is one of the main aims of effective spasticity management (Aspen Reference Group, 2006).

6.3.1.10 Autonomic Dysreflexia (AD)

In a study about Assessment of autonomic dysreflexia in patients with spinal cord injury, Curt, et al (1997) assessed the incidence of AD among SCI patients. He reported that none of the paraplegic patients, but 59% (13/22) of tetraplegic patients (91% of the complete, 27% of the incomplete patients) presented signs of autonomic dysreflexia during urodynamic examination. This indicates AD is three times more prevalent in tetraplegics with a complete injury, in comparison to those with an incomplete injury.

In a retrospective study in Kuwait about Spinal Cord Injury Patients in the Physical Medicine and Rehabilitation Hospital, Kuwait – A Nine-Year Retrospective Study, Raibuet et al., (2001) conducted that the incidence of AD at admission 4.25% of the total subjects (traumatic and non-traumatic).

In the recent study the incidence AD on admission and during inpatient were 0%. The absence of consistency may be due that there are only 17 cases (21%) of the study population tetraplegics, and only 5 cases (29.4%)of them with complete injury. AD rarely occur among paraplegics and frequently occur tetraplegics especially with complete tetraplegia.

6.3.2 Complications during Inpatient Rehabilitation

The newly developed complications that occur during inpatient rehabilitation were assessed. In general there are significant decline in the incidence of complications, which reflect the effective of rehabilitation process during inpatient rehabilitation. The only complications with different results will discussed.

6.3.2.1 Urinary Tract Infection (UTI) & Respiratory Complications (RC)

In Italia, Aito et al., (2003) in prospective 2 years study about Complications During the Acute Phase of Traumatic Spinal Cord Lesions, assessed six of most common complications on admission to rehabilitation hospitals and during inpatient rehabilitation. The incidence of urinary tract infection (UTI) and respiratory complication (RC) during inpatient were 8.8% and 9.5% respectively.

In our study the incidence of urinary tract infection (UTI) and respiratory complication (RC) during inpatient were 58.8% and 19.8% respectively. There is clearly inconsistency with the previous study. The inconsistency may be primarily due to the methodological differences because we collected data through retrospective review of patients' files on admission to the rehabilitation hospital. Also,

may be the reason is in Italia offer better effective management care for UTI and RC in comparison to Gaza.

6.3.2.2 Pain

Sawatzky et al., (2008) in review article about Classification and measurement of pain in the spinal cord-injured population, concluded that data concerning the prevalence, causes, characteristics and treatment of chronic pain in the SCI literature are accumulating but are not yet definitive. Prevalence rates for SCI-related pain range between 48% and 94% of the SCI population, depending on population characteristics (for example, acute, chronic) and measurement factors (for example, pain intensity, and interference). In our study the incidence of pain during inpatient was 58.8%. This result is consistent with the previous study.

6.3.2.4 Pressure Ulcer (PU)

In a retrospective study in Kuwait about Spinal Cord Injury Patients in the Physical Medicine and Rehabilitation Hospital, Kuwait – A Nine-Year Retrospective Study, Raibuet, et al (2001) conducted that none of the patients had newly developed pressure ulcer during inpatient rehabilitation.

In prospective a study about Traumatic Spinal Injuries at a Tertiary Care Rehabilitation Institute in Pakistan, Rathore et al., (2008) assessed 83 TSCI patients. He demonstrated that 2.4% of TSCI patients developed PU during inpatient rehabilitation.

In our study the incidence of PU during inpatient is 6.3% of the study population. The inconsistency with the previous studies may be due to effective rehabilitation care for PU in comparison to Gaza.

6.4 Comparison of the Incidence of complications on admission, during inpatient and on discharge.

In general the result of the study shows that there were sharply decrease of the incidence of the complications at discharge in comparison with the incidence of complications on admission and during inpatient (except PU). This reflects the importance and effective of TSCI rehabilitation to minimize TSCI patients suffering from secondary complications and to accelerate community reintegration as early as possible.

The incidence of PU at discharge 9.9% (8 cases) which is consider abnormal high, in normal situation all the patients must discharged without any PU. The high incidence of PU at discharge because there are five cases discharged with incomplete inpatient rehabilitation and the remaining three cases discharged with clean PU (with granulation tissue).

6.5 The effect of time lapsed from injury to admission on the incidence of complications at admission

Patients need to be transferred to specialist units for spinal cord injury at the earliest opportunity so that they can achieve the greatest degree of functional independence possible, it appears that delay causes more medical complications and prolonging rehabilitation (Inman, 1999).

Early rehabilitation in an organized multidisciplinary SCI care system has been shown to be beneficial, with lower mortality, decreased pressure sores, slightly greater chance of neurologic recovery, and shorter lengths of stay with lower hospital charges (Lim & Tow, 2007).

In prospective 2 years study about Complications During the Acute Phase of Traumatic Spinal Cord Lesions, Aito et al., (2003) assessed six of most common complications on admission to rehabilitation hospitals and during inpatient rehabilitation. The study shows that the incidence of pressure sores, heterotopic ossifications and urinary complications at admission were significantly influenced by the time lapsed from injury to admission. The longer the delay from injury to admission, the greater the incidence of the complications is. The incidence of other complications at admission (DVT, respiratory complications and pulmonary embolism) admission were not significantly influenced by the time lapsed from injury to admission.

Our study shows that the incidence of all complications at admission were not significantly influenced by the time lapsed from injury to admission. The absence of any statistically significant relationship may be for methodological differences as it is better to assess this relationship through prospective method and may be for the presence of confounding variables (age, gender, lesion characteristic, type of management and associated injuries).

6.6 Occurrence of complications at admission and during inpatient with regard the type of lesion (complete versus incomplete)

In prospective 2 years study about Complications During the Acute Phase of Traumatic Spinal Cord Lesions, Aito et al., (2003) assessed six of most common complications on admission to rehabilitation hospitals and during inpatient rehabilitation. The study shows that the incidence of pressure sores, heterotopic ossifications, and respiratory complications at admission were significantly influenced by the type of lesion (more frequent in complete lesions than in incomplete one). Also shows that the incidence of pressure sores, heterotopic ossifications, urinary complications and respiratory complications during inpatient rehabilitation were significantly influenced by the type of lesion (more frequent in complete lesions than in incomplete one).

Our study shows that the incidence of all complications at admission (except PU) and during inpatient were not significantly influenced by the type of lesion (complete versus incomplete). The absence of any statistically significant relationship may be for methodological differences as it is better to assess this relationship through prospective method. This was pointed out by Amin et al., (2005) when they concluded that complications and neurological recovery are not assessed as they have been previously well documented, and are better assessed in the remit of a prospective trial with well-matched patient populations.

6.7 TSCI Management

There are several approaches to the management of the spinal injury. Most are based on belief, logic and habit. They are justified by personal conviction regarding the importance of the various pathologies caused by the injury (El Masri(y), 2006).

Almost every aspect to the management of SCI is controversial, due in part to a lack of good –quality evidence (Murthy, 2007).

Our study shows that mean LOS, the incidence of all complications at admission (except PU) and the incidence of all complications during inpatient were not significantly influenced by the type of TSCI management (surgical management conservative management). Our study concluded that there were lack of evidence about the superiority of either methods of management (surgical or conservative) in the mean LOS, the incidence of complications on admission and the incidence of complications during inpatient rehabilitation.

6.8 Conclusions

Retrospective review of 81 files of TSCI subjects who admitted to the first time to the rehabilitation hospital is done. The researcher found the following conclusions about his study:

- There is a net dominance of young males as the male / female ratio is 8/1and the subjects who are 15-20 years old constitute the largest portion of the study population.
- Seasonal variation is observed, as there is an increase of frequency of TSCI in Summer.
- The study shows that the leading cause of TSCI is gun shot (65.4%) followed by falling down (28.4%) and there is only one case caused by RTA.
- Most of the gun shot result from Israeli assault (43.2%) and mainly directed to the upper part of the body.
- About half of the study population (49.4%) has complete SCI, (79%) were paraplegic and the most prevalent level of TSCI were thoracic followed by lumber and cervical level.
- The management of TSCI subjects are nearly equally divided between surgical or conservative management.
- The study shows that (60.8%) of the cases admitted for hospitals out side Gaza Strip (Egypt, Jordan, Israel) for surgical or conservative management.
- The median LOS for all TSCI subjects is 74 days, and the mean is 80.96 days.
- The level of lesion (paraplegia and quadriplegia) and type of lesion (complete and incomplete) were not significantly associated with LOS (P> 0.05).

- The study shows the most common complications detected at admission was flaccidity (59.3%) followed by PU (41.0%) and UTI (39.5%).
- The study shows that the most common complications detected during inpatient pain (58.8%) followed by UTI (56.8%) and GC (40.7%).
- Our study shows that the incidence of all complications at admission were not significantly influenced by the time lapsed from injury to admission.
- Our study shows that the incidence of all complications at admission (except PU) and during inpatient were not significantly influenced by the type of lesion (complete versus incomplete).
- Our study shows that mean LOS, the incidence of all complications at admission (except PU) and the incidence of all complications during inpatient were not significantly influenced by the type of TSCI management (surgical management or conservative management).

6.9 Recommendations

- The number of TSCI patients is constantly growing and the epidemiological data are becoming much more important so that more comprehensive prospective study needed to assess the incidence, prevalence and etiologic factors for TSCI patients.
- The study shows that (60.8%) of the cases admitted for hospitals out side Gaza Strip for surgical or conservative management, urge for sending many of rehabilitation team members (especially physicians) abroad for specialized training in the management TSCI.
- Complications are common following TSCI, so educational programs for rehabilitation team members, patients and their families need to focus on the prevention and early recognition of complications.
- For the primary prevention from these complications, urge for starting of rehabilitation process as early as possible in the acute stage.
- Further researches is needed to follow these complications after discharge.
- The study showed that gun shot from Israeli assault is responsible for more 40% of TSCI, urge for international protection for Palestinians people than (especially young age) against Israeli assaults.
- Further researches is needed to highlights that Israeli assaults (especially gun shot) has impact in the level of the disabilities in Gaza Strips.
- Universities should start including this field of study (rehabilitation) in the curriculums of the nursing programs and other relevant medically oriented ones.
- Advocating for the rights of those of SCI for specialized places for sporting, recreational activities and for the implementation the (5%) quota for employment of disabled.

References

References

Aito, S. et al (2003): Complications during the acute phase of traumatic spinal cord lesions. Spinal Cord; 41:629-635.

Adams, MM.& Hicks, AL. (2005): Spasticity after spinal cord injury.
Spinal Cord 43, 577–586.

Al Jadid, K. et al (2004): Traumatic Spinal Cord Injury in Saudi Arabia: A Retrospective Study. Saudi Journal of Disability and Rehabilitation; 8(3).

Amin, A. et al (2005): Spinal Injuries Admitted to a Specialist Centre over a 5-Year Period: a Study to Evaluate Delayed Admission. Spinal Cord; 43: 434-437.

Ash, D. (2002): An exploration of the occurrence of pressure ulcers in a British spinal injuries unit. J Clin Nurs;11(4):470-8.

Aspen Reference Group (2006): Spinal Cord Injury-Patient Education, 8 ed. USA: Aspen Puplisher.

Ball, JR.& Sekhon, LHS. (2006): Timing of Decompression and Fixation After Spinal Cord Injury – When is Surgery Optimal?.Critical Care and Resuscitation; 8: 56-63.

Berlly, M. & Shem, K. (2007): Respiratory management during the first five days after spinal cord injury. J Spinal Cord Med;30(4):309-18.

Brown, R. et al (2006): Respiratory dysfunction and management in spinal cord injury. Respir Care;51(8):853-870.

Canadian Institute for Health Information (2006). Life after traumatic spinal cord injury: From inpatient rehabilitation back to the community. Analysis in Brief, Canada.

Cardenas, DD. et al (1998): Factors associated with contractures in acute spinal cord injury. Spinal Cord;36(6):405-8.

Celani, MG. et al (2001) Spinal Cord Injury in Italy: A multicenter Retrospective Study. Archives of Physical Medicine and Rehabilitation; 82(5): 589-596.

Chen, D. et al (1999): Medical complications during acute rehabilitation following spinal cord injury--current experience of the Model Systems. Arch Phys Med Rehabil; 80(11):1397-4.

Cifu, DX. et al (1999): Age, outcome, and rehabilitation costs after tetraplegia spinal cord injury. NeuroRehabilitation;12(3): 177-185.

Cifu, DX. et al (1999): A multicenter investigation of age-related differences in lengths of stay, hospitalization charges, and outcomes for a matched tetraplegia sample. Arch Phys Med Rehabil;80(7):733-40.

Cooper; G. (2006): Essential physical medicine and rehabilitation. USA, Humana Press Inc.

Cripps, RA (2006): Spinal Cord Injury, Australia 2004-2005. Injury Research and Statistics, Series Number 29.

Curt, A. et al (1997): Assessment of autonomic dysreflexia in patients with spinal cord injury. J Neurol Neurosurg Psychiatry; 62: 473-477.

Deconinck, H. (2003): The health condition of spinal cord injuries in two Afghan towns. Spinal Cord;41, 303–309.

Delisa, J.(2004): Physical Medicine and Rehabilitation: Principle and practice, Philadelphia: Lippencott Williams&Wilkin

Dllingham, TR.& Belandres, PV.(1998): Rehabilitation of the injured combatant, Volume 1. USA: TTM.

Dorsett, P. (2001): Spinal Cord Injury: How Do People Cope?. Dissertation (Msc), University of Queensland

Dryden, DM. et al (2005): Direct health care costs after traumatic spinal cord injury. J Trauma;59(2): 443-9.

Eastwood, EA. et al (1999): Medical rehabilitation length of stay and outcomes for persons with traumatic spinal cord injury-1990–1997. ArchPhys Med Rehabil; 80(11): 1457–63.

El Masri(y), WS. (2006): Traumatic Spinal Cord Injury: the Relationship Between Pathology and Clinical Implications. Trauma; 8: 29-46.

El Masri(y), WS. (2006): The case for conservative management in SCI. IN: Sansam, KA, Controversies in the management of traumatic spinal cord injury, United Kingdom 29 November 2005. Clin Med;6(2):202-4

.

El Wafa Medical Rehabilitation and Specialized Surgery Hospital(EWMRSSH) Avilable at URL http://www. www.Elwafa.org (Accessed 9 Sep 2008).

Eng, JJ. & Miller, WC. (2006): Rehabilitation: From Bedside To Community Following Spinal Cord Injury. In: Eng, JJ. et al, editors. Spinal Cord Injury Rehabilitation Evidence. Vancouver.

Fehling, G& Perrin, R. (2005): The role and timing of early decompression for cervical spinal cord injury : Update with a review of recent clinical evidence. J Spinal Cord Med.;28(1):11-9.

García Leoni, ME.& Esclarín De Ruz, A. (2003): Management of urinary tract infection in patients with spinal cord injuries. : Clin Microbiol Infect;9(8):780-5.

Grabois, M. et al (2000): Physical Medicine and Rehabilitation: The Complete Approach, United Kingdom: Blackwell Science.

Groot, S. et al (2006): Demographics of the Dutch multicenter prospective cohort study 'Restoration of mobility in spinal cord injury rehabilitation. Spinal Cord; 44: 668–675.

Grundy, D & Swain, A. (2002): ABC of Spinal Cord Injury, 4th ed. London: BMJ Puplishing Group.

Gupta, A. et al (2008): Traumatic vs non-traumatic spinal cord lesions: comparison of neurological and functional outcome after in-patient rehabilitation. Spinal Cord;46(7):482-7.

Hisma, J. et al (2007): Complications Following Spinal Cord Injury: Occurrence and Risk Factors. J Rehabil Med; 39: 393–398.

Inman, C. (1999): Effectiveness of Spinal Cord Injury Rehabilitation. Clinical Rehabilitation;13: 25-31.

Jhonson, RL. et al (1998): Secondary conditions following spinal cord injury in a population-based sample. Spinal Cord;34:470-480.

Jhonson, RL. et al (1996): Cost of traumatic spinal cord injury in a population-based registry. Spinal Cord;36:45-50.

Jongjit, J. et al (20004): Functional independence and rehabilitation outcome in traumatic spinal cord injury. Southeast Asian J Trop Med Public Health;35(4):980-5.

Kaplan, R J. (2006): Physical Medicine and Rehabilitation Review, Second ed. USA: McGraw-Hill.

Karacan, I.. et al (2000): Traumatic Spinal Cord Injuries in Turkey: a Nation-Wide Epidemiological Study. Spinal Cord; 38: 697-701.

Karlsson, AK. (2006): Autonomic dysfunction in spinal cord injury: clinical presentation of symptoms and signs. Prog Brain Res;152:1-8.

Kishan, S. et al (2005): Timing of surgery following spinal cord injury. J Spinal Cord Med;28(1):11-9.

Klotz, R. et al (2002): The Tetrafigap Survey on the long-term outcome of tetraplegic spinal cord injured persons: Part III. Medical complications and associated factors. Spinal Cord;40(9):457-67.

Kuhn, W. et al (1983): Comparison of Spinal Cord Injuries in Females and in Males. 1979-1981 Basle. Paraplegia; 21(3):154-60.

Lakhey, S. et al (2004): Autonomic dysreflexia. J Neuroscience;1:56-57.

Lawrence, KS. (1996): Contractures, USA: Research and Training Center on Independent Living.

Lim, P. & Tow, A. (2007): Recovery and Regeneration after Spinal Cord Injury: A Review and Summary of Recent Literature. Ann Acad Med Singapore;36: 49-57.

Lin, V. et al (2003): Spinal Cord Medicine: Principles and Practice. U.S.A, Demos Medical Publishing.

Magenuka, NS. (2006). The Personal and Embodied Experiences of People Living With a Spinal Cord Injury in the or Tambo District Municipality in the Eastern Cape. Dissertation (Dr), University of South Africa.

Maynard, FM. Et al (1997): International Standards for Neurological and Functional Classification of Spinal Cord Injury. American Spinal Injury Association. Spinal Cord;35(5):266-74.

McKinley, W. et al (2004): Outcomes of early surgical management versus late or no surgical intervention after acute spinal cord injury. . Arch Phys Med Rehabil;85(11):1818-25.

McKinley, W. et al (2008): Functional Outcomes per Level of Spinal Cord Injury. Avilable at URL http://www.emedicine.com/copyright.html (Accessed 9 Sep 2008).

Ministry of Health (2006): Health Status in Palestine 2005.

Montgomire, J. (1997): Infections in Patients With Spinal Cord Injuries. Clinical Infectious Disease; 25: 1285-92.
MPDL, (2002): Disability in Northen& Middle Gaza, Gaza.

Murthy, TVSP. (2007): Management of Spinal Cord Injury: Issues of Debate. Indian Journal of Neurotrauma (IJNT); 4(1): 15-19.

Naser, I (2004). A Description of The Current Sexual Rehabilitation and Information Provided to Paraplgic Males of The Gaza Strip Aged Between 16 And 45 Years. Dissertation (Msc), School of Puplic Health.

National Spinal Cord Injury Statistical Center (2006). (online). Avilable at URL http://www.spinalcord.uab.edu/ (Accessed 9 Sep 2008).

Norrbrink ,C. et al (2003): Gender Related Differences in Pain in Spinal Cord Injured Individuals. Spinal Cord; 41:122–128.

O'Connor & Murray (2005): Review of Spinal Cord Injuries in Ireland. Spinal Cord; 0: 1 -4.

Otom, AS. et al (1997): Traumatic Spinal Cord Injuries in Jordan: an Epidemiological Study. Spinal Cord; 35: 253-255.

Pagliacci, M. et al (2003): An Italian Survey of Traumatic Spinal Cord Injury. Arch Phys Med Rehabil; 84(9):1266-75.

Palestinian Central Bureau of Statistics (2001). Palestinian Youth: Facts and Figures. Ramallah. Palestine.

Pandey,VK. et al (2007): Care of post-traumatic spinal cord injury patients in India: An analysis. IJO; 41(4): 295-299.

Piao, JH. (2007): Human neural precursor cells in spinal cord repair, Stockholm: Lasrserics Digital Print AB.

Pilot, D. & Hungler B.(1999): Nursing Research Principles and Methods. 6th edition , Philadelphia, New York, Baltimore Slipknot.

Post, MW. et al (2005): Duration and functional outcome of spinal cord injury rehabilitation in the Netherlands. : J Rehabil Res Dev;42(3 Suppl 1):75-85.

Quinones, M. et al (2002): Traumatic Spinal Cord Injury in Qatar: An Epidemiological Study. The Middle East Journal of Emergency Medicine; 2(1).

Raibulet,T. et al (2001): Spinal Cord Injury Patients in the Physical Medicine and Rehabilitation Hospital, Kuwait – A Nine-Year Retrospective Study. Kuwait Medical Journal; 33(3): 211-215.

Raissi, GR. et al (2007): Reports from spinal cord injury patients: eight months after the 2003 earthquake in Bam, Iran. Am J Phys Med Rehabil;86(11):912-7.

Rathore, MFA. et al (2008): The Prevalence of Deep Vein Thrombosis in a Cohort of Patients with Spinal Cord Injury Following the Pakistan Earthquake of October 2005. Spinal Cord; 46: 523–526.

Rathore, MFA. et al (2008): Traumatic Spinal Cord Injuries at a Tertiary Care Rehabilitation Institute In Pakistan. J Pak Med Assoc; 58(2):53-57.

Regan, M. et al (2006). Pressure Ulcers Following Spinal Cord Injury. In: Eng, JJ. et al, editors. Spinal Cord Injury Rehabilitation Evidence. Vancouver.

Richards, JS. (2005): Spinal Cord Injury Pain: Impact, Classification, Treatment Trends, and Implications From Translational Research. Rehabilitation Psychology; 50(2) 99-102.

Sawatzky B, et al (2008): Classification and Measurement of Pain in the Spinal Cord-Injured Population. Spinal Cord; 46: 2–10.

Schönherr, MC. (2003). Functional Outcome after Spinal Cord Injury:
Activities and Participation, Netherlands : Stichting C. Regenboog.

Schönherr, MC. (1999): Functional outcome of patients with spinal cord injury: rehabilitation outcome study. Clin Rehabil;13(6):457-63.

Schonherr,MC. et al (1996): Rehabilitation of spinal cord lesions in The Netherlands: an epidemiological study. Spinal Cord;34,679-683.

Seeley, RR. et al (2000): Anatomy & Physiology. 5th edition, U.S.A, Colin H. Wheatly.

Shah, S & Kelly, K (2003): Principles and Practice of Emergency Neurology, New York: Cambridge University Press.

Singh, R. et al (2003): Traumatic Spinal Cord Injuries in Haryana: an Epidemiological Study. Indian Journal of Community Medicine; 28(4):184-186.

Solagberu, BA. (2002): Spinal cord injuries in Ilorin, Nigeria. West Afr J Med;21(3):230-2.

Sosa, I. et al (2005): Advances in spinal cord repair techniques. P R Health Sci J ;24(4):313-22.
Spinal Cord Injury Information Network (2008). (online).Avilable at URL :http://www.spinal cord.uab. (Accessed 9 Sep 2008).

Tauqir, SF. et al (2007): Complications in patients with spinal cord injuries sustained in an earthquake in Northern Pakistan. J Spinal Cord Med.;30(4):373-7.

Tooth, L. et al (2003): Rehabilitation Outcomes in Traumatic Spinal Cord Injury in Australia: Functional Status, Length of Stay and discharge setting. Spinal Cord ;41: 220–230.

Umphred, A.(1995): Neurological Rehabilitation, 3rd ed .USA: Mosby.

Walter, JS. et al (2002): A database of self-reported secondary medical problems among VA spinal cord injury patients: its role in clinical care and management. J Rehabil Res Dev;39(5):623.

Webb, J. (2006): The case for surgical management in spinal cord injury (SCI). IN: Sansam, KA, Controversies in the management of traumatic spinal cord injury, United Kingdom 29 November 2005. Clin Med;6(2):202-4.

(Annex 1)

Internal Need Assessment

Dear colleague in El-Wafa Medical Rehabilitation Hospital.

I am a student working on my thesis for the Master degree in Rehabilitation Science through Islamic of Gaza in the area of rehabilitation for people with spinal cord injury.

Please can you help me to answer the following :-

1- Personal information

- Name - Job title

-Sex -Age

- Years of experience in the field of rehabilitation:

- Qualification:

- Phone number or mobile number:

- During your working in the rehabilitation of spinal cord injury patients in El-Wafa Medical Rehabilitation Hospital, what are the most common secondary complications you faced:

1-UTI	2-Spasticity
3-Pain	4-Contractures
5-Decubitus ulcer	6-DVT
7-Flaccidity	8-Respiratory Compliciations
9-Autonomic dysreflexia	10 -Gastointestinal Compliciations
11-Osteoprosis	12 -Degenerative joint change
13-Hetrotopic ossification	14 -Anemia
16- Other complications	15- Pulmonary embolism

Result of Internal Need Assessment

To obtain detailed insight into the secondary complications, in relation to the SCI that patients are confronted during inpatient rehabilitation, internal need assessment is done for the rehabilitation team in El-Wafa Medical Rehabilitation Hospital. 27 members of the rehabilitation team are asked about the most common complications, through questionnaire.

The results reveal the following:-

1-(96.25%) UTI	2-(88.88%) Spasticity
3-(80.50%) Pain	4-(74%)Contractures
5-(70.37) Decubitus ulcer	6-(66.66%) DVT
7-(55.55%) Flaccidity	8-(55.50%) Respiratory Complications
9-(48%) Autonomic dysreflexia	10 -(37%) Gastrointestinal Complications
11-(33%) Osteoprosis	12 -(29%)Degenerative joint change
13-(26%) Hetrotopic ossification	14 – (25%)Anemia
16-(18.50%) Other complications	15-(11%)Pulmonary embolism

The researcher choose the first ten complications according to the result of internal need assessment and according to the literature review.

(Annex 2)

بسم الله الرحمن الرحيم

الجامعة الإسلامية – غزة
The Islamic University - Gaza

عمادة الدراسات العليا
هاتف داخلي: 1150

الرقم.....ج س غ/35/..... Ref.
التاريخ.....2008/01/19..... Date

الأخ الفاضل/ أ. تيسير البلتاجي حفظه الله،
مدير مستشفى الوفاء للتأهيل الطبي والجراحة التخصصية

السلام عليكم ورحمة الله وبركاته،

الموضوع/ تسهيل مهمة طالب ماجستير

تهديكم عمادة الدراسات العليا بالجامعة الإسلامية أعطر تحياتها، وترجو من سيادتكم التكرم بتسهيل مهمة الطالب/ **خالد شعبان حسن زيادة** برقم جامعي **2004/4867** المسجل في برنامج الماجستير بكلية **التربية** تخصص **الصحة النفسية المجتمعية/علوم التأهيل**، وذلك بهدف الحصول على المعلومات التي تساعده في إعداد دراسته والمعنونة:

"Complications During the Inpatient Rehabilitation of Traumatic Spinal Cord Lesions"

وتفضلوا بقبول فائق الاحترام والتقدير،،، والله ولي التوفيق،،،

عميد الدراسات العليا

د. مازن إسماعيل هنية

صورة إلى:-
- الملف.

ص.ب. 108 الرمال، غزة، فلسطين تلفون tel: +970 (8) 286 0700 فاكس fax: +970 (8) 286 0800
P. O. Box 108, Rimal, Gaza, Palestine
public@iugaza.edu.ps www.iugaza.edu.ps

(Annex 3)

A) GENERAL INFORMATION

File Number: 1-**Name** **Age:**

2-Gender: □Male □Female

3-**Marital status:** □Married □ Single □ Widowed □Divorce □ Separated□

4-**Occupation before injury: ……**

5-**Living area**:

6-**Level of education:**

B) Medical information

1-Date of injury ……/ …../ ……

2-Did the patient has admitted for any hospitals out side Gaza Strip before admission to El- Wafa Hospital ? □ **Yes** □ **No**

3-If yes ,what the cause and duration of admission ?

4-Where the accident of traumatic spinal cord injury occur ?

5-Date of admission to the rehabilitation hospital……/ …../ ……

6-Date of discharge from the rehabilitation hospital ……/ …../ ……

7-Time lapsed from injury to admission to the rehabilitation……

8-Period of inpatient rehabilitation …… ……

9-Cause of injury :

10- **Did the cause result from Israeli assault?** □ Yes □ No

11- Associated injuries: □ Fracture □ Closed head injury

□ Intrathoracic injuries □ Intraabdominal injuries

12-**Did he loss his consciousness?** □Yes □ No

13-**If yes, what the duration of loss of consciousness**? **…… ……**

14-What the scale was used to determine the degree of the impairment?

15-Degree of impairment

□ Complete Paraplegia □ Incomplete Paraplegia

□ Complete Quadriplegia □ Incomplete Quadriplegia

16-Level of bony injury: □ Cervical □ Thoracic □ Lumbar □ Sacral

17-**Did the patient had any surgical management after (SCI)? □Yes □No**

18-If yes, what the type of the surgical management? ……

19-W here did the surgical management operation is done? ……

20-What the cause of discharge? ……

21-**Did the patient has any chronic diseases?** □Yes □No

22-**If yes, what the type of the chronic diseases?** ……

C) Medical Complications

Determination of the incidence of the most common complications will be assessed through retrospective review of patients' files at admission, during inpatient rehabilitation and at discharge.

1-Pressure Ulcer (PU)

☒ Did the patient has (PU) at admission? □Yes □No □Unknown

☒If yes, what the location and stage? **……**

☒ Did he has (PU) during inpatient?□Yes □No □Unknown

☒If yes, what the location and stage? **……**

☒ Did the patient has (PU) at discharge? □Yes □No □Unknown

☒If yes, what the location and stage? **……**

2- Urinary Tract Infection (UTI)

☒ At admission, did the patient has: - □Urine continence □Urine incontinence

☒ At admission, what the bladder management program? **……**

☒Did he has (UTI) at admission?□Yes □No □Unknown

☒During inpatient, did he has:-□Urine continence □Urine incontinence

☒During inpatient, what the bladder management program? **……**

☒Did he has (UTI) during inpatient?□Yes □No □Unknown

☒ If yes, how many times did he has (UTI) during inpatient? **……**

☒ At discharge, did the patient has: - □Urine continence □Urine incontinence

☒ At discharge, what the bladder management program? **……**

☒Did he has (UTI) at discharge? □Yes □No □Unknown

3- Respiratory Complications (RC)

☒ Did he has (RC) at admission? □Yes □No □Unknown

☒If yes, what the type? **……**

☒Did he has (RC) during inpatient? □Yes □No □Unknown

☒If yes, what the type? **……**

☒ Did he has (RC) at discharge? □Yes □No □Unknown

☒If yes, what the type? **……**

4-Spacticity

☒ Did he has spacticity at admission? □Yes □No □Unknown

☒If yes, what the type and degree? **……**

☒ Did he has spacticity during inpatient? □Yes □No □Unknown

☒If yes, what the type and degree? **……**

☒ Did he has spacticity at discharge? □Yes □No □Unknown

☒If yes, what the type and degree? **……**

5-Flaccidity

☒ Did he was in spinal shock stage at admission? **……**

☒ Did he has flaccidity at admission? □Yes □No □Unknown

☒If yes, what the type? **……**

☒ Did he has flaccidity during inpatient? □Yes □No □Unknown

☒If yes, what the type? **……**

☒ Did he has flaccidity at discharge? □Yes □No □Unknown

☒If yes, what the type? **……**

6-Pain

☒ Did he has pain at admission? □Yes □No □Unknown

☒If yes, what the type, severity and the location? **……**

☒ Did he has pain during inpatient? □Yes □No □Unknown

☒If yes, what the type, severity and location? **……**

☒ If yes, how many times? ……

☒ Did he has pain at discharge? □Yes □No □Unknown

☒If yes, what the type and location? **……**

7-Contracture

☒ Did he has contracture at admission? □Yes □No □Unknown

☒If yes, what the location? **……**

☒ Did he has contracture during inpatient? □Yes □No □Unknown

☒If yes, what the location? **……**

☒ Did he has contracture at discharge? □Yes □No □Unknown

☒If yes, what the location? **……**

8-Autonomic Dysreflexia(AD)

☒ Did he has (AD) at admission? □Yes □No □Unknown

☒Did he has (AD) during inpatient? □Yes □No □Unknown

☒If yes, what the frequency? **……**

☒ Did he has (AD) at discharge? □Yes □No □Unknown

9-Deep Venous Thrombosis (DVT)

☒ Did he has (DVT) at admission? □Yes □No □Unknown

☒If yes, what the location? **……**

☒ Did he had any prophylactic medication for (DVT) during inpatient**?**

☒ Did he has (DVT) during inpatient? □Yes □No □Unknown

☒If yes, what the location? **……**

☒ Did he has (DVT) at discharge? □Yes □No □Unknown

☒If yes, what the location? **……**

10-Gastrointestinal Complications (GC)

☒ At admission, did the patient has :- □Stool continence □Stool incontinence

☒ Did he has (GC) at admission? □Yes □No □Unknown

☒If yes, what the type? **……**

☒ Did he has (GC) during inpatient? □Yes □No □Unknown

☒If yes, what the type? **……**

☒ Did he has (GC)) at discharge? □Yes □No □Unknown

☒If yes, what the type? **……**

Number of complications at admission…… ,During inpatient……, At discharge