Islamic University – Gaza
College of Education
Degree of Master in Community Mental Health
(Rehabilitation Sciences)

COMMUNITY-ACQUIRED URINARY TRACT INFECTION CAUSING MICROORGANISMS AMONG PARAPLEGIC PATIENTS IN GAZA STRIP

By:

IYAD I. Al RUN
12004- 4875

Supervisor:

Prof. Dr.
FADEL A. SHARIF

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master in Community Mental Health (Rehabilitation Sciences)

1429 هـ - 2008 م

بسم الله الرحمن الرحيم

الجامعة الإسلامية – غزة
The Islamic University - Gaza

عمادة الدراسات العليا
هاتف داخلي: 1150

Ref. الرقم ج س غ/35/
Date التاريخ 2008/06/25

نتيجة الحكم على أطروحة ماجستير

بناءً على موافقة عمادة الدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحث/ **إياد إسماعيل درويش الرن** لنيل درجة الماجستير في كلية *التربية*/ قسم **الصحة النفسية المجتمعية- علوم التأهيل** وموضوعها:

"Community - Acquired Urinary Tract Infection Causing Microorganisms among Paraplegic Patients in Gaza Strip"

وبعد المناقشة العلنية التي تمت اليوم الاثنين 25 جماد آخر 1429هـ، الموافق 2008/06/30م الساعة العاشرة صباحاً، اجتمعت لجنة الحكم على الأطروحة والمكونة من:

أ.د. فضل الشريف	مشرفاً ورئيساً
أ.د. محمد شبير	مناقشاً داخلياً
د. سمير قوتة	مناقشاً داخلياً

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. مازن إسماعيل هنية

ABSTRACT

Title: Community-Acquired urinary Tract Infection Causing Microorganisms Among paraplegic patients in Gaza Strip.

Background: Urinary tract infection is one of the most common causes of morbidity in patients with spinal cord injury after they have recovered from the initial effects of trauma. Unique factors that predispose to UTI in this population include urinary stasis and bladder catheterization.

Objectives of the study: the aims of the study were to identify the most common UTI causing microorganisms and some pertinent risk factors among paraplegic patients in Gaza strip, to study the antimicrobial sensitivity of the isolated microorganisms and determine the most effective antimicrobial agents, and to describe the most common method of bladder management.

Study design: the present work is a descriptive cross-sectional study, which was conducted in El Wafa Medical Rehabilitation Hospital laboratory-Gaza Strip-Palestine, in the year 2008.

Methodology: a questionnaire, urine analysis and culture were used to collect data from 170 patients (85 target and 85 control) from the community. The collected data were discussed in terms of their effects on the outcomes of the study.

Results: the uropathogens identified in this study were *E. coli* (30.0%), *Klebsiella* species (21.2%), *Proteus* species (15.3%), *Pseudomonas* species (4.7%) and *Staphylococci* species (2.4%). All the isolates were subjected to antimicrobial susceptibility. Our results indicated that, a high proportion of the isolates were resistant to Doxycycline (47.6 %), Sulphamethoxazole-trimethoprim (46.5 %) and Nalidixic acid (42.4 %). On the other hand, the most effective antimicrobial agents against all isolated uropathogens were Cefatriaxone (90.4%) followed by Amikacin (80.0%), Gentamicin (67.2%) and Ciprofloxacin (61.6%). We found that, Self Intermittent Catheter (SIC), followed by external catheter "condom" (only for males), are the most commonly used methods for bladder management among paraplegic patients.

Conclusions: *E. coli* was the predominant microorganism that causes community-acquired UTI in both target and control groups and Self Intermittent Catheter (SIC) is the most commonly used method for bladder management in paraplegic patients. Urogenic bladder and bladder catheterizations are among the most common risk factors causing UTI in paraplegic patients.

Key words: Gaza Strip, spinal Cord Injury, Bladder management, Urinary Tract Infection

ملخــص

الميكروبات المسببة لالتهابات المسالك البولية المكتسبة من المجتمع عند المرضى الذين يعانون من شلل في الأطراف السفلية في قطاع غزة

تعتبر التهابات المسالك البولية من أكثر المسببات المرضية عند الأشخاص الذين يعانون من شلل في الأطراف السفلية بعد الشفاء من الإصابة الأولى و من أهم العوامل المؤدية إلى التهابات المسالك البولية عند هؤلاء المرضى هي ركود البول في المثانة و استخدام القسطرة البولية. و هدفت هذه الدراسة إلى معرفة الميكروبات المسببة لالتهابات المسالك البولية المكتسبة من المجتمع عند المرضى الذين يعانون من شلل في الأطراف السفلية في قطاع غزة ومعرفة الطريقة الأكثر استخداما في تأهيل المثانة البولية. هذه الدراسة هي وصفية للحالة الموجودة في قطاع غزة و التي تم إجرائها في مختبرات مستشفى الوفاء للتأهيل الطبي. وقد تم استخدام إستبانة لجمع البيانات من 170 مريضا (85 ذكور و85 إناث) جميعهم من المجتمع. حيث تم استخدام هذه البيانات في إطار تحليل نتائج الدراسة. وقد وجد أن نسبة انتشار البكتيريا المسببة لإلتهابات المسالك البولية عند مرضى إصابات الحبل الشوكي في هذه الدراسة كانت كالتالي: إيشيريشيا كولاي (30 %) و كليبسيلا (21.2 %) و بروتيوس (15.3 %) و السيدوموناس (4.7 %) و ستافيلوكوكس (2.4 %). كما أظهرت نتائج هذه الدراسة أن نسبة كبيرة من أنواع البكتيريا المعزولة كانت مقاومة للمواد العلاجية التالية: الدوكسيسيكلين (47.6 %) و التريميثوبريم-سلفاميثوكسازول (46.5 %) و ناليدكسيك أسيد (42.4%). بينما كان السيفاترياكسون أكثر المركبات العلاجية فاعلية تجاه جميع الميكروبات حيث وجدت نسبة الحساسية له (90.4%) يليه الاميكاسين (80%) ثم الجنتاميسين (72.2%) ثم السبروفلوكساسين (61.6%). ووجد أيضا أن القسطرة البولية المتقطعة من أكثر الطرق المستخدمة لتأهيل المثانة العصبية بعد إصابة الحبل الشوكي عند الجنسين. بينما يعتبر العازل الذكري(الكندوم) طريقة فاعلة أيضا عند الذكور مع مراعاة أن يتم تغيره يوميا.

وبناءا على نتائج الدراسة فإن الإيشيريشيا كولاي هي من أهم الميكروبات المسببة لالتهابات المسالك البولية المكتسبة من المجتمع عند المرضى الذين يعانون من شلل في الأطراف السفلية في قطاع غزة. كما أن القسطرة البولية المتقطعة هي أكثر الطرق شيوعا لتأهيل المثانة العصبية، بالإضافة إلى أن المثانة العصبية و القسطرة البولية هما من أهم العوامل المساعدة على حدوث تلك الالتهابات.

DEDICATION

TO MY FAMILY----------

FRIENDS----------

COLLEAGUES--------

IYAD AL RUN

ACKNOWLEDGEMENTS

I hereby acknowledge with sincerest thanks to the general director and team of EL wafa Medical Rehabilitation Hospital (EMRH). Thanks and appreciation are also extended to the supervisor of this work **Prof. Fadel A. Sharif** for his advice, kind help and endless support.

I would like also to express my sincere gratitude to the head of EMRH Lab. **Mr. Naeem A. Sharif** and director of nursing for their great advice and guidance they gave to me throughout this work.

I wish to express my appreciation and gratitude to all colleagues and partners who have contributed to the production of this document. My most profound gratitude is to my colleagues at beit Hanuon Hospital and my colleagues in the master program.

My thanks are extended to all those not mentioned in person and who contributed in any way during this research. I wish all of them a long and prosperous life.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Page

LIST OF ABBREVIATIONS

"C"	Cervical Nerves
"L"	Lumbar Nerves
"S"	Sacral Nerves
"T"	Thoracic Nerves
CFU	Colony-Forming Unit
CSF	Cerebrospinal Fluid
EWMRH	El Wafa Medical Rehabilitation Hospital
HPF	High Power Field
I	Intermediate
ICIDH	International Classification of Impairment, Disabilities and Handicap
MDR	Multi-Drug Resistance
MIC	Minimum Inhibitory Concentration
mL	Milliter
MSU	mid-stream urine
R	Resistant
RCF	Relative Centrifugal Force
S	Sensitive
SCI	Spinal Cord Injury

SIC	Self Intermittent Catheterization
SPSS	Statistical Package For Social Sciences
UK	United Kingdom
US	United States
UTI	Urinary Tract Infection
WOCA	Weekly Oral Cyclic Antibiotic

LIST OF ANNEXES

CHAPTER (1)

INTRODUCTION

CHAPTER (1)

INTRODUCTION

1.1. BACKGROUND

When the problem of paraplegic patients in Palestine is tackled we notice that the problem is continuously increasing because of the instability of the political situation and continuity of the Israeli occupation, particularly since the year 2000 (El Aqsa Intifada).

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 (1).

The population number in Palestine is estimated at 3.7 million in mid year 2005. Out of this total number, 2.3 million reside in the West Bank and 1.4 million in Gaza Strip representing 63 % and 37 %, respectively (1,2).

Gaza Strip is a very crowded place with an area of 365 Km^2 and constitute 6.1% of total area of the Palestinian territory land. The population of Gaza strip is concentrated in three cities, five small villages, and eight refugee camps that contain two thirds of the population of Gaza Strip (1,2).

In Gaza Strip, the population density is 3000 inhabitants/ km^2 and the prevalence of disabled population is about 3 % according to the census of Palestinian Ministry of Health in the year 2006 (1,2).

The remarkable presence of the complications that accompany the incidence of the spinal cord injury (SCI) paraplegics include: urinary tract infections, pressure ulcer, autonomic dysreflexia, and bowel dysfunction; mainly constipation (3).

The most observable problem is the neurogenic bladder which is the leading cause of urinary tract infection (UTI) since the patient loses control over the bladder. Consequently the function of the bladder is lost and either retention of urine occurs or the patient experiences uncontrollable flow of urine which is embarrassing to the paraplegic patients, and causes psychological squelae as well as medical complications. Notably, urine retention renders good media for growth of pathogenic microorganisms that can cause urinary tract infections (3).

UTI is one of the most common causes of morbidity in patients with SCI after they have recovered from the initial effects of trauma. Unique factors that predispose to UTI in this population include urinary stasis and bladder catheterization. Urinary stasis impairs the naturally occurring mechanisms that protect the urinary tract, including the washout effect of voiding. Even with sterile intermittent bladder catheterization, which is "theoretically safer" than the "clean technique" and indwelling urethral catheters, where the introduction of microorganisms into the urinary tract and clinical infections are frequently seen (3).

UTI may manifest differently in patients with SCI than in the general population. For instance, the complaints of dysuria, frequency, and urgency that are usually voiced in able-bodied patients with UTI are often absent in infected patients with SCI. Furthermore, Suprapubic and flank pain or tenderness is not perceived in insensate patients. Common manifestations of UTI in patients with SCI include worsening muscle spasms, increasing autonomic dysreflexia, urinary leakage, and change in voiding habits. Fever is usually, but not always present (3).

Between 10% and 20% of patients who are hospitalized receive an indwelling Foley’s catheter. Once this catheter is in place, the risk of bacteriuria is approximately 5% per day. With long-term catheterization, bacteriuria is inevitable. Catheter-associated UTIs account for 40 % of all nosocomial infections and are the most common source of gram-negative bacteremia in hospitalized patients (4).

The number of SCI patients in the United States has been estimated to be approximately 253,000 patients, with a range of 225,000 to 296,000 patients. Because tetraplegic SCI patients typically have difficulties with independent living, they cannot perform catheterization strategies such as self intermittent catheterization (SIC) or use external fitting catheters. Spontaneous voiding between catheterization can be problematic with SIC. Difficulties with external fitting catheters include chronic penile skin changes, catheter dislodgment, and autonomic dysreflexia. For these reasons, a suboptimal form of lower urinary tract drainage, such as chronic indwelling catheters may be utilized. Chronic indwelling catheters lead to recurrent bacteriuria, UTI and, eventually stones (7,9).

The number of patients in the Gaza strip who are alive and who have SCI is about 300 patients. It is worth mentioning here that no previous studies has been conducted on urinary tract infections in adults with spinal cord dysfunction in Gaza Strip (5).

1.2. SCOPE

This study investigated the community-acquired UTIs causing microorganisms and their resistance profiles to 10 selected antimicrobial agents among SCI patients in the Gaza Strip. The researcher selected antimicrobial drugs according to the treatment regimens followed at the rehabilitation centers in Gaza strip especially in El Wafa Medical Rehabilitation Hospital (EWMRH).

1.3. OBJECTIVES

- To identify the most common UTI causing microorganisms among paraplegic patients in Gaza strip.
- To study the antimicrobial sensitivity of the isolated microorganisms and determine the most effective antimicrobial agents .
- To describe the most common method of bladder management.
- To investigate the relation between sex, age, marital status and etiologic agents of UTI among SCI patients.
- Relationship of various risk factors with the development of UTI in SCI patients.

1.4. IMPORTANCE OF THE STUDY

It is hoped that this work will provide further information regarding the transition from asymptomatic bacteriuria to symptomatic UTI and how to reduce or even prevent this from occurring (e.g., through method of catheterization, technique of catheter cleaning and changing, use of preventive medications, and bladder muscle pressure reduction). In addition, costs of UTI include medical charges for doctor visits and drugs and non-medical costs. Moreover, the number of SCI patients in Gaza strip has increased during the Intifada and most of the SCI patients suffer from urogenic bladder and many of them have been re-hospitalized due to severe UTI. The results of this study can help in strengthening the sensitivity of those in the position of planning, to set out suitable strategies for essential antimicrobial list for SCI patients. This will facilitate better planning of health education programs regarding the treatment of UTIs and antimicrobial resistance. This is in addition to defining the extent of antimicrobial agent resistance for uropathogens in Gaza Strip.

CHAPTER (2)

LITERATURE REVIEW

CHAPTER (2)

THEORITICAL FRAMEWORK

2.1. SPINAL CORD INJURY AND ITS EPIDEMIOLOGY

2.1.1. Anatomy and functions of the spinal cord

The Spinal Cord is connected to the brain and is about the diameter of a human finger. From the brain the spinal cord descends down the middle of the back and is surrounded and protected by the bony vertebral column. The spinal cord is surrounded by a clear fluid called Cerebral Spinal Fluid (CSF), that acts as a cushion to protect the delicate nerve tissues against damage from banging against the inside of the vertebrae (3).

The anatomy of the spinal cord itself, consists of millions of nerve fibers which transmit electrical information to and from the limbs, trunk and organs of the body, back to and from the brain. The brain and spinal cord are referred to as the Central Nervous System, whilst the nerves connecting the spinal cord to the body are referred to as the Peripheral Nervous System (3). The nerves within the spinal cord are grouped together in different bundles called Ascending and Descending tracts. Ascending tracts within the spinal cord carry information from the body, upwards to the brain, such as touch, skin temperature, pain and joint position, while descending tracts within the spinal cord carry information from the brain downwards to initiate movement and control body functions (3,6).

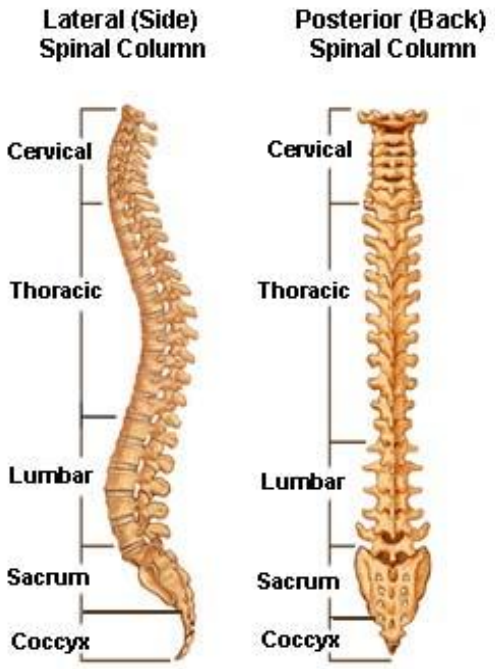
Nerves called the spinal nerves or nerve roots come off the spinal cord and pass out through a hole in each of the vertebrae called the Foramen to carry the information from the spinal cord to the rest of the body, and from the body back up to the brain (3).

The spinal column (or vertebral column) extends from the skull to the pelvis and is made up of 33 individual bones termed vertebrae (Figure 2.1). The vertebrae are stacked on top of each other group into four regions: These, in descending order down the vertebral column are:

Cervical Nerves "C" : (nerves in the neck) supply movement and feeling to the arms, neck and upper trunk..

Thoracic Nerves "T" : (nerves in the upper back) supply the trunk and abdomen.

Lumbar Nerves "L" and Sacral Nerves "S" : (nerves in the lower back) supply the legs, the bladder, bowel and sexual organs.



Term	# of Vertebrae	Body Area	Abbreviation
Cervical	7	Neck	C1 – C7
Thoracic	12	Chest	T1 – T12
Lumbar	5 or 6	Low Back	L1 – L5
Sacrum	5 (fused)	Pelvis	S1 – S5
Coccyx	3	Tailbone	None

Figure 2.1. Levels of spinal cord (segments)

The spinal nerves carry information to and from different levels (segments) in the spinal cord. Both the nerves and the segments in the spinal cord are numbered in a similar way to the vertebrae. The point at which the spinal cord ends is called the conus medullaris, and is the terminal end of the spinal cord. It occurs near lumbar nerves L1 and L2. After the spinal cord terminates, the spinal nerves continue as a bundle of nerves called the cauda equina. The upper end of the conus medullaris is usually not well defined (3).

2.1.2. Spinal Cord Injury

The term SCI refers to any injury of the neural elements within the spinal canal. Spinal cord injury can occur from either trauma or disease to the vertebral column or the spinal cord itself. Most spinal cord injuries are the result of trauma to the vertebral column causing a fracture of the bone, or tearing of the ligaments with displacement of the bony column producing a pinching of the spinal cord (3,6).

2.1.3. Causes

Spinal cord injury primarily occurs in young men with the greatest number of injuries occurring in the 16-50 age group (7).

Patients with a spinal cord injury are designated as having tetraplegia (preferred to quadriplegia) or paraplegia. Tetraplegia refers to injuries to the cervical spinal cord and paraplegia refers to injuries below the cervical spinal cord (7).

Patients with tetraplegia are slightly more common (51.7%) than patients with paraplegia. The majority of spinal cord injuries, representing about 37.4%, are sustained during a motor vehicle accident (7).

Acts of violence are the second most common cause at 25.9%, fallings are third at 21.5% and sports injuries are fourth at 7.1%. In our country, however, the acts of violence are the most common cause of spinal cord injuries (7).

2.1. Incidence

It is estimated that the annual incidence of spinal cord injury SCI, not including those who die at the scene of the accident, is approximately 40 cases per million population in the U. S. or approximately 11,000 new cases each year (7,9).

2.1.5. Prevalence

The number of people in the United States who are alive in June 2006, and who have SCI has been estimated to be approximately 253,000 persons, with a range of 225,000 to 296,000 persons (7,9).

2.1.6. Types of Paralysis - Quadriplegia and Paraplegia

When a person suffers a spinal cord injury, information traveling along the spinal nerves below the level of injury, will be either completely or partially cut off from the brain, resulting in Quadriplegia or Paraplegia. The body will still be trying to send messages from below the level of injury to the brain, however these messages will be blocked by the damage in the spinal cord at the level of injury. Nerves joining the spinal cord above the level of injury will be unaffected and continue to work as normal (3,6).

2.1.7. Quadriplegia

This condition occurs when a person has a spinal cord injury above the first thoracic vertebra, paralysis usually affects the cervical spinal nerves resulting in paralysis of all four limbs. In addition to the arms and legs being paralyzed, the abdominal and chest muscles will also be affected resulting in weakened breathing and the inability to properly cough and clear the chest. People with this type of paralysis are referred to as Quadriplegic (3,6).

2.1.8. Paraplegia

This condition occurs when the level of injury occurs below the first thoracic spinal nerve. The degree at which the person is paralyzed can vary from the impairment of leg movement, to complete paralysis of the legs and abdomen up to the nipple line. Paraplegic patients have full use of their arms and hands (3,6).

2.1.9. Level of injury (Lesion)

The level of injury, otherwise known as a lesion, is the exact point in the spinal cord at which damage has occurred. The levels are determined by counting the nerves from the top of the spine downwards, and these nerves are grouped into four different areas. These are the Cervical, Thoracic, Lumbar and Sacral parts of the spinal cord (3).

These areas are important in defining quadriplegia and paraplegia, as damage to the spinal cord at these points directly determines how groups of muscles, organs and sensations will be affected (3).

There are two types of lesions, these are a complete injury and an incomplete injury. Someone with a complete injury will have complete loss of muscle control and sensation below their level of lesion. An incomplete injury is where may be only the muscles have been paralyzed, or where there is impaired sensation (3).

2.2. BLADDER AND KIDNY FUNCTIONS BEFORE SCI

2.2.1. Urinary system

The kidneys are essentially regulatory organs which maintain the volume and composition of body fluid by filtration of the blood and selective reabsorption or secretion of filtered solutes. Kidneys are retroperitoneal organs located behind the peritoneum situated on the posterior wall of the abdomen on each side of the vertebral column, at about the level of the twelfth rib. The left kidney is lightly higher in the abdomen than the right, due to the presence of the liver pushing the right kidney down (8). The kidneys take their blood supply directly from the aorta via the renal arteries; blood is returned to the inferior vena cava via the renal veins (8). Urine (the filtered product containing waste materials and water) excreted from the kidneys passes down the fibro-muscular ureters and collects in the bladder and normally is sterile (8). The bladder muscle (the detrusor muscle) is capable of distending to accept urine without increasing the pressure inside; this means that large volumes can be collected (500-700ml) without high-pressure damage to the renal system occurring (8). When urine is passed, the urethral sphincter at the base of the bladder relaxes, the detrusor contracts, and urine is voided via the urethra (8).

The degree to which a patient's body will work following a spinal cord injury resulting in quadriplegia or paraplegia will depend on the level of injury, and whether the injury was complete or incomplete (3).

Urine is then discharged via the urethra, through the penis in men or the vulva in women. The bladder has two functions, a storing one and an expelling one. Initially it receives the urine from the kidneys and stores it. As the bladder fills the muscle of the bladder wall (the detrusor muscle) relaxes, this is extremely important as it allows the urine to be stored at low pressure; the bladder stretches to hold a large quantity, once sufficient urine has been collected, a person will become aware of the need to pass urine and the bladder then contracts to empty itself. At the same time as the bladder is contracting the valve mechanism around the exit from the bladder (called the sphincter) relaxes to allow the urine to pass down the exit pipe from the bladder (the urethra). At all other times the sphincter muscles are contracted and prevent incontinence (3,6 & 8).

2.2.2. Nervous control of the bladder before SCI

Nerves contain fibers that convey electrical messages to and from the organs of the body. These messages are divided into two main types, sensory and motor. The former is information coming from the organs of the body and the latter are signals going from the spinal cord to the muscles telling them to contract or relax. As the bladder fills the sensory nerves within its wall become stretched and send messages to the spinal cord. In the spinal cord these messages stimulate the motor nerves which are responsible for telling the bladder muscle (detrusor) to contract. The message passes back to the bladder and it contracts expelling all the urine it contains (3).

This interaction of sensory and motor nerves within the spinal cord related to the bladder is called the Micturition Reflex – the reflex that allows the storage and release of urine as required. At the same time other nerve cells in the spinal cord are stimulated and send messages to the sphincter muscle to relax (3).

This all occurs automatically without any conscious thought. This is the reflex we are born with, the bladder filling and emptying automatically. As a child develops it becomes aware of the sensation of bladder fullness but still cannot either initiate a bladder contraction or suppress one once it starts. With time and increasing development the child will be able to both suppress a bladder contraction until it reaches the potty and be able to initiate a bladder contraction on demand (3).

The bladder is normally controlled by a reflex interaction of the sensory and motor nerves that occurs in the sacral section of the spinal cord. This reflex activity is controlled by signals sent down the spinal cord from the brain which also receives sensory information from the bladder via the base of the spinal cord (3).

2.2.3. Bladder function immediately following a spinal cord injury

2.2.3.1. Spinal shock

Immediately following SCI the entire spinal cord ceases to function and all reflex activity is lost. This is called spinal shock and has numerous effects. One of these results is complete inactivity of the bladder. The bladder simply fills to capacity and overflows with urine continuously leaking out. If untreated this is potentially dangerous for a number of reasons:

1. There is a very high risk of urinary system infection.
2. Kidney function may be affected by the overfilling of bladder leading to urine passing up the ureters to the kidneys.
3. The bladder muscle may be irreversibly damaged by overstretching.

Spinal shock will last for a variable time and the bladder must be drained either by an indwelling catheter or regular intermittent self catheterization (3,8).

2.2.3.2. Bladder recovery

Following the initial period of spinal shock the pattern of bladder behavior will depend on the level of SCI, its completeness and the state of the spinal cord below the level of the injury. The tip of the spinal cord (the sacral section) provides the nerve supply to the sexual organs, rectum and parts of the legs and feet in addition to the bladder (3,8).

2.3. COMPLICATIONS ASSOCIATED WITH CHANGES IN BLADDER BEHAVIOR AFTER SCI

2.3.1. Incomplete bladder emptying and urinary tract infection

Before a SCI patients are usually able to completely empty the bladder each time they pass water. This is one of the most important defenses against UTI. In any situation in which the bladder does not fully empty there is an increased risk of UTI from bacteria growing in the urine. Both reflex and flaccid bladders after SCI may not empty fully. UTI may result which as well as causing unpleasant symptoms (such as fever and sickness), can also result in kidney damage (3).

2.3.2. Incontinence of urine

Following SCI, normal control of urination will be lost. If the bladder develops a reflex pattern it may empty spontaneously without any conscious control. Even with a flaccid bladder incontinence can occur - either because of overflow (continuous dribbling because the bladder is so full) or as a result of a co-existing weakness of the sphincter, this is called stress incontinence.

Not only is incontinence unpleasant and sometimes distressing, it can also contribute to skin problems and pressure sore development (6,8).

2.3.3. Kidney damage

The kidneys can only continue to produce urine if the pressure within the ureters is low. If the bladder pressure is high, back pressure up the ureters can stop the kidneys producing urine. Prolonged high bladder pressures, especially if combined with UTI will cause progressive scarring of the kidneys. If the bladder pressure is very high urine can be forced from the bladder back up the ureters. This process, which is called reflux is particularly damaging to the kidneys especially if the urine is infected. Reflux can also lead to kidney infections which can be hard to detect without sensation except for a high temperature (6,8).

2.4. URINARY TRACT INFECTIONS (UTIs)

Urinary tract infections (UTIs) are defined as an inflammatory syndrome caused by microorganism's invasion of the urinary tract. They affect a variety of patients ranging from young children to the elderly, and from healthy men and women to the compromised. UTIs are the most common bacterial infection and have a significant societal and economic burden. Most UTIs are treated by family physicians and are usually uncomplicated. However, in some patients, such as spinal cord injury and diabetics, UTIs are more complicated and demand further considerations and longer treatment periods (4).

The body has many defense mechanisms against UTI, but the most important is that the bladder is regularly and completely emptied and any bacteria present are therefore flushed out. If this does not occur there will always be stagnant urine in the bladder and bacteria present will be able to multiply and cause an infection (4). UTIs are more common in patients with SCI because of incomplete bladder emptying and the use of catheters, which can introduce bacteria into the bladder (4).

UTIs are the conditions where one or more structures in the urinary tract become infected after bacteria overcome its strong natural defenses. In spite of these defenses, UTIs are the most common of all infections and can occur at any time in the life of an individual. Almost 95% of cases of UTIs are caused by bacteria that typically multiply at the opening of the urethra and travel up to the bladder (known as the ascending route) (3,4).

UTIs are frequent medical complications during the initial medical and rehabilitation period after SCI and continues to be a problem throughout the life of many SCI patients. The urine of patients with neurogenic bladders frequently contains bacteria, and *Escherichia coli* is among the most frequent bladder colonizers (8).

2.4.1. Community-Acquired Infections

Most UTIs are thought to develop in the community at large. It is unclear how primary community-acquired infections occur or how they are spread. Although most cases have been thought to arise sporadically (9).

2.4.2. Hospital-Acquired Infections (Nosocomial Infections)

UTIs are also commonly acquired in the hospital, often due to contaminated urinary catheters. Hospital-acquired infections (known as nosocomial infections) tend to be more serious because the bacteria that cause them are often resistant to drug treatment and patients are often in poor general health (9).

2.5. CILINICAL ENTITIES OF UTI

Urinary tract infection is a broad term that encompasses different clinical entities which include:

a) Asymptomatic bacteriuria: Significant bacteriuria without symptoms.

b) Uncomplicated urinary tract infection: Infection in a patient with a normal, unobstructed genitourinary tract with no prior instrumentation.

c) Complicated urinary tract infection: Infection in a patient with structural or functional abnormalities. This also includes men, pregnant women, presence of foreign body (urinary catheter, stone).

d) Relapse: Recurrence of bacteriuria with the same microorganism within seven days of therapy and implies failure to eradicate infection.

e) Reinfection: Recurrence of bacteriuria with a new microorganism. Reinfection is difficult to differentiate from relapse when infection occurs with a microorganism of the same species as the initial infection. Approximately 80% of recurrent infections are due to reinfection.

f) Cystitis: Inflammatory syndrome and infection of the bladder with signs and symptoms of dysuria, frequency, urgency, and suprapubic tenderness.

g) Pyelonephritis: Bacterial infection of the kidney involving flank pain, tenderness, and fever, and often associated with dysuria, urgency, and frequency. This condition may be acute or chronic.

h) Urethritis: Lower urinary tract inflammation with / without bacterial infection, causing symptoms similar to those of cystitis. Most often associated with sexually transmitted diseases such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae*.

i) Prostatitis: Encompasses several different clinical entities, from bacterial infection to inflammation to pain, which cause symptoms related to the prostate gland.

2.6. EPIDEMIOLOGY OF UTIs AMONG SCI PATEINTS

The risk of acquiring UTI depends on the method and duration of catheterization, the quality of catheter care, and host susceptibility. Reported infection rates vary widely, ranging from 1 %-5 % after a single brief catheterization to virtually 100 % for patients with indwelling urethral catheters draining into an open system for longer than 4 days (10).

Catheter-associated UTIs are caused by a variety of pathogens, including *Escherichia coli, Klebsiella, Proteus, enterococcus, Pseudomonas, Enterobacter, Serratia*, and *Candida*. Many of these microorganisms are part of the patient's endogenous bowel flora, but they can also be acquired by cross-contamination from other patients or hospital personnel or by exposure to contaminated solutions or non-sterile equipment (11).

Asymptomatic bacteriuria is common (70 %) in SCI patients under self-catheterization, with UTI being the most frequent complication (12).

Adoption of the closed method of urinary drainage has markedly reduced the risk of acquiring a catheter-associated infection, but the risk is still substantial. As recent studies have shown, over 20% of patients catheterized and maintained on closed drainage on busy hospital wards may be expected to become infected (13). In the community, approximately 5–10% of older men and 10–20 % of older women have asymptomatic bacteriuria (10). In nursing homes, the incidence can be as high as 25-50% (10).

Prieto-Fingerhut *et al* (1997) determined the effect of sterile and non-sterile Self Intermittent Catheterization (SIC) on the incidence of urinary tract infection in 29 patients after SCI, they reported a 28.6% UTI incidence in sterile SIC while in the non-sterile catheterization group the incidence was 42.4 % (14).

Bakke (1993) found that among patients with neurogenic bladder, during an observation period of one year, 24.5 % were with non-clinical UTI, 58.6 % experienced minor symptoms, 14.3 % had more comprehensive or frequent symptoms, while 2.6 % claimed major symptoms (15).

2.7. SYMPTOMS AND SIGNS OF UTI

The most typical UTI symptoms are:

- Frequency of micturition by day and night.
- Painful voiding.
- Suprapubic pain and tenderness.
- Hematuria (blood in urine).
- Smelly urine.

In patients with SCI the signs and symptoms of UTI may differ. Some will get all of the above whilst others will get none. Some will just feel unwell, sweaty and headachy but not notice any change in the urine and others will notice difficulty in passing urine or passing catheters (8).

Most patients will learn from experience what symptoms or signs they personally get with a UTI.

2.8. FACTORS INCREASING THE RISK OF UTI

Some patients are more prone to getting a UTI than others. It varies because of inherited factors such as age and sex. Sometimes diabetes mellitus, fluid intake, neurogenic bladder, urinary catheterizations and stones in the urinary tract are risk factors for developing UTI (16).

2.8.1. Age and sex

UTI affects people in varying incidences depending on age group and gender. In the pediatric population, boys are at greater risk before the age of 3 months but girls become at greater risk thereafter. Approximately 3 % of prepubertal girls and 1 % of prepubertal boys are diagnosed with a UTI. In male infants, circumcision is associated with a decreased rate of UTI (4).

When all age groups are combined, women are at greater risk than men of developing a UTI. As many as 40–50 % of females report having at least one symptomatic UTI in their lives. Young sexually active women are particularly prone to UTIs with an incidence of approximately 0.5 episodes per person per year. This is not the case in men younger than 50 years of age, where UTIs are rare and are generally secondary to urologic abnormalities (17).

The picture is somewhat different in older men, where increasing prostatic hypertrophy may obstruct urine flow and increase the risk of developing a UTI. In older people in general, UTIs are also the most common bacterial infections, and these infections are often asymptomatic (8).

2.8.2. Diabetes mellitus

Patients with diabetes have a higher risk for UTI because of changes in the immune system. UTIs are more severe and serious in diabetic women and can cause renal and perirenal damage (18).

2.8.3. Fluid intake

A good fluid intake is vital during the process of bladder retraining and also throughout subsequent life with SCI. It not only keeps the bladder free from UTIs and stones but maintains a healthy bowel. An inadequate fluid intake can increase the risk of infection and concentrated urine can cause bladder irritation, and it also causes constipation (8).

Excessive fluid intake will lead to large volumes of urine being produced that may over-stretch the bladder. It may also cause problems with incontinence between catheterizations or difficulties with overflowing leg bags (8).

The generally recommended minimum fluid intake is two liters per day. It is important to spread this evenly throughout the day, especially during bladder training (6).

Reducing fluid intake in the evenings is important as excessive production of urine overnight is obviously undesirable (6).

It is also true that following SCI, urine production at night is relatively increased. This is because when lying down, fluid that has accumulated in the paralyzed legs during the day will re-enter the blood stream and be filtered out by the kidneys, so filling the bladder. It is not necessary to precisely measure every drink taken. As a guide to volumes an average hospital cup of tea or coffee is about 200 mls (6).

2.8.4. Neurogenic bladder

2.8.4.1. Reflex bladder (spastic bladder)

When the spinal cord is injured, the bladder activity will recover but without any sensation or control from the brain. The bladder will thus generally fill to a certain level and then contract automatically (3).

This sort of bladder is called a "reflex bladder" and will generally arise from any injury above the T6 level of the spinal cord provided that the cord below the level of the injury survives (3).

There will be no sensation of filling and the contractions and passing of urine will be completely uncontrolled. Because the bladder contractions arise as a result of a reflex, they can sometimes be triggered by tapping the lower abdomen or sudden movement such as transferring (3).

Provided the reflex contractions empty the bladder regularly and completely and the pressure within the bladder remains low (allowing bladder to fill without backing-up to kidney) this sort of bladder can be managed safely (3).

Often the sphincter does not relax properly during reflex bladder contractions and this results in incomplete emptying. If the sphincter does not remain relaxed and shuts off before full emptying, this can lead to dangerously high bladder pressure (3).

The uncontrolled bladder contractions will of course result in incontinence. Men are able to wear external catheters (condoms) to control this successfully. As yet no such device has been devised for women. It may however be possible through very careful fluid intake control and regular stimulation of the Micturition Reflex for women with reflex bladders to control their incontinence. This would necessitate transfers onto a toilet at regular intervals (19).

2.8.4.2. Flaccid bladder (a contractile bladder)

If the SCI affects the part of the spinal cord responsible for the reflex activity (levels S2-4) or destroys nerves connecting the spinal cord to the bladder then the bladder will completely lose its activity. This part of the spinal cord lies at about the 12th thoracic or first lumbar vertebra. So injuries at T12 or below are liable to result in a flaccid or a contractile bladder. In a flaccid bladder there will be no sensation of filling and the bladder muscle will simply relax as the bladder becomes fuller. There will be no reflex or voluntary bladder contractions and the bladder will simply fill until it overflows with a constant dribbling incontinence. The bladder doesn't tend to empty completely and so it is extremely vulnerable to UTI. The pressure within such a bladder is not usually high but can be sufficient to cause kidney damage in the long term if it continually overfills.

Provided it is regularly and completely emptied an acontractile bladder can be safe and continent. Emptying is generally by regular intermittent self-catheterization through Nylaton catheters or indwelling catheters (19).

2.8.4.3. Mixed bladders

As with everything following SCI, bladder behavior is not always completely predictable and much depends on whether the injury to the spinal cord is complete or incomplete after recovery. It will usually follow the above patterns in complete injuries but with incomplete injuries the pattern can be a confusing mixture of reflex and flaccid bladder behavior with or without sensation. It may be thought that the bladder is functioning normally but due to altered sensation this may be misleading and bladder pressures may be dangerously high and residual urine volumes high, so placing patient’s health at risk (19).

2.8.5. Urinary catheterization

2.8.5.1. External catheter (Condom)

Men are fortunate in having an external catheter to which it is possible to attach a device to collect urine and control incontinence (20).

Initially forty to fifty years ago standard contraceptive condoms were used; these were attached to the penis with glues and tapes and attached to drainage tubing and bags to collect the urine. Nowadays numerous different types of sheath are available in various sizes and using various materials and adhesives (20).

These are a great improvement as problems with reactions to condoms (latex) or adhesives used to be very common and difficult to deal with. The purpose designed drainage systems now in use are also a great improvement (20).

It is important to get a good fit (too tight can damage the penis and too loose can lead to leakage problems) (3).

The condom should generally be changed every day and it is a good idea to allow the penis to "breathe" for a few hours each day by leaving the sheath off. Penis size, reflex erections, retracted penises, obesity and skin sensitivity can all cause problems with fitting condom but with the variety now available it is usually possible to find a system that suits each patient (3,20).

If the bladder is not emptying completely with each reflex contraction, residual urine can build up and cause problems with UTI. It is important if relying on reflex emptying and a condom, to ensure that the bladder empties as fully as possible. Reflex emptying is only appropriate for those whom some of the reflexes controlling the bladder, remain intact (3).

Advantages

- catheter free.
- reduced risk of infection, and stone formation.
- bladder continues to fill and empty naturally, reducing long term problems.
- often will be reliably dry for predictable periods.
- reflex voids can be stimulated to empty bladder on demand.
- sexual function is not impeded by urethral catheters.

Disadvantages

- condom and leg bag required.
- altered body image and problems of condom and bag leakage.
- need good manual dexterity to do this and therefore care might be needed to help with this method
- bladder pressure may rise and endanger kidneys without outward signs.
- residuals may rise without outward sign until UTI or kidney problems become apparent
- regular reviews important.
- as a man gets older, the penis tends to retract and this affects the efficacy of using the condom.
- penile pressure sores in problems with inappropriately fitted condoms.

2.8.5.2. Intermittent self-catheterization

Intermittent self-catheterization (ISC) was initially proposed more than 30 years ago to address the clinical problems associated with mechanical or functional urinary voiding dysfunction. Early studies were done in patients with traumatic SCI. Guttmann and colleagues (2002) recommended strict aseptic technique to prevent UTI (21).

ISC is a safe and effective method of completely emptying the bladder at regular intervals. ISC should be done every 3 to 8 hours, or as recommended by the physician and never stop ISC unless instructed by the physician (21). At first, the thought of having to pass a catheter regularly into ones bladder was worrying. Patients with SCI are concerned whether they will physically be able to do it and also that they will be introducing infection into the bladder (21).

It is well proven that regular ISC is as effective as regular sterile catheterization in preventing UTI and much more effective than an indwelling catheter. By catheterizing himself, it is generally agreed that there is less chance of infection, because patients will not have another person introducing microorganisms that lead to UTI (3).

Plain non-lubricated catheters are used with a lubricant such as KY jelly and can be cleaned and re-used for up to a week safely. The main advantage is simplicity and the need only to carry one catheter and a tube of gel. The actual choice of which catheter to use can be confusing because so many options are available. Generally the smallest calibre (8,10, 12 or 14 French gauge normally) should be selected (21).

Advantages

- no permanent foreign body in bladder.
- low UTI risk - as long as one follows the basic rules of hygiene.
- no external appliance needed and full continence possible.
- good bladder capacity will be maintained.
- sexual function should not be impaired.
- body image not affected.

Disadvantages

- good manual dexterity is required.
- personal hygiene needs to be good.
- time consuming.
- relatively strict fluid intake regime required.
- embarrassment and privacy issues.

2.8.5.3. Indwelling catheters

An urethral catheter is one that passes into the bladder through the urethra, this is usually the first form of bladder management most SCI patients experience after their injury. They are quick and easy to put in and very reliable at draining the bladder in the short term. They are therefore ideal for managing the bladder in the initial phases of spinal shock (20).

Many patients become comfortable with their urethral catheters and therefore question the need to change to other forms of bladder management as recovery and rehabilitation proceed. If urethral catheters were always trouble-free then they would be an obvious and easy option for long-term bladder management in many patients (3).

Unfortunately this is not the case and many complications can arise from long-term indwelling urethral catheterization. These complications include loss of bladder capacity due to contraction of the bladder around the catheter, catheter bypassing and blockages, bladder stones, urinary infection, kidney damage, urethral damage and even rarely bladder cancers. It is for these reasons that where possible an alternative to a urethral catheter will be recommended (3).

Living with an indwelling catheter

If an indwelling catheter (urethral or suprapubic) is to be used – either temporarily or permanently – then it is important that good catheter care is used to minimize the problems (3).

Good hygiene and regular cleaning around the suprapubic site or urethra is clearly important and will reduce infection problems (3).

Maintaining a high flow of urine through the catheter and bladder will reduce the chances of stones forming, catheters blocking and UTI arising. The most important way of achieving this is to have a good fluid intake. Most units recommend a minimum of three liters per twenty-four hours (3).

Indwelling catheters can either be on free drainage or intermittent drainage, using a clip or catheter valve. In the former, the catheter is simply attached to the drainage bag and the urine continuously flows into the bag. With intermittent drainage a catheter valve or clip is used to stop drainage, and released periodically to allow the bladder to empty through the catheter into the toilet, a bottle or leg bag (3).

UTI, stone formation and catheter blockages can all be deferred by keeping the urine acidic. This can be achieved by taking citrus juice. Sometimes it will be suggested that certain drugs could be used for the same reason such as vitamin C (4).

Advantages

- unlimited fluid intake.
- bladder pressures will usually remain low protecting the kidneys.
- people with high lesions will be relatively independent of carers except for blockages and changes.
- catheter management familiar to non spinal injury nursing and medical staff.

Disadvantages

- permanent foreign body in bladder and urethra.
- urine permanently colonized with bacteria resulting in smelly urine and clinical infection rate becomes high.
- stone formation is common.
- risk of urinary tract tumors in long-term use.
- fertility and sexual function can be effected (with the high incidence of UTI).
- urethral erosion or scarring can occur.
- periurethral abscess and testicular infections may occur.
- over time bypassing around the catheter may develop.
- self-image affected in both sexes.
- women during menstruation have to be extra careful with personal hygiene.

2.8.5.4. Suprapubic catheters

Suprapubic catheters go through the lower abdomen directly into the bladder. They share many of the same problems as urethral catheters as they still involve a permanent foreign body in the bladder. However because the catheter does not lie in the urethra and through the sphincter many of the problems of urethral catheters can be avoided. They are also usually easier to change and better from a body image and sexual function point of view (20).

Advantages

All those of a urethral catheter plus.

- no urethral damage.
- easier to change (can be done by carer or patient).
- better for sexual function and possibly for body image.
- facilitates bladder training through clamping and releasing.
- may be less irritating to the bladder than a urethral catheter.

Disadvantages

- all of those of urethral catheter in terms of permanent foreign body in the bladder.
- can be difficult to insert, change and care for in the obese patients.
- requires a minor operation to position – possible complications.
- urethral leakage may be a problem (particularly if a urethral catheter has been used for a long time before) and may require medication or surgery to correct.

2.8.6. Stones in the urinary tract

Approximately 2 % of the population in the UK have urinary tract stone at any given time. Much higher prevalence of stone disease has been recorded elsewhere, notably in the Middle East (8).

In the western world, most stones occur in the upper urinary tract. Most urinary stones are composed of calcium oxalate and phosphate. Mixed infective stones are composed of magnesium ammonium phosphate together with variable amounts of calcium. The overall male / female ratio in the term of stone development is about 2:1. Significant bacteriuria is usually found in patients with bladder stones (4).

2.8.6.1. Risk factors

Stone formation in the urinary tract is common after SCI for many reasons. Immobility and loss of muscle tone after injury can cause the bones to lose a lot of calcium and other minerals that pass via the blood into the urine. They can then form stones in the kidneys or bladder. Other factors also encourage stone formation including the presence of catheters in the bladder and UTI. The commonest foreign body that precipitates stone formation in the bladder is an indwelling catheter (4).

The commonest stones in people with SCI are bladder stones, usually associated with catheter use (indwelling urethral or suprapubic and less commonly ISC). These can cause recurrent or drug-resistant UTIs, frequent catheter blockages, bladder irritation causing bypassing of the catheter. Bladder stones related to catheters are usually quite soft and can be broken up and flushed out (8).

2.8.6.2. Prevention of stone formation

Urinary stones are generally the result of concentrated, alkaline, infected urine and foreign bodies in the bladder. To reduce the risk of stone formation it is vital therefore to maintain a good fluid intake and urine output three liters a day or more, so that the urine itself is very dilute (flushes out small particles in the urine) (4). If the urine is alkaline then the chemicals that form stone will do so more easily. If the urine is more acidic, then the chemicals are more likely to remain dispersed in the urine and not form stones (22).

High dose vitamin C and any citrus fruit (oranges, lemons etc) all acidify the urine and help reduce stone formation and urinary infection (22).

Infection in the urine can cause stone formation mainly by making the urine more alkaline. It is therefore important to prevent infections where possible and to treat them rapidly when they do occur (8).

2.9. PREVENTION OF UTIs

UTIs in patients with SCI are usually the result of excessive residual urine or the presence of foreign bodies such as catheters or stones in the urinary tract. It is important that the bladder empties completely because if it does not, the stagnant urine that is always present in the bladder is the ideal environment for bacteria to multiply and cause UTIs (4).

For this reason when relying on a condom, it is important to monitor the residual urine volume. If this is found to be high then it may be sensible to change bladder management in some way to reduce the risk of infection. When an indwelling catheter is used, the urine will always contain bacteria which have colonized the bladder. The skin is naturally covered with bacteria whilst the bladder is sterile. When a permanent catheter is present, the bacteria on the skin will extend along it into the bladder (3).

Colonization is however, not the same as infection. UTI only occurs when the bacteria are dividing rapidly and attacking the lining of the bladder (19). It is impossible to eliminate urinary colonization, for this reason it is important that when an indwelling catheter is used, only symptomatic UTIs (temperature, unwell, smelly discolored urine) are treated (8).

Using antimicrobials to "treat" asymptomatic colonization of the urine is potentially dangerous and leads to antimicrobials being less effective (4). Before resorting to antimicrobials, the progress from colonization to UTI can usually be prevented by simple measures including increased fluid intake, good catheter hygiene, regular catheter changes and so on. In some instances, urine acidifiers such as citrus juice may also help (3).

2.10. REHABILITATION

2.10.1. Definition of Rehabilitation

Rehabilitation can be defined as a holistic and integrated program of medical, physical, psychosocial and vocational interventions that empower a disabled person to achieve a personally fulfilling, socially meaningful and functionally effective interaction with the world. As rehabilitation seeks to empower, it is a mechanism for a disabled person to reclaim his or her world and a process whose goal is morally congruent with our society's exaltation of "independence" (3).

Rehabilitation is a process that extends from the point of admission, well past discharge, to the point of successful re-integration into society. This process involves a continuum of services beginning with the emergency medical system and extending through the acute and rehabilitation hospital stay into a program of lifetime medical care (3).

Patients with SCI are best treated in tertiary care facilities that include a direct linkage with emergency medical services, full trauma team availability, spinet specialist, Neurourologists, and on-site consultation by the staff of an accredited SCI rehabilitation program. A co-ordinated system of care shortens hospital stays and improves efficiency of function gains made during rehabilitation (53).

The successful rehabilitation process is comprehensive: It includes prevention, early recognition, and inpatient, outpatient, and extended care programs: The comprehensive rehabilitation program for SCI is comprised of several health care professionals including the physicians, occupational therapist; physical therapist, therapeutic recreation specialist, prosthetist, orthotist, nurse, speech pathologist, respiratory therapist, psychologist, social worker, vocational counselor, and engineer (53).

The coordinated effort of all these professionals is referred to as the team approach. The health care team is defined as a group of health care professionals from different disciplines who share common values and work toward common objectives. Healthcare professionals agree that healthcare delivery using the team approach is more effective than fragmented care for patients with long-term disabilities (53).

2.10.2. Definitions Used in Rehabilitation

- **Health:** is the optimum condition of a person including the physical, mental and social well-being, so health is not merely the absence of a disease or disability (3).
- **Disease:** is that diagnosis or disorder characterized by a set of signs, symptoms and pathology and is attributable to infections, diet, hereditary or environment (3).

2.10.3. International Classification of Impairment, Disabilities, and Handicap (ICIDH) -1980

- **Impairment:** any loss or abnormality of physiological, psychological or anatomical structure or function.
- **Disability:** any restriction or lack of activity resulting from an impairment to perform an activity in the manner (or average) considered to be normal for people of the same age, sex and culture.
- **Handicap:** is a disadvantage for a given individual resulting from impairment or disability that limits or prevents the fulfillment of a role in society that would otherwise be normal for that individual.

2.10.1. International Classification of Impairment, Disabilities, and Handicap (ICIDH) -1999

- **Impairment:** any loss or abnormality of physiological, psychological or anatomical structure or function.
- **Activity limitation**: the nature and extent of functioning of a person. It may be limited by nature, duration and quality.
- **Participation restriction:** a problem in the manner or extent of person's ability to participation in a life situation.

2.10.5. Phases of Rehabilitation

The rehabilitation process may be divided into four or five phases. These phases create a framework for visualization of how the person may progress (Figure 3.1) through rehabilitation. The progression of a patient through the rehabilitation process will vary greatly from one individual to another. The SCI patient may move back and forth in the phases as well as have a great deal of overlap between and within the phase framework (53).

2.10.5.1. Phase one

Immediately after SCI, there is a loss of function due to neurotrauma and immobilization. The principal emphasis of rehabilitation is to lessen the adverse effects of immobilization. Thus phase one includes all therapeutic intervention during the critical and acute care stages of rehabilitation. This phase may last from a few days to several weeks depending on the severity and level of injury and other associated injuries. Although therapeutic intensity may be limited, patients may begin out-of-bed activities. Goals during this phase may address prevention of secondary complications (53).

2.10.5.2. Phase two

This period may be referred to as the early rehabilitation phase. During this time, out-of-bed activities are tolerated for longer periods of time, and the patient begins to work toward specific long-term goals. In accordance with Medicare guidelines for rehabilitation, the patient is able to participate in therapeutic programs a minimum of three hours a day. The intensity of therapy may continue to be limited due to unresolved medical issues (53).

2.10.5.3. Phase three

This period in rehabilitation is the most active and often the most rewarding. During this period the efforts of weeks and months of work are realized and tangible results can be seen. The SCI person gains varying levels of independence in specific skills and may begin to believe that there is life after SCI. The patient may be taught advanced skills in transferring, wheelchair mobility, gaiting, grooming, and other activities of daily living. Outings may be scheduled to refine advanced skills and foster community re-integration (53).

2.10.5.4. Phase four

This phase largely encompasses activities aimed at a smooth transition to home. Although discharge planning culminates during this phase, it has been ongoing throughout all phases. Discharge planning must be initiated at the time of admission and continue to be integral to treatment planning and goal setting during the entire rehabilitation process (53).

The following will be completed unless otherwise noted:

(1) family training,
(2) home modification recommendations,
(3) vocational testing/planning (in process),
(4) final arrangement for discharge equipment (delivery and fitting),
(5) home management,
(6) home exercise programs,
(7) referrals to outside agencies, and
(8) driving evaluation.

2.10.5.5. Phase five

This phase is comprised of outpatient and other follow-up services, as well as community reintegration. Individuals may return to work or school and resume other family responsibilities (53).

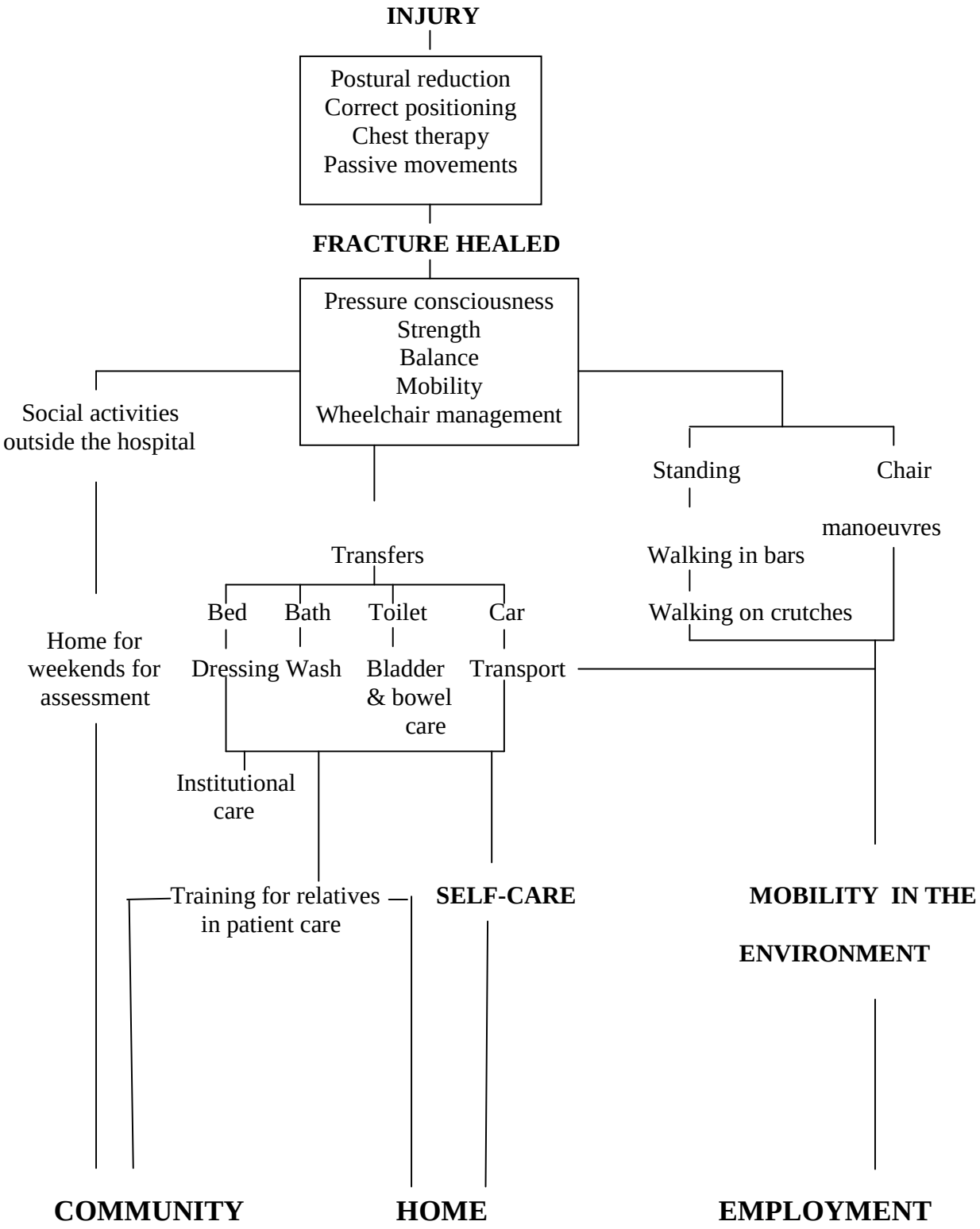


Figure 3.1. A framework for progress of an individual through rehabilitation

(Adopted from ref. 53)

CHAPTER (3)

LITRATURERENIEW

CHAPTER (3)

LITERATURE REVIEW

Paraplegic patients as one of the most common type of SCI who have been trained for using SIC and condom catheters. This chapter will discuss the literature review which conducted in urinary tract infections among SCI patients.

3.1. UTI in SCI patients

Kass (1956) first introduced the concept of significant bacteriuria in an attempt to negate the problem of growing contaminants. He demonstrated that the presence of more than 10 colony forming units of bacteria per ml (CFU/mL) of urine in a single specimen indicated bacteriuria with a probability of greater than 80 % which could be increased to more than 90 % or up to 99% when 2 or 3 consecutive specimens were examined. In symptomatic patients, increased fluid intake may dilute the urine and decrease bacterial counts or they may have received antibacterial therapy in the recent past. In some patients with recurrent infection and uroepithelial damage, the bacterial count may not reflect clinical realities (23).

Montgomerie, *et al* (1980) investigated the prevalence of *Pseudomonas aeruginosa* colonization of patients with SCI from 1976 to 1980. A total of 224 men and 32 women were studied. Most patients were managed with an external urinary collection system and intermittent catheterization. *P. aeruginosa* was cultured from one body site (urethra) in 65 % of men and 18 % of women. Significant bacteriuria with *P. aeruginosa* was present in 19 % of the men and 13 % of the women. *P. aeruginosa* colonization of body site in men was closely associated with the use of an external urinary collection system. Significantly greater urethral colonization was found in men using an external urinary collection system. The antibiotic susceptibility of the strains of *P. aeruginosa* isolated from these patients did not change in the 5 years (24).

Ribo *et al* (1981) recommended that, in the presence of pyuria, the microscopical finding of microorganisms in the urine sediment that fail to grow on routine aerobic cultures should lead to bacteriologic examination of urine for anaerobic bacteria (25).

Donna, *et al* (1981) reported that *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* colonization in humans with SCI who were using the external urinary collection system showed that meticulous bathing with the bar soap issued by the hospital did not eliminate colonization and was frequently associated with the shifting of these bacteria to adjacent sites on the body. Bacterial counts of the skin showed that bathing did reduce the numbers of *P. aeruginosa* and *K. pneumoniae* found on the skin surface and temporarily eliminated these bacteria from some sites (26).

Donna, *et al* (1982) showed that colonization with *Pseudomonas aeruginosa* varied from year to year in men, with some decrease over the years. The greatest incidence of *P. aeruginosa* bacteriuria was found in men using an external urinary collection system or indwelling catheter. *P. aeruginosa* bacteriuria was uncommon in men managed solely by intermittent catheterization. Men using an external urinary collection system had significantly greater colonization with *P. aeruginosa* in the urethra than men who did not (27).

DeVivo, (1993) pinpointed that diseases of the urinary system ranked 13 out of the 19 primary causes of death in SCI patients, and as a secondary cause of death, such diseases were the most common cause of death in these patients. Overall, diseases of the urinary system were the fifth most common cause of death. For this reason, UTI continues to pose a major threat to the health of paraplegic patients due to spinal cord damage. For example, UTI is the most frequent secondary medical complication reported by the federally designated Model Spinal Cord Injury Systems during acute care and rehabilitation where, 80 % of individuals in this population reported a UTI. UTI is also the most common complication after discharge: 57 % of individuals experience a UTI in the first post-injury year. Moreover, 80 % of the individuals will have experienced a UTI at some point by their 16^{th} year post-injury (28).

Bennett, *et al* (1995) concluded that *E. coli*, *Pseudomonas* species, *Klebsiella* species and *Enterococcus* have been the predominant microorganisms that cause UTIs in patients with SCI. A high prevalence of *Proteus* species, which may relate to the more frequent use of indwelling catheters, has been noted at some centers. *Klebsiella, Pseudomonas*, and *Proteus* species tend to be more resistant than *E. coli* to commonly used antibiotics, but out-breaks of infection with multi-resistant gram-negative *bacilli* have been described relatively infrequently in SCI units. Additionally, the patient's sex may affect the microbiology of bacteriuria and colonization. The incidence of infection with *Klebsiella* and *Pseudomonas* species among male patients has been high, which may be related to the use of external condom catheters. Whereas in female patients with SCIs who underwent intermittent catheterization, *E. coli* and *Enterococcus* species accounted for 71% of infections (29).

Falahatkar, *et al* (1995) reported that 50 spinal cord transected war victims of Gilan province, north of Iran, were recruited and complete laboratory tests, including urine culture and antibiogram were performed for all patients. Twenty three (46 %) of the total 50 war victims with spinal cord transection suffered from UTI, and the remaining 27 (54 %) had sterile urine. They showed that a considerable number (88 %) of the patients had some form of drug resistance which is probably due to the indiscriminate use of antibiotics in war victims. The authors recommended to treat spinal cord transected war victims suffering from UTI, with the more available and cheaper antimicrobials such as cephalexin and amoxicillin in the first line and resort to more costly antimicrobials for special cases (30).

DeVivo (1998) who investigated 239 SCI patients concluded that urinary tract complications were the leading cause of rehospitalization, contributing to over 42 % of all hospitalizations. Urinary tract complications were the primary cause in 29.6 % of the cases and a secondary cause in 12.8 % of cases. Urinary tract complications were almost always infections (UTIs). Pyelonephritis, a sign of a more severe upper tract infection, occurred in 24 instances; while the remaining 120 infections were less specific (31).

El Ayyat (2003) investigated, in Public Health Department, Theodor Bilharz Research Institute, the significance of urine analysis in detecting urinary tract diseases, in a community based in rural Eygpt, to help in early diagnosis and prevention of them. The total sample was 328 subjects (166 males and 162 females), the author showed that 17.1% indicated UTI and 12.6 % indicated asymptomatic hematuria due to urinary stones and infection (32).

Jung (2006) reported that injury characteristics are important for the development of urinary stone in chronic traumatic SCI. In addition, his findings suggest that in men who cannot use SIC or when the bladder cannot empty spontaneously, suprapubic cystostomy is better than urethral catheterization to avoid renal stone formation. The author also showed that more than 50 % of *E. coli* isolated from the patients enrolled in the study were resistant to ampicillin, more than 40 % were resistant to sulphonamide and more than 30 % were resistant to trimethoprim (33).

Salomon, *et al* (2006) concluded that, asymptomatic bacteriuria is common (70%) in SCI patients under self-catheterization, with urinary tract infection being the most frequent complication. They also showed that the symptoms of UTI were non-specific. Factors increasing the risk of infection included over-distention of the bladder, vesicoureteric reflux, high pressure voiding, large post-void residuals and stones of the urinary tract (16).

3.2. Prevention and treatment of UTIs

Katul, *et al* (1970) stated that 1 g twice daily of methenamine hippurate as compared with placebo has preventive effect on recurrent attacks of acute cystitis. Methenamine hippurate and placebo were interchanged every six months for two years. There were 52 episodes of acute cystitis caused by reinfection; 41 occurred during placebo treatment and only 11 during the methenamine hippurate regimen. Extra fluid intake did not reduce the incidence of acute cystitis, nor did it reduce the effect of methenamine hippurate. Methenamine hippurate is an effective prophylactic agent against recurrent acute cystitis and has the advantage of not inducing cross resistance to conventional antibiotics (34).

Wiesner, *et al* (1972) reported that the cumulative percentage of 30 isolates of *S. aureus* were susceptible to increasing concentrations of cephalexin. At a concentration of 7.5 mg or less/ml, cephalexin inhibited and killed 100 % of strains of *E. coli* and *Proteus mirabilis* and more than 80% of strains of *Klebsiella* when tested against an inoculum of 10^5 bacterial cells /ml. However, increasing the inoculum size 100-fold from 10^5 to 10^7 bacterial cells/ml resulted in a diminution in the susceptibility of these isolates to cephalexin (35).

Calvin, *et al* (1993) showed that the frequency of recent sexual activity, pregnancies, and contraceptive practices were not statistically different between women with acute urinary symptoms and asymptomatic controls. *E. coli* and *Staphylococcus* species were the only microorganisms statistically associated with urinary symptoms and pyuria. Low counts of these organisms were found in 10.2 % of asymptomatic women. As the bacterial count increased, the association between these organisms and symptoms increased, and a step-wise increase occurred in the frequency and magnitude of pyuria. *E coli*, even at low counts, grew well in the patients own urine. Pyuria was present in 19.6 % of asymptomatic women and was associated with vaginal leucorrhea (36).

Walter, *et al* (1993) indicated that prevention of bacteriuria and associated complications in patients undergoing long-term catheterization has been largely unsuccessful. But intermittent catheterization has resulted in lower rates of bacteriuria than long-term indwelling catheterization in studies with appropriate controls. They added also that in patients undergoing intermittent catheterization, bacteriuria may be reduced by bladder irrigation with a solution of neomycin and by oral nitrofurantoin, or trimethoprim-sulfamethoxazole prophylaxis and that, prophylactic regimens are not effective in patients with long-term indwelling catheters. Likewise, treating episodes of asymptomatic bacteriuria does not reduce the complications of bacteriuria in patients undergoing long-term catheterization. The authors also defined relapse as the recurrent infection caused by the original infecting microorganism, usually within two weeks after the completion of therapy while, re-infection refers to recurrent infection with a different species or strain, usually more than two weeks after completion of therapy (37).

Raz, *et al* (1993) in their study on antimicrobial resistance of urinary isolates in Israel found that Haifa had higher resistance rates than Jezreel for Trimethoprim- Sulfamethoxazole and cefalexin, and higher overall antibiotic usage. However, prescribing rates for Trimethoprim- Sulfamethoxazole and cefalexin were similar despite substantial differences in resistance rates. The authors reasoned that differences existed in the two areas with respect to the age profile of the population and in the use of antibiotics in veterinary and agricultural practices (38).

DeVivo (1999) examined the efficacy of ciprofloxacin in eradicating susceptible organisms from the urine, urethra and perineum. The 25 men who had urine with $> 10^5$ bacterial colonies/ml were treated with 500 mg ciprofloxacin twice a day for 10 days. While the susceptible bacteria disappeared from urine in all subjects, at follow-up, 12 had cultures positive for ciprofloxacin-resistant bacteria. While the author supported the use of ciprofloxacin for treatment of UTIs in patients with SCI, in view of the super colonization with resistant organisms, the drug should be reserved for symptomatic persons not likely to respond to other oral agents (39).

Kahlmeter, *et al* (2003) found that there was no statistically significant correlation between the consumption of and resistance to sulfamethoxazole and trimethoprim. On the other hand, there were statistically significant correlations between consumption of broad-spectrum penicillins and quinolones in 1997 and 2000 and resistance to ciprofloxacin and nalidixic acid. Total antimicrobial consumption in 1997 was significantly correlated to ciprofloxacin and nalidixic acid resistance, and there were significant relationships between quinolone consumption in both years and resistance to gentamicin. *E. coli* with multiple antimicrobial resistance was significantly more common in countries with high total antimicrobial consumption (40).

Arslan, *et al* (2005) conducted a study on a total of 611 Gram-negative isolates; 321were isolated from uncomplicated UTI and 290 were isolated from complicated UTI. *E. coli* was the causative agent in 90 % of the uncomplicated UTI and in 78 % of the complicated UTI. Moreover, 17 % of *E. coli* isolated from uncomplicated cases and 38% of *E. coli* isolated from complicated UTI were found to be resistant to ciprofloxacin (41).

Salomon, *et al* (2006) in their investigation on Microbiological Unit, Raymond Poincare University Hospital, Garches, France, found that there was a significant decrease in antimicrobial consumption linked to the dramatic decrease in the incidence of UTI. At the start of the study the mean length of time under antibiotic treatment was 110 days per year. The antibiotics were frequently self-prescribed and broad spectrum (78 %). Following the Weekly Oral Cyclic Antibiotic (WOCA) programme, the mean total period under curative antibiotic treatment decreased to 14 days per year. Seventeen patients (44 %) did not take any curative antibiotics and only two patients received antibiotics for >50 days per year. The antibiotics selected were more closely adapted to the recommendations, with only 12 % broad spectrum. More than 90 % of patients were careful to take their antibiotic therapy as directed and there were no severe adverse events. The most frequent combination of antibiotics utilized was trimethoprim and sulfamethoxazole and cefalexin (30 %) followed by cefalexin and nitrofurantoin (25 %). The combination of antibiotics was modified in 40 % of the patients once, 20 % twice and 10 % on three occasions during the follow-up period (16).

3.3. UTI causing microorganisms and their antimicrobial resistance

In Egypt, Khalifa *et al* (1987) found that, the most common organisms causing UTI were *E. coli* (47.5 %) followed by *Klebsiella* species (17.1%), *Pseudomonas aeruginosa* (10.4%) and *Proteus* species (8.4 %). Some rare organisms were also isolated, such as *Candida albicans* (0.28 %) and *Streptococcus* species (0.27 %) (42).

Ahmed *et al* in Saudi Arabia, (1995) recorded that, *E. coli* was the commonest organism 50.1 % followed by *Klebsiella* species (28.33 %), *Pseudomonas* species (7.84 %) and *Proteus* species (4.91 %) (43).

In our region, Farah and Murshidi (1996) found in Jordan that, *E. coli* was the most frequently isolated organism from patients with community-acquired UTIs and occurred in 55.6 % of the cases, while Gram-positive *cocci*, isolated from 22 % of the study population were emerging as important hospital and community-acquired urinary tract microorganisms (44).

Different results were reported in the same country in the study by Abu Shaqra (2000). The isolates collected from patients with community-acquired UTIs were (86%) *Enterobacteriacea* species. The most frequently recovered microorganisms were *E. coli* (82 %), *Klebsiella* species (7.3 %) and *proteus* species (6.2 %) (45).

In Israel, Weber *et al* (1997) reported that, gram-negative aerobic rods accounted for 93.9 % and 86 % of isolated uropathogens in outpatient clinic in 1991 and 1995, respectively and the frequency of gram-positive aerobic bacteria increased markedly in the outpatient specimens during the five–year period from 6.1 % to 13.5 %. Additionally, the proportion of *Enterococcus* species increased significantly in the outpatient specimens (46).

Kalpana (2001) reported that the spectrum of agents causing community-acquired UTI has remained relatively constant. *Escherichia coli* accounted for 75 % to 90 % of cases; *Staphylococcus saprophyticus* accounted for 5 % to 15 % (particularly in younger women); and enterococci and non–*E. coli* aerobic gram-negative rods, such as *Klebsiella* species and *Proteus mirabilis*, accounted for the remaining 5 % to 10 %. Although less well studied, the spectrum of agents causing uncomplicated pyelonephritis was similar to that causing acute cystitis (47).

Judy (2002) in a community-based study found that most of culture-proven UTIs are caused by *Escherichia coli.* Other less frequent microorganisms included *Proteus* species (10 %), *Staphylococcus aureus* (5 %), *Enterococcus* species (3 %), and *Klebsiella* species (3 %). Infections can also be caused by noninfectious inflammation or trauma, neoplasm, calculi, hypoestrogenism, interstitial cystitis, or psychogenic disorders (48).

Astal *et al* (2002) conducted a study to assess the common organisms causing UTI in the Gaza Strip, and to examine the incidence of ciprofloxacin resistance in the strains of bacteria isolated from patients suspected with UTI over a six-month period. Ciprofloxacin was evaluated along with other commonly-used antibiotics against a total of 480 clinical isolates obtained from urine samples. The samples were collected from community patients from different parts of the Gaza Strip. The author showed that the resistance rate to ciprofloxacin was 15.0 %. However, high resistance to ciprofloxacin was detected among *Acinetobacter haemolyticus* (28.6 %), *Staphylococcus* species (25.0 %), *Pseudomonas* species (20.0 %), *Klebsiella* species (17.6 %) and *E. coli* (12.0 %). Minimum Inhibitory Concentration (MIC) of ciprofloxacin was measured for all resistant UTI isolates. The author also showed that, *E. coli* was the common organism causing UTI and the most effective antimicrobial agent against all the isolated uropathogens was ciprofloxacin (95.9 %) followed by Amikacin (95.0 %) (49).

Chulain, *et al* (2005) reported that from 7.9 % (community) to 12.5 % (hospital) of UTI isolates were resistant to cephalexin with approximately 20 % being of intermediate susceptibility. In general practice most *E. coli* remains susceptible to nalidixic acid (93.9 %) and ciprofloxacin (94.7 %). For all agents rates of resistance were higher in hospital as compared with general practice isolates (50).

McNulty, *et al* (2006) conducted a prospective cohort study on the clinical outcome of community acquired UTI. The total patients recruited in the study were 497 women (>18–70 years) presenting to general practitioner surgeries in Norwich and Gloucester, Health Protection Agency Primary Care Unit, Microbiology Department, UK; with at least two symptoms of acute (<7 days) uncomplicated UTI. Significant bacteriuria was defined as > 10^4 CFU/ mL from a mid-stream urine (MSU). The authors found that 75 % of enrolled patients had significant bacteriuria, and trimethoprim resistance was present in 13.9 % of the isolates. Patients with resistant isolates had a longer median time to symptom resolution, greater reconsultation to the practice (39 % versus 6 % in first week), more subsequent antibiotics (36 % versus 4 % in first week), and higher rates of significant bacteriuria at 1 month (42 % versus 20 % with susceptible isolate). Half of patients reconsulting in the first week had a resistant organism (51).

Nwanze, *et al* (2007) conducted a study on 550 UTI patients (330 males and 220 females) in order to investigate the antimicrobial sensitivity pattern of their bacterial isolates. The study was carried out over the period November 2004 to November 2005 using the disc diffusion method. The commonest isolates were *Escherichia coli* (51.2%), *Staphylococcus aureus* (27.3 %), and *Klebsiella pneumoniae* (12.8 %), respectively. The isolates were highly sensitive to ofloxacin but low to moderately sensitive to gentamicin, nalidixic acid, ciprofloxacin, tetracycline, and cefuroxime. In addition, the isolates showed multi-drug resistance (52)

CHAPTER (4)

MATERIALS AND METHODS

CHAPTER (4)

MATERIALS AND METHODS

4.1. STUDY DESIGN

This is a descriptive cross-sectional study for antimicrobial susceptibilities of urine isolates, collected during the period November 2007 to January 2008, from patients having SCI (Paraplegia) in the Gaza Strip. The selection of this design for the research was because it is a simple description of the health status of a community, based on routinely available data. In many countries, the national center of health statistics undertake this type of study.

4.2. WORKING PLAN

The study was carried out over six months starting in December 2007. The working plan is provided in (Annex-1).

4.3. STUDY POPULATION

The study population consisted of 170 patients from both sexes, aged 16 years and over, 50 males and 35 females diagnosed as SCI who presented at El Wafa Medical Rehabilitation Hospital (EWMRH) during the specimen collection period. The control group consisted of 50 males and 35 females suffering from community acquired UTIs from the community.

In this study, urine samples were collected from male and female patients with neuropathic bladder due to SCI and stabilized in a particular method of bladder drainage, (e.g. external catheter (condom) or indwelling catheter or Self intermittent catheter) and midstream urine samples were also collected from male and female control patients.

The exclusion criteria of the study population were as follow:

- Patients aged less than 16 years.
- Patients who use suprapubic catheter.
- Hospitalized patients.
- Patients on antibiotic treatment.

To prevent the effect of previous antimicrobial drugs on the culture result, all the subjects who were included in the study had not taken antimicrobial drugs at least three days prior to specimen collection.

The age of the patients, sex and other demographic information were recorded consistently and that information was thus included in the data analysis.

4.4. SETTING

The setting of the study was EWMRH, Gaza Strip, Palestinian Authority.

4.5. ETHICAL CONSIDERATIONS

The study-principles were discussed and revised by the academic supervisor. Accordingly, the study was approved officially by the EWMRH (Annex-3). All participants were given an informed consent in Arabic (Annex-2). The subjects were dealt with by code numbers, without personal data or names to ensure confidentiality.

All processing steps of the study samples and records were dealt within a way that ensured privacy and accuracy.

4.6.MATERIALS

4.6.1.Questionnaire

A close ended questionnaire for the patients was designed (Annex-4) for male patients and (Annex-5) for female patients and translated into Arabic to prevent misunderstanding (Annex-6) and (Annex-7) respectively. The questions were dichotomous items with Yes OR No choices. The researcher avoided personal, complicated and misleading questions. The researcher interviewed all the patients who participated in the study. The questions were direct and brief. It included: personal data, age, marital status, occupation, previous history of UTI, risk factors, hygiene habits, the antibiotics use and the method of bladder drainage after SCI.

4.6.2. Urine Investigation Form

The urine investigation form covered all the results of the specimens analyzed in this research. The form included pus-cell count of centrifuged sediment\High Power Field (HPF), Gram-stain of sediment, bacterial cell count, type of organism and the susceptibility results for the used antimicrobial agents. The investigation form is provided in (Annex-8).

4.6.3. Laboratory Records

The urine investigation forms were filled from two laboratory records. The first was for routine urine analysis and included the pus-cell count. The other was for urine cultures and included the type of isolates and the susceptibility results.

4.6.4. Equipment

a) Binocular microscope (Olympus, Japan)
b) Personal computer
c) Ambient air incubator (Memert, Spain)
d) Vortex mixer (Gemmy industrial, USA)
e) Centrifuge (Hettich, Gemmany)
f) Disposable plastic-ware
g) Multi-disk dispensing apparatus (Himedia, India)
h) Forceps
i) Computer Statistical Package for the Social Sciences (SPSS)

4.6.5. Media and Reagents

a) Blood agar (Himedia, India)
b) Mueller Hinton agar (Himedia, India)
c) MacConkey agar (Himedia, India)
d) Antimicrobial disks (Himedia, India)
e) Sterile 0.9% Sodium Chloride (NaCl) for inoculum adjustment
f) McFarland 0.5 turbidity standard
h) Gram-stain
i) Antibiotic disks of Cefatriaxone 30µg, Amikacin 30µg, Gentamicin 10 UI, Ciprofloxacin 5µg, Ofloxacin 5µg, Cefuroxime 30µg, Cephalexin 30µg, Nalidixic acid 30µg, Trimethoprim-sulfamethoxazole 25µg and Doxycycline 30µg.

4.6.6. Drugs Used to Treat UTIs

4.6.6.1. Aminoglycoside

Aminoglycoside that inhibit protein synthesis, are a useful drugs, and when combined with Trimethoprim-sulfamethoxazole or ampicillin, are part of first line therapy against UTI. They have maintained their spectrum of activity and, appropriate monitoring of levels, the danger of renal toxicity can be minimized. These drugs include Amikacin and Gentamicin (54).

4.6.6.2. Cephlosporins

β- lactam antibiotics and decrease cell wall synthesis. Broad spectrum antibiotics.

A) First Generation → Cephalexin

B) Second Generation → Cefuroxime

C) Third Generation → Ceftriaxone (54).

4.6.6.3. Fluoroquinolones

Fluoroquinolones are bactericidal and they enter the bacteria by passive diffusion through the porins, broad spectrum antibiotics of activity and have proven to be safe and clinically effective against many community-acquired UTI. These drugs include Ciprofloxacin, Ofloxacin and Nalidixic acid (54).

4.6.6.4. Tetracycllines

Tetracycllines are broad spectrum agents that inhibit a wide variety of aerobic and anaerobic gram-positive and gram-negative bacteria. Tetracycllines are incompletely absorbed orally. Affected by meal as: milk and cheese. These drugs include Doxycycline (54).

4.6.6.5. Sulfonamides

Sulfonamides are synthetic chemotherapy agents and derivatives of P-aninobenzene sulfonamide. Trimethoprim-sulfamethoxazole is a combination that synergistically interferes with folate metabolism and frequently used in the treatment of uncomplicated UTIs (54).

4.7. PILOT STUDY

Pilot testing for patient questionnaire was done for ten subjects to check the validity of the questionnaire and evaluate the outcome. The researcher attended each of these interviews when the pilot testing was being done. The researcher emphasized on urine analysis test and urine culture.

4.8. DATA COLLECTION

4.8.1. Collection of Samples

Urinary tract infections are very common especially in the female population. It is of utmost importance that the genital area of the patient must be properly cleansed before collecting the urine specimen. For that, the patients were instructed to follow strict regulations on sample collection. Failure to do so may result in a report of "multiple organisms present suggesting contamination".

Data were collected via patient interviews for 85 male and female SCI patients and 85 male and female control patients with clinical evidence of community-acquired UTI.

Questionnaire was collected from each patient in three consecutive months. During the period of the sample collection, the patients were informed about the right way of collecting right samples and they were supplied with sterile plastic urine containers and sterile Nylaton or Foley's urinary catheters. Freshly voided midstream specimens of urine from SCI patient and control UTI patients were received by the laboratory on the same day.

4.8.2. Processing of Samples

4.8.2.1. Examination of Urine Sediment

Urine analysis for sediment was done by centrifugation of 10 to 12 m1 of well-mixed fresh urine in a graduated centrifuge tube at a constant time of 5 minutes and a Relative Centrifugal Force (RCF) of 400 to 500 as the usual standard of practice in the US (55). The usual procedure for microscopic examination of the urine was done by placing a drop of the concentrated centrifuged urine sediment on a glass microscopic slide and observing it with a microscope, equipped with l0 x and 40 x phase objectives.

Normally urine is sterile. According to Burnett *et al* (1994) two-five or more pus-cells/HPF were considered as a positive test indicative of infection (56).

4.8.2.2. Microbiological Studies

Urine mixed well by inverting the container many times, a standard calibrated sterile disposable plastic loop delivered 0.001ml of uncentrifuged urine was used to inoculate a sheep blood agar and MacConkey agar plates. These plates were incubated aerobically at 37°C for 24-48 hours. Microorganisms isolated were identified according to colonial morphology, gram-stain reaction and biochemical test.

4.8.2.3. Antibiogram for Uropathogens

Isolates were tested for antimicrobial susceptibility by the Kirby-Bauer disk diffusion technique on Mueller Hinton agar plates. The agar surface was of smooth level and required approximately 25 to 30 ml of medium prior to placing the plate into service. The tops of 4 to 5 well-isolated uniform colonies were touched with an inoculating loop and used to inoculate 4 to 5 ml of normal saline solution. A 0.5 McFarland standard for adjusting the turbidity of the inoculum was used. A sterile cotton swab was immersed into the adjusted inoculated saline, swirled to eliminate air bubble. The swab was used to streak the surface of the Mueller Hinton agar plate in the three directions.

The antimicrobial disks were stored at -20°C when not in use; the disks were allowed to reach room temperature before being opened. The disks were placed into the surface of the inoculated agar plate no later than 15 minutes after inoculation. A maximum of 7 disks were used on a 9 cm plate. Once applied, they were not repositioned because the antimicrobial begins to diffuse immediately.

The plates were inoculated at 37°C for 18 to 24 hours. After this time, the zone of the inhibition was measured to the nearest millimeter and the results were interpreted following the appropriate guidelines as stated by manufacturer.

4.9. DATA ANALYSIS

The variables were coded numerically to enable the researcher to enter the data systematically and efficiently. Data were entered and analyzed on SPSS by using a personal computer. Data entry was double-checked.

Statistical analysis by using frequencies and cross tabulation between dependent and independent variables were carried out using Chi-square test. P-values of ≤ 0.05 were considered statistically significant.

4.10. CITATION AND REFERENCING METHOD

The researcher used the numerical method for citing references. The literature review used in this research was from, Medical journals, WHO publications and internet resources. The literature was obtained from EWMRH Library, Shifa Hospital Library, Internet-Key words used in the search included Community-Acquired Urinary Tract Infection Causing Microorganisms, Paraplegia and antimicrobial resistance.

4.11. LIMITATIONS OF THE STUDY

- Incomplete archive system in El Wafa Medical Rehabilitation Hospital.
- No Statistics resources of disabled persons in Palestinian territories ,especially about SCI persons.
- Some individuals were living in out of reach areas.
- Changes in clients personals data such as ,telephone number and address.
- No previous studies has been conducted in urinary tract infections among SCI patients in our country.

CHAPTER (5)

RESULTS

CHAPTER (5)

RESULTS

In this chapter the researcher tries to present the results in two models; the first is the description of the socio-demographic characteristics of the study population, while the second describes parametric results by using the suitable statistical methods to answer the study questions.

5.1. SOCIO-DEMOGRAPHIC RESULTS OF THE STUDY POPULATION

5.1.1. Age and subgroups of the study population

As shown in Table 5.1. below, the total number of UTI case control subgroups was 170. The study population was divided into four subgroups; the first is 35 of females target group with a mean age of (30 ± 11), the second subgroup is 35 of females control group with a mean age of (33 ± 10), the third subgroup is 50 of males target group with a mean age of (31± 13), and the fourth subgroup is 50 of males control group with a mean age of (34 ± 15).

Table 5.1. Mean age of the study population

Variable	N	Mean age ± SD	Minimum	Maximum
Female Target Group	35	30 ± 11	16	60
Female control Group	35	33 ± 10	16	60
Male Target Group	50	31 ± 13	16	70
Male Control Group	50	34 ± 15	16	72
Total	170	32 ± 13	16	72

Note: All urine specimens of the SCI patients showed ≥ 2-5 pus-cells /HPF, and thus all the SCI individuals were considered as UTI patients.

5.1.2. Distribution of the study population according to sex

Table 5.2. illustrates the sex of the SCI target group and the UTI control group.

Table 5.2. Distribution of the study population according to sex

Variable		Target Group		Control Group	
		n	%	n	%
Sex	*Male*	50	29.4	50	29.4
	Female	35	20.6	35	20.6
	Total	85	50.0	85	50.0

5.1.3. Distribution of the study population according to marital status

As shown in the following Table 5.3. the highest percentage of the study population is presented by married individuals in both the control and study groups.

Table 5.3. Distribution of the study population according to marital status

Variable		Target Group		Control Group	
		n	%	n	%
Marital Status	**Married**	46	54.1	61	71.8
	Single	36	42.4	19	22.4
	Widow	1	1.2	4	4.7
	Divorced	2	2.4	1	1.2
	Total	85	50.0	85	50.0

5.1.4. Distribution of the study population according to level of education

Table 5.4. represents the educational level of the population involved in the study.

Table 5.4. Distribution of the study population according to level of education

Variable		Target Group		Control Group	
		n	%	n	%
Level of Education	**Primary**	15	17.6	11	12.9
	Preparatory	24	28.2	16	18.8
	Secondary	33	38.8	32	37.6
	University	13	15.3	26	30.6
	Total	85	50.0	85	50.0

5.1.5. Distribution of the study population according to place of residence

The place of residence of the study sub-groups is shown in Table 5.5.

Table 5.5. Distribution of the study population according to place of residence

Variable		Target Group		Control Group	
		n	%	n	%
Place of residence	**City**	30	35.3	49	57.6
	Camp	39	45.9	24	28.2
	Village	16	18.8	12	14.1
	Total	85	50.0	85	50.0

5.2. UTI CAUSING MICROORGANISMS ACCORDING TO DEMOGRAPHIC VARIABLES

5.2.1. UTI causing microorganisms and sex of the study population

As shown in Table 5.6. the highest UTI causing microorganism was *E. coli*. This is followed by *Klebsiella* sp., *Proteus* sp., *Pseudomonas* sp. and *Staphylococci* sp.

Statistical analysis revealed that there is a significant difference between sex and UTI causing microorganisms in both target and control groups (χ^2= 41.43, df= 15; p = 0.001).

Table 5.6. UTI causing microorganisms and sex

Variables	Female Target Group		Female Control Group		Male Target Group		Male Control Group		X^2 Df = 15
	n	%	n	%	n	%	n	%	
***Klebsiella* Sp.**	9	25.7	11	31.4	7	14.0	9	18.0	
***Proteus* Sp.**	9	25.7	4	11.4	5	10.0	8	16.0	
***Staphylococci* Sp.**	-	-	2	5.7	-	-	2	4.0	
***Pseudomonas* Sp.**	2	5.7	-	-	3	6.0	3	6.0	** 41.43
***Escherichia* Coli**	13	37.1	10	28.6	8	16.0	20	40.0	
Negative	2	5.7	8	22.9	27	54.0	8	16.0	
Total	35	100	35	100	50	100	50	100	

***p< 0.001 **p< 0.01 *p< 0.05

5.2.2. UTI causing microorganisms and age of target (SCI) group

As shown in Table 5.7. the highest UTI causing microorganism among the youngs in the target (SCI) group was *Proteus sp*.

Statistical analysis revealed that there is no significant difference between age and UTI causing microorganisms in both target and control groups (χ^2= 15.59, df= 12; p = 0.211; NS).

Table 5.7. UTI causing microorganisms and age

Variables	25 years and Less		26 – 35 years		36 – 50 years		More than 50 years		X^2
	n	%	n	%	n	%	n	%	*Df*=12
***Klebsiella* Sp.**	6	15.8	7	31.8	3	18.8	-	-	15.59
***Proteus* Sp.**	10	26.3	2	9.1	1	6.3	1	11.1	
***Staphylococci* Sp.**	-	-	-	-	-	-	-	-	
***Pseudomonas* Sp.**	4	10.5	-	-	1	6.3	-	-	
***Escherichia* Coli**	7	18.4	4	18.2	6	37.5	4	44.4	
Negative	11	28.9	9	40.9	5	31.3	4	44.4	
Total	38	100	22	100	16	100	9	100	

***p< 0.001 **p< 0.01 *p< 0.05

5.2.3. UTI causing microorganisms and marital status of target (SCI) group

As shown in Table 5.8. the main UTI causing microorganism in married paraplegic patients was *Escherichia coli* (30.4%), while in the single SCI individuals it was *Proteus* sp. (22.2%).

Statistical analysis revealed that there is no significant difference between marital status and the type of UTI causing microorganisms in both target and control groups (χ^2= 12.26, df= 12; p = 0.425; NS).

Table 5.8. UTI causing microorganisms and marital status

Variables	Married		Single		Widow		Divorced	
	n	**%**	**N**	**%**	**n**	**%**	**n**	**%**
Escherichia coli	14	30.4	7	19.4	-	-	-	-
***Klebsiella* sp.**	9	19.6	7	19.4	-	-	-	-
***Proteus* sp.**	5	10.9	8	22.2	1	100	-	-
***Pseudomonas* sp.**	2	4.3	3	8.3	-	-	-	-
***Staphylococci* sp.**	-	-	-	-	-	-	-	-
Negative	16	34.8	11	30.6	-	-	2	100
Total	46	100	36	100	1	100	2	100

5.2.4. UTI causing microorganisms and level of education of target (SCI) groups

As shown in Table 5.9. of the paraplegic patients 8 (33.3 %) of the preparatory school, 8 (24.2%) of the secondary school and 5 (38.5%) of those who finished the university level were infected by *Escherichia coli.*

Statistical analysis revealed that there is no significant difference between the level of education and UTI causing microorganisms in both target and control groups (χ^2= 17.06, df= 12; p = 0.147; NS).

Table 5.9. UTI causing microorganisms and level of education

Variable	Primary		Preparatory		Secondary		University	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Escherichia coli	-	-	8	33.3	8	24.2	5	38.5
***Klebsiella* sp.**	3	20.0	2	8.3	8	24.2	3	23.1
***Proteus* sp.**	3	20.0	3	12.5	8	24.2	-	-
***Pseudomonas* sp.**	-	-	2	8.3	2	6.1	1	7.7
***Staphylococci* sp.**	-	-	-	-	-	-	-	-
Negative	9	60.0	9	37.5	7	21.2	4	30.8
Total	15	100.0	24	100.0	33	100.0	13	100.0

5.2.5. UTI causing microorganisms and place of residence of target (SCI) groups

As Table 5.10. shows, 10 (33.3%) paraplegic patients who live in the city and 8 (20.5%) of those who live in camp were infected by *Escherichia coli*.

Statistical analysis revealed that there is no significant difference between place of residence and UTI causing microorganisms in both target and control groups (χ^2= 4.52, df= 8; p = 0.808; NS).

Table 5.10. UTI causing microorganisms and place of residence

Variables	City		Camp		Village	
	n	**%**	**n**	**%**	**n**	**%**
Escherichia coli	10	33.3	8	20.5	3	18.8
***Klebsiella* sp.**	5	16.7	8	20.5	3	18.8
***Proteus* sp.**	5	16.7	5	12.8	4	25.0
***Pseudomonas* sp.**	2	6.7	3	7.7	-	-
***Staphylococci* sp.**	-	-	-	-	-	-
Negative	8	26.7	15	38.5	6	37.5
Total	30	100.0	39	100.0	16	100.0

5.3. SESITIVITY TEST

As indicated in Table 5.11. the highest sensitivity of UTI causing microorganisms was towards Cefatriaxone where 113 (90.4%) of the isolates were sensitive to this drug. This was followed by sensitivity to Amikacin. While the highest resistance was to Doxycycline and Trimethoprim-sulfamethoxazole.

Table 5.11. Sensitivity of UTI causing microorganisms among the study population

Variable	Sensitive		Intermediate		Resistant	
	N	%	n	%	n	%
Cefatriaxone	113	90.4	1	0.6	11	6.5
Amikacin	100	80.0	6	3.5	19	11.2
Gentamicin	84	67.2	10	5.9	31	18.2
Ciprofloxacin	77	61.6	17	10.0	31	18.2
Ofloxacin	74	59.2	16	9.4	35	20.6
Cefuroxime	72	57.6	14	8.2	39	22.9
Cephalexin	59	47.2	4	2.4	62	36.5
Nalidixic acid	41	32.8	12	7.1	72	42.4
Trimethoprim-sulfamethoxazole	39	31.2	4	2.4	79	46.5
Doxycycline	22	17.6	24	14.1	81	47.6

Table 5.12. illustrates that the sensitivity pattern of the isolates was similar in both the SCI and control group.

Statistical analysis revealed that there is no significant difference between sensitivity to antimicrobial and UTI causing microorganisms in both target and control groups.

Table 5.12. Sensitivity of UTI causing microorganisms according to case-control study population

Variable	Target Groups		Control Groups		Total	
	N	%	n	%	n	%
Cefatriaxone	48	85.7	65	94.2	**113**	**90.4**
Amikacin	48	85.7	52	75.4	**100**	**80.0**
Gentamicin	43	76.8	41	59.4	**84**	**67.2**
Ciprofloxacin	30	53.6	47	68.1	**77**	**61.6**
Ofloxacin	29	51.8	45	65.2	**74**	**59.2**
Cefuroxime	32	57.1	40	58.0	**72**	**57.6**
Cephalexin	26	46.4	33	47.8	**59**	**47.2**
Nalidixic acid	14	25.0	27	39.1	**41**	**32.8**
Trimethoprim-sulfamethoxazole	13	23.2	26	37.7	**39**	**31.2**
Doxycycline	8	14.3	14	20.3	**22**	**17.6**

5.4. SELF REPORTED INFORMATION ABOUT UTI IN THE CASE-CONTROL SUBGROUPS

5.4.1. General knowledge about previous UTI in the case-control subgroups

Table 5.13 indicates that, 84 % of the males and 93.3 % of the females in the target group suffered from previous UTIs. The respective percentages of those in the control group were 91.4 % and 94.0 %.

Statistical analysis revealed that there is a significant difference regarding knowledge of previous UTI among case-control subgroups (X^2= 9.08, 9.27, 12.18, df= 3, p= 0.028, 0.029, 0.007 respectively).

Table 5.13. General knowledge about UTI among case-control subgroups

Variable		Female Target Group		Female Control Group		Male Target Group		Male Control Group	
		n	%	n	%	n	%	n	%
Have you ever suffered from UTI?	Yes	33	94.3	34	97.1	42	84.0	49	98.0
	No	2	5.7	1	2.9	8	16.0	1	2.0
If yes, was it during last year?	Yes	32	91.4	33	94.3	38	76.0	46	92.0
	No	3	8.6	2	5.7	12	24.0	4	8.0
Suffer from UTI more than once in life time ?	Yes	26	74.3	32	91.4	36	72.0	47	94.0
	No	9	25.7	3	8.6	14	28.0	3	6.0

5.5. RISK FACTORS OF UTI

5.5.1. Risk factors of UTI and the case-control subgroups

As illustrated in Table 5.14. most of the individuals in the study subgroups were consuming a lot of water, 34 (97.1%) of the females in the SCI group significantly consumed a lot of water, while 38 (76.0%) of the male target group consumed a lot of water. While 14 of female target group (40.0%) and 9 (22.0%) of the male target group were unable to use the catheter.

Statistical analysis revealed that there is a significant difference between various risk factors of UTI and the SCI-control subgroups. (X^2= 9.73, df= 3, p= 0.021).
In terms of catheterizations in the SCI group, significantly higher percentage of females (40%) as compared to males (22%) reported their inability to use the catheter.

Table 5.14. Risk factors of UTI among case-control subgroups

Variable		Female Target Group		Female Control Group		Male Target Group		Male Control Group		X^2 Df=3	Sig. level
		n	%	n	%	n	%	n	%		
* Have you had surgery of urinary tract?	Yes	1	2.9	-	-	10	20.0	2	4.0	15.78	*** 0.001
	No	34	97.1	35	100.0	40	80.0	48	96.0		
* Do you have any defect or problems in the urinary tract?	Yes	2	5.7	-	-	7	14.0	1	2.0	9.50	* 0.023
	No	33	94.3	35	100.0	43	86.0	49	98.0		
* Have you had stones in the urinary tract?	Yes	10	28.6	19	54.3	9	18.0	14	28.0	13.21	** 0.004
	No	25	71.4	16	45.7	41	82.0	36	72.0		
* Are you diabetic?	Yes	5	14.3	14	40.0	1	2.0	14	28.0	21.58	** 0.001
	No	30	85.7	21	60.0	49	98.0	36	72.0		
* Are unable to use sterile technique in catheterization?	Yes	11	31.4	-	-	31	62.0	-	-	7.98 df=1	** 0.006
	No	24	68.6	-	-	19	38.0	-	-		
* Do follow improper way to insert the catheter ?	Yes	19	54.3	-	-	4	8.0	-	-	22.34 df=1	*** 0.001
	No	16	45.7	-	-	46	92.0	-	-		
* Do you suffer from urinary retention?	Yes	30	85.7	-	-	20	40.0	31	62.0	57.48	*** 0.001
	No	5	14.3	35	100.0	30	60.0	19	38.0		
Do drink a lot of fluids?	Yes	34	97.1	30	85.7	38	76.0	46	92.0	9.73	* 0.021
	No	1	2.9	5	14.3	12	24.0	4	8.0		
Are you unable to use the catheter?	Yes	14	40.0	-	-	9	22.0	-	-	2.91 df=1	0.088
	No	21	60.0	-	-	32	78.0	-	-		

*p< 0.05 **p< 0.01 ***p< 0.001

* These risk factors showed statistical significance

5.5.2. Risk factors pertinent to females in the case- control groups

Regarding the variables listed in Table 5.15. there was significant difference between the females in the case-control groups.

Table 5.15. Risk factors concerning females in the case- control groups

Variable		Female Target Group		Female Control Group		X^2 Df=1	Sig. level
		n	%	n	%		
Have you ever had menopause?	Yes	4	11.4	14	40.0	7.48	** 0.006
	No	31	88.6	21	60.0		
Do you have absence of the period?	Yes	5	14.3	22	62.9	17.42	*** 0.001
	No	30	85.7	13	37.1		
Does the UTI co-exist with you menstrual cycle?	Yes	11	31.4	28	80.0	16.73	*** 0.001
	No	24	68.6	7	20.0		
Does the UTI re-occur after the cycle?	Yes	13	37.1	32	91.4	22.46	*** 0.001
	No	22	62.9	3	8.6		
Did suffer from UTI before marriage?	Yes	14	63.6	13	44.8	1.78	0.183
	No	8	36.4	16	55.2		
Did suffer from UTI after marriage?	Yes	21	95.5	28	96.6	0.04	0.842
	No	1	4.5	1	3.4		
Do you urinate immediately after intercourse?	Yes	1	4.3	14	50.0	12.67	*** 0.001
	No	22	95.7	14	50.0		

*p< 0.05 **p< 0.01 ***p< 0.001

5.5.3. Prostatitis among males in the case- control groups

Despite the difference in prostatitis occurrence (Table 5.16.) between males in the SCI (10%) and control group (20.0%), statistical analysis revealed that there is no significant difference between the males in the two groups (X^2= 1.96, df= 1, p= 0.161; NS).

Table 5.16. Male risk factor in the case- control groups

Variable		Male Target Group		Male Control Group		X^2 *Df*=1	Sig. level
		n	%	n	%		
Have you suffered from prostatitis?	Yes	5	10.0	10	20.0	1.96	0.161
	No	45	90.0	40	80.0		

*p< 0.05 **p< 0.01 ***p< 0.001

5.6. HYGIENE

5.6.1. Hygiene of UTI patients in the case-control subgroups

Table 5.17. shows that 31 (62.0%) of males in the target group wash their hands before catheterization while significantly less females 5 (14.3%) apply this practice. Meanwhile, significantly lower number of males wash their hands after catheterization.

Moreover, significant difference existed between certain hygiene variables and individuals in the SCI-control subgroups.

Table 5.17. Hygiene and case-control subgroups

Variable		Female Target Group		Female Control Group		Male Target Group		Male Control Group		X^2 Df=3	Sig. level
		n	%	n	%	n	%	n	%		
Do you suffer from continuous wetting?	Yes	27	77.1	28	80.0	18	36.0	27	54.0	22.56	*** 0.001
	No	8	22.9	7	20.0	32	64.0	23	46.0		
Do you use lubricants for catheterization?	Yes	30	85.7	-	-	29	58.0	-	-	7.45	** 0.006
	No	5	14.3	-	-	21	42.0	-	-		
Do you wash your hands before catheterization?	Yes	5	14.3	-	-	31	62.0	-	-	19.20	*** 0.001
	No	30	85.7	-	-	19	38.0	-	-		
Do you wash your hands after catheterization?	Yes	30	85.7	-	-	37	74.0	-	-	2.26	0.324
	No	5	14.3	-	-	13	26.0	-	-		
Do you dry with paper tissue instead of washing with water?	Yes	21	60.0	29	82.9	25	50.0	30	60.0	9.64	* 0.022
	No	14	40.0	6	17.1	25	50.0	20	40.0		

*p< 0.05 **p< 0.01 ***p< 0.001

5.6.2. Female's hygiene practice

Statistical analysis revealed that there is a significant difference between female's use of shower for bathing in the case-control subgroups, while there was no significant difference between their care of keeping under-wear dry (Table 5.18).

Table 5.18. Female's hygiene in the case- control groups

Variable		Female Target Group		Female Control Group		X^2 Df=1	Sig. level
		n	%	n	%		
Do you care about keep dry under wear?	Yes	33	94.3	34	97.1	0.35	0.555
	No	2	5.7	1	2.9		
Do you use shower for bathing?	Yes	30	85.7	35	100.0	5.38	* 0.020
	No	5	14.3	-	-		

*p< 0.05 **p< 0.01 ***p< 0.001

5.6.3. Male's hygiene with respect to penile condom

As shown in Table 5.19. the majority of SCI males (72 %) do not have trouble with changing the penile condom.

Table 5.19. Changing the penile condom daily

Variable		Male Target Group	
		n	%
Have trouble with changing the penile condom daily	Yes	14	28.0
	No	36	72.0

5.7. SIGNS AND SYMPTOMS OF UTI AND CASE-CONTROL SUBGROUPS

Table 5.20. indicates the response of study subjects to the variables concerning signs and symptoms of UTI. Statistical analysis revealed that complaints in the two groups were significantly different.

Table 5.20. Signs and symptoms of UTI in the case-control subgroups

Variable		Female Target Group		Female Control Group		Male Target Group		Male Control Group		X^2 Df=3	Sig. level
		n	%	n	%	n	%	n	%		
* Are you feel general malaise now?	Yes	6	17.1	32	91.4	17	34.0	44	88.0	70.44	*** 0.001
	No	29	82.9	3	8.6	33	66.0	6	12.0		
* Are you sweating now?	Yes	7	20.0	27	77.1	10	20.0	44	88.0	69.67	*** 0.001
	No	28	80.0	8	22.9	40	80.0	6	12.0		
* Are you shivering now?	Yes	1	2.9	27	77.1	3	6.0	43	86.0	104.98	*** 0.001
	No	34	97.1	8	22.9	47	94.0	7	14.0		
* Are you suffering from pain the urinary bladder?	Yes	2	5.7	31	88.6	12	24.0	44	88.0	90.51	*** 0.001
	No	33	94.3	4	11.4	38	76.0	6	12.0		
* Is there bad smell in the urine?	Yes	15	42.9	32	91.4	23	46.0	38	76.0	28.20	*** 0.001
	No	20	57.1	3	8.6	27	54.0	12	24.0		
* Is you urine turbid?	Yes	16	45.7	31	88.6	20	40.0	45	90.0	42.19	*** 0.001
	No	19	54.3	4	11.4	30	60.0	5	10.0		
Is there bleeding during urination?	Yes	1	2.9	-	-	3	6.0	6	12.0	6.15	0.105
	No	34	97.1	35	100.0	47	94.0%	44	88.0		

* Statistical analysis revealed that complaints in the two groups were significantly different.

5.8. METHOD OF BLADDER MANAGEMENT IN SCI PATEINTS

As shown in Table 5.21. most of the females (80.6 %) in the target group were on use of intermittent urinary catheter while (19.4 %) of the females use Foley's catheter.

Among males (42.9 %) use intermittent urinary catheter, (33.3 %) use external catheter (condom) and (23.8 %) use Foley's catheter.

Statistical analysis revealed that there is significant difference between urinary catheters and gender of SCI patients (X^2= 14.81, df= 2, p= 0.001).

Table 5.21. Method of bladder management

Variable		Female Target Group		Male Target Group		X^2 Df=2	Sig. level
		n	%	n	%		
Do you currently have a urinary catheter?	Yes	31	88.6	42	84.0	0.35	0.551
	No	4	11.4	8	16.0		
If yes, is	Folly's	6	19.4	10	23.8	14.81	*** 0.001
	Intermittent	25	80.6	18	42.9		
	Condom	-	-	14	33.3		

*p< 0.05 **p< 0.01 ***p< 0.001

5.8.1. Type of catheters and type of uropathogens among target groups

Table 5.22. shows the type of uropathogens isolated from SCI patients who are using different catheterizations. There were no significant differences between type of catheter employed and type of uropathogens among SCI patients (χ^2= 16.22, df= 10; p = 0.093).

Table 5.22. Type of catheters and type of uropathogens among target groups

Variable	Foley's		Intermittent		Condom		Total	
	n	%	n	%	n	%	n	%
Escherichia coli	4	25	15	34.9	3	21.4	22	30.1
***Klebsiella* sp.**	2	12.5	12	27.9	2	14.3	16	21.9
***Proteus* sp.**	3	18.8	7	16.3	2	14.3	12	16.4
***Pseudomonas* sp.**	3	18.8	1	2.3	1	7.1	5	6.8
***Staphylococci* sp.**	-	0.0	-	0.0	2	14.3	2	2.7
Negative	4	25	8	18.6	4	28.6	16	21.9
Total	16	100	43	100	14	100	73	100

5.8.2. Type of catheter and type of uropathogen among female target group

As shown in Table 5.23. statistical analysis revealed that there is no significant difference between type of catheter and type of uropathogen among female target group (χ^2= 3.41, df= 4; p = 0.491).

Table 5.23. Type of catheter and type of uropathogens among female target group

Variable	Foley's		Intermittent		Total	
	n	%	n	%	n	%
Escherichia coli	3	50.0	9	36.0	12	38.7
***Klebsiella* sp.**	2	33.3	7	28.0	9	29.0
***Proteus* sp.**	-	0.0	7	28.0	7	22.6
***Pseudomonas* sp.**	1	16.7	1	4.0	2	6.5
***Staphylococci* sp.**	-	0.0	-	0.0	-	0.0
Negative	-	0.0	1	4.0	1	3.2
Total	6	100.0	25	100.0	31	100.0

5.8.3. Type of catheter and type of uropathogens among male target group

As shown in Table 5.24. statistical analysis revealed that there is no significant difference between type of catheter and type of uropathogen among male target group (χ^2= 17.43, df= 10; p = 0.065).

Table 5.24. Type of catheter and type of uropathogens among male target group

Variable	Foley's		Intermittent		Condom		Total	
	n	%	n	%	n	%	n	%
Escherichia coli	1	10.0	6	33.3	3	21.4	10	23.8
***Klebsiella* sp.**	-	0.0	5	27.8	2	14.3	7	16.7
***Proteus* sp.**	3	30.0	-	0.0	2	14.3	5	11.9
***Pseudomonas* sp.**	2	20.0	-	0.0	1	7.1	3	7.1
***Staphylococci* sp.**	-	0.0	-	0.0	2	14.3	2	4.8
Negative	4	40.0	7	38.9	4	28.6	15	35.7
Total	10	100.0	18	100.0	14	100.0	42	100.0

5.9. PREVALENCE OF CULTURABLE UROPATHOGENS IN SCI PATIENTS

As shown in Table 5.25. the rate of bacterial infection was much higher, and statistically significant, in SCI females 33 (94.3 %) as compared to SCI males 23 (46.0 %) ($\chi 2$= 30.27, df= 3; p = 0.001).

Table 5.25. Prevalence of culturable uropathogens in SCI patients

Variables	infected		Not infected	
	n	**%**	**n**	**%**
Female Target Group	33	94.3	2	5.7
Female Control Group	27	77.1	8	22.9
Male Target Group	23	46.0	27	54.0
Male Control Group	42	84.0	8	16.0
Total	**125**	**73.5**	**45**	**26.5**

5.10. MULTIPLE-DRUG RESISTANCE (MDR)

Multiple drug resistance is often used to encompass microorganisms having patterns of drugs resistance comprising four or more resistant traits. The MDR patterns for each of the isolates recovered in the present study are illustrated in Table 5.26.

Table 5.26. Multiple- drug resistance

Variables	**n**	**%**
Escherichia coli	51	30
***Klebsiella* sp.**	36	21.2
***Proteus* sp.**	26	15.3
***Pseudomonas* sp.**	8	4.7
***Staphylococci* sp.**	4	2.4

CHAPTER (6)

DISCUSSION

CHAPTER (6)
DISCUSSION

The present study describes community-acquired urinary tract infection causing microorganisms among paraplegic patients in Gaza Strip.

UTI is the most common complication of neurogenic bladder in the paraplegic patients and microbial resistance to antimicrobial drugs is a widespread phenomenon all over the world. The importance of this study lies in its contribution to identifying the most common UTI causing microorganisms among paraplegic patients and their antimicrobial sensitivities. The study also describes the most common method of bladder management. Moreover, the study analyzed various factors that might play a role in the community-acquired UTI causing microorganisms such as; sex, age, marital status, personal hygiene, neurogenic bladder and method of bladder management.

Regarding the rate of bacterial infection in the SCI patients, our results showed that culturable bacteria were significantly higher in female SCI patients as compared to males. This result is consistent with that reported by many authors who showed that, the incidence of UTI caused by culturable bacteria (particularly *Enterobacteriaceae*) is higher in females (57).

Multiple factors are probably contributing to the increasing problem of infection among females. One factor may be the anatomical differences in the urogenital organs between the two sexes, e.g., the shorter urethra in females allows quicker access of bacteria to the urinary system (58).

Although the etiology of UTI has been changing over the past few years, *E. coli* proved to be the most common urinary pathogen encountered in our study (Table 5.6) in both genders and in both the control and SCI groups. Moreover, *E. coli* was the most common uropathogen in SCI patients who are in use of intermittent catheter for bladder management.

That *E. coli* is the most predominant uropathogen has been reported by many studies all over the world. For example, Astal *et al* (2002) showed that, *E. coli* was the most common organism causing UTI in Gaza Strip (49). In Egypt, Khalifa *et al* (1987) found that, the most common organism causing UTI was *E. coli* 47.5 % (42). Also, Ahmed *et al* in Saudi Arabia, (1995) recorded that, *E. coli* was the commonest UTI causing organism 50.1 % (43). Farah and Murshidi (1996) found in Jordan that, *E. coli* was the most frequently isolated organism from patients with community-acquired UTIs and occurred in 55.6 % (44). While in Turkey, Arslan *et al* (2005) found that, *E. coli* was the causative agent in 90 % of the uncomplicated UTIs and in 78 % of the complicated UTIs (41).

From my point of view, UTI among SCI is complicated due to neurogenic bladder and the predominance of *E. coli* observed in those patients could be attributed to direct fecal contamination of urinary tract from the anus especially when common hygiene practices are not followed, such as, hand washing before and after catheterization and keeping the under-wear dry.

The distribution of the identified uropathogens in this study was *E. coli* (30.0%) followed by *Klebsiella* species (21.2 %), *Proteus* species (15.3 %), *Pseudomonas* species (4.7 %), and *Staphylococci* (2.4 %). The first four types of uropathogens were also predominant in catheterized patients. Interestingly, *Staphylococci* was present only in condom using male SCI patients and this correlates with *Staphylococci* being a skin microbiota.

The pattern of uropathogens encountered in this study correlates well with many studies conducted in different countries either in the regional or international settings. For example, In Egypt, Khalifa *et al* (1987) found that, the most common organisms causing UTI were *E. coli* (47.5 %) followed by *Klebsiella* species (17.1 %), *Pseudomonas aeruginosa* (10.4 %) and *Proteus* species (8.4 %) (42). While Nwanze *et al* (2007) found that, the commonest isolates were *E. coli* (51.2 %), *Staphylococcus aureus* (27.3 %), and *Klebsiella pneumoniae* (12.8 %) (52).

Additionally, Abu Shaqra (2000) showed that the most frequently recovered microorganisms from community-acquired UTI patients were *E. coli* (82 %), *Klebsiella* species (7.3 %), *Proteus* species (6.2 %) and stated that, the incidence of UTI caused by *Enterobacteriaceae* was three times higher among females than males (45).

The above mentioned results show some differences from those reported in the US (57), where it has been found that, *E. coli* and *staphylococci* were the most common uropathogens accounting for 90 % of UTIs. The causative uropathogens included *E. coli* (86 %) and *staphylococci* (4 %), *Klebsiella* species (7.3 %) and *proteus* species (6.2 %).

The similarities and differences in the type and distribution of uropathogens may result from the different environmental conditions and the practices prevailing in each country.

In terms of sensitivity of uropathogens to antimicrobial drugs, our results indicated that, the isolates are sensitive *in-vitro* to Cefatriaxone 90.4 %, followed by Amikacin 80.0 %, Gentamicin 67.2 %, Ciprofloxacin 61.6 %, Ofloxacin 59.2 %, Cefuroxime 57.6 %, Cephalexin 47.2 %, Nalidixic acid 32.8 %, Sulphamethaxazole-trimethoprim 31.2 % and Doxycycline 17.6 %.

The relatively high sensitivity to Cefatriaxone, Amikacin, Gentamicin and Ciprofloxacin might be attributed to the fact that these drugs are uncommonly used. The exposure to these antimicrobial agents are limited because of their high price and low tolerability. Therefore, in order to decrease the chance of microorganisms to attain resistance, these drugs should be carefully and wisely used.

This agrees with the result of Astal *et al* (2002) who have reported that, the most effective antimicrobial agents against all the isolated uropathogens were Ciprofloxacin 95.9 %, followed by Amikacin 95.0 % in the Gaza Strip (49). Although DeVivo (1999) supported the use of ciprofloxacin for treatment of UTIs in patients with SCI, in view of the super colonization with resistant organisms, this drug should be reserved for symptomatic persons not likely to respond to other oral agents (39).

Nwanze *et al* (2007) reported that, the commonest UTI isolates were *E. coli* (51.2%), *S. aureus* (27.3 %), and *K. pneumoniae* (12.8%). In disagreement to our results their isolates were highly sensitive to ofloxacin but of low to moderate sensitivity to gentamicin, nalidixic acid and ciprofloxacin. In addition, their isolates showed multi-drug resistance (52).

In the present study, MDR patterns for the isolates differed according to the type of the isolated bacteria. MDR was observed for all the isolated bacteria and is illustrated in Table 5.26.

There are many factors that may contribute to the decreased sensitivity of uropathogens to antimicrobial drugs (as e.g., Doxycycline, Sulphamethoxazole-trimethoprim and Nalidixic acid observed in this study) including the use of antimicrobial agents as prophylactic in presence of bacteriuria in paraplegic patients, antibiotic use in animal feeds and under-dosing of antibiotics. Also, resistance could probably emerge in the community as a result of the clustering and overcrowding, the widespread use of broad-spectrum antibiotics, the sale of antibiotics over the counter, self treatment of antibiotics, the inappropriate use of antibiotics and decreased funding for public health surveillance (59).

The study of Raz *et al* (1993) for example showed that the uropathogens in Haifa as compared to those isolates in Jezreel had higher resistance rates to Sulphamethoxazole-trimethoprim and cephalexin. The author linked this phenomenon to the age profile of the two populations and the difference in using antibiotics in veterinary and agricultural practices (38).

It is possible that, the high resistance to Doxycycline, Sulphamethoxazole-trimethoprim and Nalidixic acid observed in this study is due to the widespread use of those drugs and use for a long period in the community. Therefore, Doxycycline, Sulphamethoxazole-trimethoprim and Nalidixic acid should no longer be prescribed for community-acquired UTI among paraplegic patients unless susceptibility tests prove otherwise.

Multiple factors are probably contributing to the increased incidence of UTI among SCI (paraplegic) patients such as: urinary catheterization and stones, over-distention, high pressure voiding and high post-void residuals.

Our results showed that 43 of the total 85 paraplegic patients use Self Intermittent Catheter (SIC), 16 use Foley's catheter and only 14 of the total 50 paraplegic male patients use external urinary catheter, e.g., "condom".

The combined results show that SIC is the most commonly used method of bladder management among SCI patients and that *E. coli* is the most common uropathogen encountered in those patients. This is in agreement with Bennett *et al* (1995) who reported that the incidence of infection with *Klebsiella* and *Pseudomonas* species among male patients has been high and may be related to the use of external condom catheters. While female patients with SCI who underwent intermittent catheterization, *E. coli* and *Enterococcus* species accounted for 71 % of the infections (30).

SIC decreases the incidence of bacteriuria by completely emptying the urinary bladder. But Foley's catheter is a permanent and considered good media for growth of uropathogens and urinary bladder stone formation. For example, Walter *et al* (1993) indicated that, prevention of bacteriuria and associated complications in patients undergoing long-term catheterization has been largely unsuccessful. But intermittent catheterization has resulted in lower rates of bacteriuria than long-term indwelling catheterization in studies with appropriate controls. They added also that in patients undergoing intermittent catheterization, bacteriuria may be reduced by bladder irrigation (37). While Jung (2006) reported that, injury characteristics are important for the development of urinary stone in chronic traumatic SCI. In addition, his findings suggest that in men who cannot use SIC or when the bladder cannot empty spontaneously, suprapubic cystostomy is better than urethral catheterization to avoid renal stone formation (28). The results of the present study however, are not in agreement with the above mentioned reports in that, the majority of uropathogens were isolated from SIC using patients. This discrepancy could be due to the various factors (Table 5.14) particularly the inability of the patients to use a sterile technique in catheterization.

Regarding the external catheter "condom", 2 (14.3 %) and 1 (7.1 %) of the total 14 SCI patients who use condom were infected with *Proteus* sp. and *Pseudomonas* sp respectively; this result is similar to that of Bennett *et al* (1995) who reported that, *E. coli*, *Pseudomonas* species and *Klebsiella* have been the predominant microorganisms that cause urinary tract infections in patients with SCI and a high prevalence of *Proteus* species, which may relate to the more frequent use of indwelling catheters, has been noted at some centers (30). While Donna *et al* (1982) reported that, the greatest incidence of *Pseudomonas* sp bacteriuria was found in men using an external urinary collection system or indwelling catheter. *Pseudomonas* sp bacteriuria was uncommon in men managed solely by intermittent catheterization. Men using an external urinary collection system had significantly greater colonization with *Pseudomonas* sp. in the urethra than men who did not (27).

Similarly, Montgomerie *et al* (1980) reported that, a significant bacteriuria with *Pseudomonas* sp was present in 19 % of the men and 13 % of the women, and that, *Pseudomonas* sp colonization of body site in men was closely associated with the use of an external urinary collection system (24).
In our point of view external urinary collection system "condom" should be changed at least every 24 hrs, otherwise it can lead to growth of bacteria.

Asymptomatic bacteriuria is common in SCI patients because of multiple factors that increase the incidence of bacteriuria such as: absence of sensation, large post-void residuals, high pressure to void and high exposure to an invasive procedure for emptying the bladder. Adding to that the hygiene practices that each patient should consider. As shown in Table 5.14 the majority of SCI patients suffered from urinary retention.

Our result showed that most of the SCI patients who were suffering from UTI have (asymptomatic bacteriuria) no signs or symptoms of UTI, which is in agreement with McNulty *et al* (2006) who conducted a prospective cohort study on the clinical outcome of community acquired UTI and found that 75 % of enrolled patients had significant bacteriuria (51). Similarly, Salomon *et al* (2006) reported that, asymptomatic bacteriuria is common (70 %) in SCI patients under self-catheterization, with urinary tract infection being the most frequent complication and they also showed that the symptoms of UTI were non-specific (16).

Lastly, type of uropathogen and its antibiotic resistance, hygiene practices (e.g., application of a sterile technique during catheterization) and type of bladder management are the key points in development of UTI among spinal cord injury patients in Gaza Strip. We recommended that similar studies should be conducted throughout Palestine in order to better determine the dimensions of antibiotic resistance, the types of uropathogens, and method of bladder management among SCI patients.

CHAPTER (7)
CONCLUSIONS AND RECOMMENDATIONS

CHAPTER (7)

CONCLUSIONS AND RECOMMENDATIONS

7.1. CONCLUDING REMARKS

From the current study we can conclude that:

- *Escherichia coli* is the predominant microorganism that causes community-acquired UTI followed by *Klebsiella* species among SCI patients in Gaza Strip.

- There is a significant relation between sex and the type of UTI causing microorganisms in both target and control groups.

- The rate of culturable bacteria is much higher in SCI females as compared to SCI males.

- There is a considerable high resistance to some antimicrobial agents, often used in treatment of community-acquired UTI, especially Doxycycline, Trimethoprim-sulfamethoxazole and Nalidixic acid.

- The most effective antimicrobial agents against all isolated uropathogens were Cefatriaxone, Amikacin, Gentamicin and Ciprofloxacin.

In our study, we found that, there is a significant relation between risk factors such as: previous surgery of urinary tract, diabetes mellitus, stones in the urinary tract, amount of fluid intakes and using urinary catheters and UTI causing microorganisms. Moreover, there is a relation between certain hygiene practices e.g., continuous wetting, hand washing before and after application of catheters and individuals in the SCI-control subgroups.

Regarding the bladder management and urinary catheterizations, we found that, Self Intermittent Catheter (SIC), followed by external catheter "condom" (only for males), which are associated with lower infection were the most commonly used among paraplegic patients and our results revealed that there is a relation between urinary catheters and gender of SCI patients.

Additionally, *Escherichia coli* is the main uropathogen causing community-acquired UTI among paraplegic patients who are using Self Intermittent Catheter and Foley's catheter. Moreover, *Staphylococci* species are found only among patients who are using external catheter "condom".

7.2. RECOMMENDATIONS

Doxycycline, Trimethoprim-sulfamethoxazole and Nalidixic acid should no longer be prescribed for community-acquired UTI among SCI patients unless susceptibility tests prove otherwise. It is suggested that, Cefatriaxone, Amikacin, Gentamicin and Ciprofloxacin could be employed as empirical treatment for community-acquired UTI until the causative agent and its susceptibility is defined. However, to decrease the chance of microorganisms to attain resistance, these drugs should be carefully and wisely used.

Accurate urine microscopy, from economical point, may reduce the number of specimens sent for culture. Since our results showed that, there is no need for culturing urine specimens when the pus-cell count $\leq$ 5/HPF.

Regarding management and rehabilitation of the bladder, we consider Self Intermittent Catheter (SIC) as the most effective method of bladder management, which decreases the rate of UTI and increases patient's self-esteem and body image. However, proper handling and sterile techniques should be applied during its use.

Finally, periodic monitoring of the frequency and antimicrobial susceptibility of urinary pathogens among SCI patients in order to document such changes is recommended. The data obtained by monitoring may then serve as a basis for urgent empirical prescription of therapy until the culture results become available.

7.3. SUGGESTIONS FOR FUTURE WORK

We would like to emphasize that similar studies should be conducted throughout Palestine in order to:

- determine the problem dimensions of antimicrobial resistance among SCI patients.
- monitor the use of antimicrobial agents in the SCI population.
- investigate the effect of methenamine hippurate in prevention and treatment of UTI among SCI patients.

.

REFERENCES

REFERENCES

1. Palestine Central Bureau of Statistics (1997). The Demographic survey in the West Bank and Gaza Strip.
2. Ministry of Health (2005). The Status of Health in Palestine. Annual report.
3. Jackson, C. (2006). Practical manual of physical medicine and rehabilitation. 2nd Ed. Elsevier Mosby. Philadelphia. US.
4. Harry, L.T., Mobley and John, W., Warren. (1996). Urinary tract infections: Molecular pathogenesis and clinical management. 3th Ed. Baltimore, Maryland, USA.
5. El wafa Medical Rehabilitation Hospital Records (EWMRHR). (2007).
6. Suzanne, C., Smeltzer Brenda, G. Bare. (2000). Brunner and Suddarth's Textbook of Medical-Surgical Nursing. 9th Ed. Lippincott, New York, Baltimore. USA.
7. National Spinal Cord Injury Statistical Center (NSCISC). (2006).
8. Kumar P. and Clark M. (1996). Clinical medicine. 3rd Ed. London philadlphia Toronto Sydney Tokyo.
9. Robert, B., Mark, H., Andrew, J. (1997). The Merck manual of medical information. Home Ed. US.
10. Foxman, B. (2002). Epidemiology of urinary tract infections. *American Journal of Medicine:* Incidence, Morbidity, and Economic costs. 113(2): 55–135.
11. Paul M., Bakul, M., Gurpreet, S., Pradipkumar, S. (2002). The Method of bladder drainage in spinal cord Injury patients may influence the histological changes in the mucosa of neuropathic bladder. *Journal of Urology*, 2: 24-29.
12. Viktoria, R., Glen, C., Mark, A., Per, K. (2006). The asymptomatic bacteriuria *Escherichia coli* Strain 83972. *Journal of Clinical Microbiology*, 74 (1): 615–624.
13. Montgomerie, Z., Gilmore, D.S., Schick, D.G. (1982). *Pseudomonas aeruginosa* and *Klebsiella pneumonia* on the perinea of males with spinal cord injuries. *Journal of Clinical Microbiology*, 16 (5): 865–867.

14. Prieto-Fingerhut, T., Banovac, K., Lynne, CM. (1997). A study comparing sterile and nonsterile urethral catheterization in patients with spinal cord injury. *Journal of Rehabilitation Nursing*, 22 (3): 299-302.
15. Bakke, A. (1993). Clean intermittent catheterization, physical and psychological complications. *Journal of Urology*, 150 (5): 1-69.
16. Salomon, J., Pierre, D., Corinne, M., Emmanuel, C., Louis, B. (2006). Prevention of urinary tract infection in spinal cord-injured patients: safety and efficacy of a weekly oral cyclic antibiotic (WOCA) programme with a 2 year follow-up-an observational prospective study. *Journal of Antimicrobial Chemotherapy*, 20 (3):123-128.
17. Kumamoto, Y., Tsukamoto, T., Hirose, T., Yokoo, A., Watanabe, K., et al. (1999). Comparative studies on activities of antimicrobial agents against causative organisms isolated from patients with urinary tract infections. *Japanese Journal of Antibiotic*, 52 (2):130-145.
18. Baron, E.J., Peterson, L.R., Fingold, S.M. (1994). Diagnostic Microbiology. 9th Ed. Mosby Year Book. US. 168-875.
19. Mimata, H. (1993). Changes of rate urinary bladder during a cute phase of spinal cord injury. *Journal of Urology*, 51(2): 89-93.
20. Barbara, K. T. (2001). Fundamental skills and concepts in patient care. 7th Ed. Lippincott, New york, Baltimore. USA.
21. Guttmann, J., Wyndaele, J. (2002). Intermittent catheterization; which is the optimal technique?. American Journal of Medicine. 40 (5): 432-437.
22. Tero, K., Jaana, L., Leea, J., Tytti, P., Kaj, S., Matti, U. (2003). Dietary factors protecting women from urinary tract infection. *The American Journal of Clinical Nutrition*, 77 (5): 600-604.
23. Kass, E.H. (1956). Asymptomatic infections of the urinary tract . *Journal of Postgraduate Medicine*, 69 (4):56-63.
24. Montgomerie, Z., Morrow, J. W. (1980). Long-term Pseudomonas colonization in spinal cord injury. *American Journal of Epidemiology*, 112 (3):508-517.

25. Ribo, S., McDowall, D.R.M., Fairely, K.F. (1981). Anerobic and other fastidious microorganisms in asymptomatic bacteriuria in pregnant women. *The Journal of Infectious Diseases*, 144 (5): 114.
26. Donna, S., Gilmore, D., Aeilts, B. A., Sandra K., Enes M., Morrow, W., Montgomerie, Z. (1981). Effects of bathing on *Pseudomonas* and *Klebsiella* colonization in patients with spinal cord injuries. *Journal of Clinical Microbiology*, 12 (4): 404-407.
27. Donna, S., Sandra, K., Enes, M., Donald, G., James, W., John, Z. (1982). Pseudomonas aeruginosa colonization in patients with spinal cord injuries. *Journal of Clinical Microbiology*, 16 (5): 856-860.
28. DeVivo, (1993). Urologic complications and management after spinal cord Injury. National Institute of Disability and Rehabilitation Research, 2 (1): 1- 4.
29. Bennett, C.J., Young, M. N., Darrington, H. (1995). Differences in urinary tract infections in male and female spinal cord injury patients on intermittent catheterization. *American Journal of Medicine*, 33 (2): 69–72.
30. Falahatkar, S., Abdol-Rasoul S., Hani G., Kamran G. (1995). Urinary tract infection in spinal cord transected war victims. Department of Urology, Gilan University of Medical Sciences, Rasht, Iran.
31. DeVivo, (1998). Rehospitalization costs of individuals with spinal cord injury. Annual Publication of The Medical Rehabilitation Research and Training Center in Secondary complications in Spinal Cord Injury, Spain Rehabilitation Center.
32. Ayyat, A. (2003). Significance of urine analysis in detecting renal troubles: A Community based study in rural Egypt. *The Egyptian Journal of Community Medicine*, 21(3): 13-23.
33. Jung, Ku. (2006). Risk factors for urinary stone formation in men with spinal cord injury. American Academy of Family Physicians, 97 (4): 790-793.
34. Katul, M., Frank, I. (1970). Antibacterial activity of methenamine hippurate. *Journal of Urology*, 104 (4): 320-4.
35. Wiesner, P., Mracgregor, R., Bear, D., Berman, S., Holmes, K., Turck, M. (1972). Evaluation of a new cephalosporin antibiotic, Cephapirin. *Journal of Antimicrobial Chemotherapy*, 1(4): 303-309.

36. Calvin, M., Kunin, L., Arsdale W., Tong Huahua, A. (1993). Reassessment of the importance of "Low-Count" bacteriuria in young women with a cute urinary symptoms. *Journal of Clinical Microbiology*, 119 (6) : 454-460.
37. Walter, E., Thomas, M., Hooton. (1993). Management of urinary tract infections in adults. *The New England Journal of Medicine*, 329 (18):122-125.
38. Raz, R., Hetter, H., Oren, B., Kennes, Y. Potasman, I. (1993). Antimicrobial resistance of urinary isolates in the community and its relation to antibiotic use. *Israel Journal of Medical Sciences*, 29 (2): 207-210.
39. DeVivo, (1999). Urologic complications and management after spinal cord Injury .National Institute of Disability and Rehabilitation Research, 2 (2): 2- 9.
40. Kahlmeter, G., Menday, P., Cars, O. (2003). Non-hospital antimicrobial usage and resistance in community-acquired *Escherichia coli* urinary tract infection. *Journal of Antimicrobial Chemotherapy*, 52 (2): 1005–1010.
41. Arslan, H., Ozlem K., Azap, O., Funda, T. (2005). Risk factors for ciprofloxacin resistance among *Escherichia coli* strains isolated from community-acquired urinary tract infections in Turkey. *Journal of Antimicrobial Chemotherapy*, 56 (3): 914–918.
42. Khalifa, K., Ali, M. F., Abo El Ela, O., El Ayaat, A. (1997). Retrospective two-year study of urinary tract infection in the Ismailia area of Eygpt. Chemioterapia, 6 (2 supple 1) : 500-502.
43. Ahmed, S., Ahmed, F. (1995). Urinary tract infection at a specialist hospital in saudi Arabia. Bangladesh medical research council bulletin, 21(3): 95-100.
44. Farah, N. B., Murshidi, M. S. (1996). Urinary tract infection in adult and adolescent females and of a developing community: pattern, bacteriology and genitourinary predisposing factors. *International Urology Nephrology*, 28 (3): 319-325.
45. Abu Shaqra, Q. (2000). Occurrence and antibiotic sensitivity of *Enterobacteriacea* isolates from a group of Jordanian patients with community-acquired urinary tract infection. Cytobios. 101: 15-21.
46. Weber, G., Riesenberg, K., Schlaeffer, F., Peled, N., Borer, A., Yaguosky, p. (1997). Changing trends in frequency and antimicrobial resistance of urinary

pathogens in outpatient clinic and a hospital in Southen Israel, 1991-1995. *European journal of clinical microbiology and infectious diseases*, 16 (4): 834-838.

47. Kalpana, (2001). Increasing antimicrobial resistance and the management of uncomplicated community-acquired urinary tract infections. University of Washington, 135 (1): 41-50.
48. Judy, D. (2002). Evaluation of dysuria in adults. American Academy of Family Physicians, 65 (1): 589-596.
49. Astal, Z., Sharif, F., Manama, A. (2002). Antibiotic resistance of bacteria associated with community-acquired urinary tract infections in the southern area of the Gaza Strip. *Journal of Chemotherapy*, 14 (3): 259-264.
50. Chulain, M. N., Murray, A. M., Corbett-Feeney, G., Cormican, M. (2005). Antimicrobial resistance in *E. Coli* associated with urinary tract infection in the West of Ireland. *Irish Journal of Medical Science*, 174 (4): 6-9.
51. McNulty, C.A., Richards, J., Livermore, P., Little, A., Charlett, E., Freeman, I., Harvey and Thomas, M. (2006). Clinical relevance of laboratory-reported antibiotic resistance in acute uncomplicated urinary tract infection in primary care. *Journal of Antimicrobial Chemotherapy*, 58 (4):1000–1008.
52. Nwanze, P. I., Nwaru, L. M., Oranusi, S., Dimkpa, U., Okwu, M. U., Babatunde, B. B., Anake, T. A., Jatto, W., Asagwara, C. E. (2007). Urinary tract infection in Okada village: Prevalence and antimicrobial susceptibility pattern. Scientific Research and Essay, 2 (4) :112-116.
53. Bromley, I. (2002). Tetraplegia and Paraplegia, A guide for Physiotherapists, 5th Ed Churchill livingstone ,London . 4-6.
54. Marrie, A. (2002). Pharmacology. 1st Ed. University book center. Faculty of medicine. Cairo university.
55. Henry, J.B., Dou Glass, A., Russell, H., John, A. (1991). Clinical diagnosis management by laboratory methods. 18th Ed. W.B. Sanders Company. US. 1039-1045.

56. Burnett, R.W., Haber, M.H., Hackel, E., Hanson, C.A., Keren, D.F., Leelewadrowski, E. (1994). Clinical laboratory medicine. Williams &Wilkins. Philadelphia, US. 1113-1120.
57. Storm, B. L., Collins, M., West, S. L. (1987). Sexual activity, contraceptive use and other risk factors for symptomatic and asymptomatic bacteriuria. *The New England Journal of Medicine*, 329 (4): 753-756.
58. Gupta, K., Scholes, D., Stamm, W. E. (1999). Increasing prevalence of antimicrobial resistance among uropathogens causing uncomplicated cystitis in women. *The Journal of the American Medical Association*, 281(8): 736-738.
59. Amyes, S.G.B. (2000). The rise in bacterial resistance. *British Medical Journal*, 320 (3): 199-200.

ANNEXES

ANNEX -1

WORKING PLAN

Task	December 2007	January	February	March	April	May
1) literature review						
2) Data collection Questionnaire, Sample collection and processing						
3) Data entry and analysis						
4) Finalization of thesis						

ANNEX -2

إقرار موافقة

العنوان : الميكروبات المسببة لالتهابات المسالك البولية المكتسبة من المجتمع عند الأشخاص الذين يعانون من شلل في الأطراف السفلية في قطاع غزة

على المشارك قراءة الأسئلة التالية والإجابة عليها قبل التوقيع على هذه الورقة :

هل سبق أن قرأت وفهمت رسالة المشارك	**نعم**	**لا**
هل كان لديك فرصة لطرح الأسئلة ومناقشة هذه الدراسة	**نعم**	**لا**
هل تم الإجابة على أسئلتك بشكل مرضي ومريح	**نعم**	**لا**
هل تم إبلاغك بكل المعلومات المتعلقة الكافية لهذه الدراسة	**نعم**	**لا**
مع من تحدثت في هذه الدراسة ، هل الباحث أم غيره	**نعم**	**لا**
هل تم تفهيمك أن من حقك الانسحاب من الدراسة في أي وقت تراه مناسبا .	**نعم**	**لا**

أنا الموقع أدناه ابدي موافقتي على المشاركة في هذه الدر اسه بعد أن تم الشرح و التوضيح .

توقيع المشارك

نشكركم على موافقتكم على الدخول معنا في هذه الدراسة

وتقبلوا فائق الاحترام والتقدير

ANNEX- 3

بسم الله الرحمن الرحيم

السيد/ المدير الطبي لمستشفى الوفاء للتاهيل الطبي ،،،،، حفظه الله

السلام عليكم ورحمة الله وبركاته

الموضوع: بحث التخرج لدرجة الماجستير في الصحة النفسية المجتمعية – تخصص علوم التأهيل

أحيط سيادتكم علما بأنني بصدد البدء في عمل بحث التخرج وهو من متطلبات إتمام درجة الماجستير في الصحة النفسية المجتمعية- تخصص علوم التأهيل ، في الجامعة الإسلامية وعنوان البحث هو

Community-Acquired Urinary Tract Infection Causing Microorganisms among Paraplegic Patients in Gaza Strip

وعلية نرجو موافقتكم علي عمل الفحوصات المخبرية في مختبر المستشفي لديكم

ولكم جزيل الشكر لحسن تعاونكم للرقي بالتأهيل الطبي

مقدمه

الباحث/ إياد إسماعيل الرن

د. ماهر محمود شامية
Dr. Maher Mahmoud Shamia

ANNEX- 4

FOR MALE ONLY

Community-Acquired Urinary Tract Infection Causing Microorganisms among Paraplegic Patients in Gaza Strip

Age : …….. .

Marital status : 1- married 2- single 3- widow 4- divorced

Monthly income : ……

Date of injury : ……. / …… / ……. .

Education : 1- Elementary 2- Preparatory 3- Secondary 4- University

Residence : 1- City 2- Camp 3- Village 4- Town

Governorate : 1- North 2- Gaza 3- Middle 4- Khanyonis 5- Rafah

No.	Please read these question before answer it	No	Yes
	A) General information		
1.	Have you ever suffered from UTI ?		
2.	If yes , was it during last year ?		
3.	What treatment that have been prescribed ?		
4.	Did suffer from UTI more than once in life time ?		
5.	If yes, how many times?		
	B) Risk factors		
6.	Have you had surgery of urinary tract ?		
7.	Do you have any defect or problems in the urinary tract ?		
8.	If yes, describe please .		
9.	Have you had stones in the urinary tract ?		
10.	Are you diabetic ?		
11.	Have you suffered from prostatitis ?		
12.	If yes, was it in the last year ?		
13.	Did you take drug ? describe .		
14.	Did the physician prescribe the medicine ?		
15.	Are you unable to use sterile technique in catheterization ?		
16.	Do follow improper way to induce the catheter ?		
17.	Do you suffer from urinary retention ?		
18.	Do you drink a lot of fluids ?		
19.	Do you drink little of fluids ?		
20.	Are you unable to use the catheter ?		
21.	Do you ignore the penile ulcer ?		
	C) Hygiene		
22.	Do you suffer from continuous wetting ?		
23.	Do you use lubricants for catheterization ?		
24.	Do you change the urinary bag frequently as scheduled ?		
25.	Do you have trouble with changing the penile condom Daily?		
26.	Do you wash your hands before catheterization ?		
27.	Do you wash your hands after catheterization ?		
28.	Do dry below with paper tissue instead of water ?		
	D) Signs and symptoms		
29.	Are you feel general malaise now ?		
30.	Are you sweating now ?		
31.	Are you shivering now ?		
32.	Are you suffering from pain the urinary bladder ?		
33.	Do you observe blood in urine ?		
34.	Is there bad smell in the urine ?		
35.	Is you urine turbid ?		
36.	Is there bleeding from the urination ?		
	E) Methods of bladder management		
37.	Do you currently have a urinary catheter?		
38.	If yes, is 1) intermittent 2) permanent 3) Condom		
39.	How frequent do catheter your self		

ANNEX- 5

FOR FEMALE ONLY

Community-Acquired Urinary Tract Infection Causing Microorganisms among Paraplegic Patients in Gaza Strip

Age : …….. .

Marital status : 1- married 2- single 3- widow 4- divorced

Monthly income : ……

Date of injury : ……. / …… / ……. .

Education : 1- Elementary 2- Preparatory 3- Secondary 4- University

Residence : 1- City 2- Camp 3- Village 4- Town

Governorate : 1- North 2- Gaza 3- Middle 4- Khanyonis 5- Rafah

No,	Please read these question before answer it	yes	NO
	A) General information		
1.	Have you ever suffered from UTI ?		
2.	If yes, was it during last year ?		
3.	What treatment that have been prescribed ?		
4.	Did suffer from UTI more than once in life time ?		
5.	if yes, how many times?		
6.	Mention how frequent last delivery and if it was accompanied by UTI ?		
	B) Risk factors		
7.	Have you had surgery of urinary tract ?		
8.	Do you have any defect or problems in the urinary tract ?		
9.	If yes, describe please .		
10.	Have you had stones in the urinary tract ?		
11.	Are you diabetic ?		
12.	Have you ever had menopause ?		
13.	Do you have absence of the period ?		
14.	Are you unable to use sterile technique in catheterization ?		
15.	Do follow improper way to induce the catheter ?		
16.	Do you suffer from urinary retention ?		
17.	Do you drink a lot of fluids ?		
18.	Do you drink little of fluids ?		
19.	Are you unable to use the catheter ?		
20.	Do you wear tight clothes (jeans) ?		
21.	Does the UTI co–exist with you menstrual cycle ?		
22.	Does the UTI re–occur after the cycle ?		
24.	Did you suffer from UTI before marriage ?		
25.	Did you suffer from UTI after marriage ?		
26.	Do you urinate immediately after intercourse ?		
27.	Do suffer from frequent UTI during pregnancy ?		
28.	Do you use contraceptive ?		
29.	If yes, describe ?		
30.	Do you often suffer from UTI after delivery ?		
	C) Hygiene		
31.	Is the bathroom , where the catheterization done is clean ?		
32.	Do you suffer from continuous wetting ?		
33.	Do you use lubricants for catheterization ?		
34.	Do you change the urinary bag frequently as scheduled ?		
35.	Do you wet between catheterization ?		

36.	Do you wash your hands before catheterization ?		
37.	Do you wash your hands after catheterization ?		
38.	Do you care about keep dry under wear ?		
39.	Do you dry below with paper tissue instead of water ?		
40.	Do you clean your self from front to backward ?		
41.	Do you clean your self from back to forward ?		
42.	Do you use shower for bathing ?		
43.	Do you use bath-tub for bathing ?		
D) Signs and symptoms			
44.	Are you feel general malaise now ?		
45.	Are you sweating now ?		
46.	Are you shivering now ?		
47.	Are you suffering from pain the urinary bladder ?		
48.	Do you observe blood in urine ?		
49.	Is there bad smell in the urine ?		
50.	Is you urine turbid ?		
51.	Is there bleeding from the urination ?		
E) Methods of bladder management			
52.	Do you currently have a urinary catheter?		
53.	If yes, is 1) intermittent 2) permanent		
54.	How frequent do catheter your self		

ANNEX- 6

العنوان : الميكروبات المسببة لالتهابات المسالك البولية المكتسبة من المجتمع عند المرضى الذين يعانون من شلل في الأطراف السفلية في قطاع غزة

المعلومات الأولية الشخصية :

☑ **العمر :.....**

☑ **الحالة الاجتماعية :** ☐ متزوج ☐ أعزب ☐ أرمل ☐ مطلق

☑ **عدد الأولاد :.....**

☑ **معدل الدخل :.....**

☑ **تاريخ الإصابة : ..../...../.....**

☑ **الدرجة العلمية :** ☐ ابتدائي ☐ إعدادي ☐ ثانوي ☐ جامعي

☑ **طبيعة السكن :** ☐ مدينة ☐ مخيم ☐ ريف ☐ بلدة

☑ **المحافظة :** ☐ الشمال ☐ غزه ☐ الوسطى ☐ خانيونس ☐ رفح

مسلسل	الرجاء قراءة الأسئلة بدقة والإجابة عليها إجابة واحدة	نعم	لا
1	هل عانيت من التهابات في المسالك البولية ذات مرة ؟		
2	إذا كانت الإجابة نعم هل كان ذلك خلال السنة السابقة ؟		
3	ما هي العلاجات التي تم وصفها لك من قبل طبيبك الخاص ؟		
4	هل عانيت أكثر من مرة من التهابات المسالك البولية في حياتك ؟		
5	إذا كانت الإجابة بنعم كم عددها ؟		
6	هل حدث وان تم إجراء عملية جراحية لك في المسالك البولية ؟		
7	هل عندك دراية بأي عيوب خلقية أو مشاكل عندك في المسالك البولية ؟		
8	إذا كانت الإجابة نعم ، الرجاء وصف ذلك ؟		
9	هل حدث وان عانيت من تكون حصى في المسالك البولية		
10	هل أنت مريض بالسكر؟		
11	هل حدث وان عانيت من التهابات في البروستاتا ؟		
12	إذا كانت الإجابة نعم ، هل كان ذلك خلال السنة السابقة ؟		
13	هل تعاطيت العلاجات ؟ الرجاء وصف ذلك		
14	هل طبيبك الخاص هو الذي وصف لك العلاجات؟		
15	هل لديك المعرفة عن استخدام القسطرة البولية بطريقة معقمة ؟		
16	هل تستخدم طريقة غير سليمة لإدخال القسطرة البولية ؟		
17	هل تعاني من انحباس في البول ؟		
18	هل تشرب السوائل بكثرة ؟ الرجاء حدد الكمية		
19	هل تشرب السوائل بكميات قليلة ؟ الرجاء حدد الكمية		
20	هل تعاني من عدم القدرة على استخدام القسطرة البولية ؟		
21	هل تتجاهل التقرح في القضيب ؟		
23	هل تستخدم المسهل لعملية القسطرة البولية ؟		

24	هل تعاني من عدم المقدرة على تغيير كيس البول بانتظام ؟		
21	هل تعاني من عدم القدرة على تغيير العازل الذكري البولي (الكوندوم) يوميا		
25	هل تقوم بغسل يديك قبل عملية القسطرة ؟		
26	هل تقوم بغسل يديك بعد عملية القسطرة؟		
27	هل تقوم بالإستجمار بالمناديل بدلا من الماء ؟		
28	هل تشعر بإرهاق الآن ؟		
29	هل تعاني من تصبب في العرق الآن ؟		
30	هل تشعر ببرودة شديدة الآن ؟		
31	هل تشعر بألم في المثانة الآن ؟		
32	هل تلاحظ دم في البول الآن ؟		
33	هل يوجد رائحة كريهة للبول الآن ؟		
34	هل يوجد تعكر في البول الآن ؟		
35	هل يوجد نزيف من الاحليل (مجري البول) الآن ؟		
36	هل لديك قسطرة بولية حاليا ؟		
37	إذا كانت الإجابة نعم ؟ هل القسطرة 1) دائمة 2) متقطعة 3) كوندوم		
38	كم مرة تستخدم القسطرة البولية في اليوم ؟		

ANNEX- 7

العنوان : الميكروبات المسببة لالتهابات المسالك البولية المكتسبة من المجتمع عند المرضى الذين يعانون من شلل في الأطراف السفلية في قطاع غزة

المعلومات الأولية الشخصية :

☑ **العمر :.....**

☑ **الحالة الاجتماعية :** ☐ متزوجة ☐ أعزب ☐ أرملة ☐ مطلقة

☑ **عدد الأولاد :.....**

☑ **معدل الدخل :.....**

☑ **تاريخ الإصابة : ..../...../.....**

☑ **الدرجة العلمية :** ☐ ابتدائي ☐ إعدادي ☐ ثانوي ☐ جامعي

☑ **طبيعة السكن :** ☐ مدينة ☐ مخيم ☐ ريف ☐ بلدة

☑ **المحافظة :** ☐ الشمال ☐ غزه ☐ الوسطى ☐ خانيونس ☐ رفح

مسلسل	الرجاء قراءة الأسئلة بدقة والإجابة عليها إجابة واحدة	نعم	لا
1	هل عانيتي من التهابات في المسالك البولية ذات مرة ؟		
2	إذا كانت الإجابة نعم هل كان ذلك خلال السنة السابقة ؟		
3	ما هي العلاجات التي تم وصفها لكي من قبل طبيبك الخاص ؟		
4	هل عانيت أكثر من مرة من التهابات المسالك البولية في حياتك ؟		
5	إذا كانت الإجابة بنعم كم عددها ؟ الرجاء وصف ذلك		
6	حددي طريقة آخر ولادة والتي كانت مصاحبة بالتهابات في المسالك البولية ؟		
7	هل حدث وان تم إجراء عملية جراحية لك في المسالك البولية ؟		
8	هل أنت على دراية بأي عيوب أو مشاكل عندك في المسالك البولية ؟		
9	إذا كانت الإجابة نعم ، الرجاء وصف ذلك		
10	هل حدث وان عانيت من حصى في المسالك البولية ؟		
11	هل أنت مريضة بالسكر؟		
12	هل سبق وان حدث توقف للدورة الشهرية ؟		
13	هل تعانين حاليا من توقف للدورة الشهرية ؟		
14	هل تعانين من عدم القدرة على استخدام القسطرة البولية بطريقة معقمة ؟		
15	هل تستخدمين طريقة غير سليمة لإدخال القسطرة البولية ؟		
16	هل تعانين من انحباس في البول ؟		
17	هل تشربين السوائل بكثرة ؟ الرجاء حددي الكمية		
18	هل تشربين السوائل بكميات قليلة ؟ الرجاء حددي الكمية		
19	هل تعانين من عدم القدرة على استخدام القسطرة البولية ؟		

20	هل تلبسين الملابس الضيقة (الجينز)؟		
21	هل كانت التهابات المسالك البولية مصاحبة للدورة الشهرية ؟		
22	هل تتكرر التهابات بعد انتهاء الدورة الشهرية ؟		
23	هل تستعملين هرمون الإستروجين موضعيا على المهبل و الاحليل (مجري البول) بعد توقف الدورة الشهرية؟		
24	هل عانيتي من التهابات في المسالك البولية قبل الزواج ؟		
25	هل عانيتي من التهابات في المسالك البولية بعد الزواج ؟		
26	هل تقومين بالتبول مباشرة بعد الجماع ؟		
27	هل تعانين من تكرار التهابات المسالك البولية في فترة الحمل ؟		
28	هل تستخدمين وساءل لمنع الحمل ؟		
29	إذا كانت الإجابة نعم الرجاء حددي ذلك ؟		
30	هل غالبا ما تعانين من التهابات في المسالك البولية بعد الولادة ؟		
31	هل الحمام المستخدم لعمل القسطرة البولية غير نظيف ؟		
32	هل تعانين من بلل مستمر ؟		
33	هل تستخدمين المسهل لعملية القسطرة البولية ؟		
34	هل تعانين من عدم تغيير كيس البول بانتظام حسب جدول معين ؟		
35	هل تعانين من رشح بولي بين عمليتي القسطرة البولية ؟		
36	هل تقومين بغسل اليدين قبل القسطرة ؟		
37	هل تقومين بغسل اليدين بعد القسطرة ؟		
38	هل تهتمين بتجفيف الملابس الداخلية جيدا ؟		
39	هل تقومين بالإستجمار بالمناديل بدلا من الماء ؟		
40	هل تستخدمين عملية الاستجمار بطريقة من الأمام إلى الخلف ؟		
41	هل تستخدمين عملية الاستجمار بطريقة من الخلف إلى الأمام ؟		
42	هل تستخدمين المياه الجارية للاستحمام ؟		

43	هل تستخدمين البانيو للاستحمام ؟		
44	هل تشعرين بإرهاق الآن ؟		
45	هل تعانين من تصبب في العرق الآن ؟		
46	هل تشعرين ببرودة شديدة الآن ؟		
47	هل تشعرين بألم في المثانة الآن ؟		
48	هل تلاحظين دم في البول الآن ؟		
49	هل يوجد رائحة كريهة للبول الآن ؟		
50	هل يوجد تعكر في البول الآن ؟		
51	هل يوجد نزيف من الاحليل (مجري البول) الآن ؟		
52	هل لديك قسطرة بولية حاليا ؟		
53	إذا كانت الإجابة نعم ، هل القسطرة 1) دائمة 2) مؤقتة		
54	كم مرة تستخدمين القسطرة البولية في اليوم		

ANNEX- 8

URINE INVESTIGATION REPORT

Serial No. …….

1) Urine analysis:

Pus-cell count of sediment \HPF. ……..

Gram-stain of sediment:…….

2) Urine culture:

Bacterial count …….CFU/ml of urine

☐ Positive ☐ Negative

Kind of organism …….

Susceptibility test:

Type of antibiotic	S	I	R
Cefatriaxone			
Amikacin			
Gentamicin			
Ciprofloxacin			
Ofloxacin			
Cefuroxime			
Cephalexin			
Nalidixic acid			
Trimethoprim-sulfamethoxazole			
Doxycycline			

Note:……
…….

بسم الله الرحمن الرحيم

الجامعة الإسلامية - غزة
The Islamic University - Gaza

هاتف داخلي: 1150

عمادة الدراسات العليا

Ref. الرقم: ج س غ/35/

Date التاريخ: 2008/01/12

الأخوة الأفاضل/ مستشفى الوفاء للتأهيل الطبي حفظهم الله،

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/ إياد إسماعيل درويش الرن برقم جامعي 2004/4875 المسجل في برنامج الماجستير بكلية التربية تخصص الصحة النفسية المجتمعية/علوم التأهيل، وذلك بهدف الحصول على المعلومات التي تساعده في إعداد دراسته والمعنونة:

"Community - Acquired Urinary Tract Infection Causing Microorganisms among Paraplegic Patients in Gaza Strip"

والله ولي التوفيق،،،

عميد الدراسات العليا

د. مازن إسماعيل هنية

صورة إلى:-
- الملف.