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**Assessment Nurses's Knowledge Regarding Road
Traffic Accident Emergency Management in Omdurman
Military Hospital in 2018**

**A research Submitted in fulfillment of the
requirement for the degree of Master in critical care
nursing**

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قال تعالى:
وَأَيُّوبَ إِذْ نَادَى رَبَّهُ أَنِّي مَسَّنِيَ الضُّرُّ
(وَأَنْتَ أَرْحَمُ الرَّاحِمِينَ)

الأنبياء 83

Dedication

This work is dedicated to my family.

The first and the greatest woman in my life, to my father, to my wife, my daughter and to my brother who I see them in eyes all human beings.

Acknowledge

Thanks Gods, I was capable of achieving this task, lot of thanks and appreciation to all those support me.

Special thanks to my parent who all my help me all the time.

Special thanks for my friends.

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Special thanks for all nurses working at emergence department in Omdurman military hospital who are help me.

Special thanks for Dean College nursing DR Hejaz Mohamed Ahmed, and teaching staff of nursing.

Abstract

Background

Objective:

This study to assess Nurses' knowledge regarding Road Traffic Accident Emergency Management at Omdurman Military Hospital.

Method:

This is descriptive cross-sectional study hospital based at Omdurman military hospital,

Assessed 61 nurses working at emergency department, using structured self administrated questionnaire.

Data were collected and analysis by Computerized statistical package for social science (SPSS, version20),

From October 2017to April 2018.

Result:

The result showed that more than two third (39, 63.9 %) from nurses has bachelor degree , and about one third (24 , 39.3%) the experience years between (4-6yr) , the study group they received training course about road traffic accident emergency management about one third (17, 27.9%) and more than two third (40,65.6%) from the nurses are know the meaning of road traffic accident.

The study showed that more than two third from nurses has good knowledge about the causes(46,75.4%)and more than two third (41, 67.2%)about road traffic accident management ,the most common level of knowledge are satisfy ,there are more than half from study group with good knowledge (47,77.0%)about application of primary survey, more than half (31,50.8%) from nurses has satisfy knowledge about AVPU method, also more than half (31,50.8%) about component of taking history, there are 2 third from study group with satisfy knowledge (45,73.8%)about fluid resuscitation.

Conclusion:

The current study revealed that most of study group had satisfy knowledge regarding definition and risk factors, Kind of generalized mechanism of injury ,how can RTA occur, complication and road traffic accident emergency management.

Good knowledge about the primary survey, and causes, diagnostic test and application of secondary survey.

Poor knowledge or not satisfy about basic mechanism of motion injury, the compartment syndrome complication and life support.

Recommendation:

Enhance nurses education level by periodic training. Provide educational posters in ED and trauma unit about protocol of road traffic accident management. Utility from the researches finding to improve nurses knowledge. Intensives and continuing education . Provide resources including practice guidelines.

Key words: Nursing, Knowledge ,Road Traffic accident.

مستخلص الدراسة

الخلفية : تعريف حوادث الطرق والمعالجه للمريض في الطواري هي الحوادث الناتجه عن اصطدام سياره باخري او بانسان او حيوان او بمنشآت واشياء اخري في الطريق,وطرق المعالجه السريعه لهذه الحالت في الطواري.

الهدف : معرفة وسلوك الممرضين نحو علاج

الألم في مستشفى أم درمان العسكري.

الطريقة : دراسة عرضية وصفية في مستشفى أم درمان العسكري تم استخدام بيانات استبيان منظم ذاتي ، عدد 16 من الممرضين الذين يعملو في قسم الطوارئ والاصابات وتم تحليل البيانات ببرنامج التحليل الاحصائي.

النتائج : اغلبية الممرضين بنسبة(40,65.6%) لديهم المعرفة بتعريف حوادث السيارات وطرق العلاج السريع في الطواري ،ونجد نسبة (24 , 39.3%) لديهم خبره من 4-6 في الطواري. (46,75.4%) لديهم معرفة بالاسباب الحوادث .(41, 67.2%) لديهم معرفه بطرق العلاج للحوادث في الطواري. لديهم معرفه بطرق التقييم للحالات الطارئه الناتجه من الحوادث(31,50.8) . (%)

الخلاصة : لديهم المعرفة الكاملة للدراسة فيما يتعلق بعلاج الحالات الطارئه الناتجه من الحوادث، ووجدنا انه لا يوجد معرفه كافيه بعض المضاعفات الكامنه الناتجه من الحوادث.

التوصيات : وضع ارشادات في قسم الطوارئ حول علاج الحالات الطارئه الناتجه من الحوادث. زيادة الابحاث الاضافية المتعلقة بالحوادث ، مواصلة برنامج التدريب للممرضين .زيادة فترة التدريب لكل الممرضين في قسم الطواري

الكلمات الاساسية : التمريض ، المعرفة، الحوادث ومعالجه الحالات الطارئه .

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LIST OF ABBREVIATION

| | |
|------|---|
| RTA | Road Traffic Accident |
| MVCs | Motor Vehicle Collisions |
| RTI | Road Traffic Injury |
| RTCs | Road Traffic Collisions |
| PTSD | Post-Traumatic Stress Disorder |
| SCI | Spinal Cord Injury |
| mTBI | moderate Traumatic Brain Injury |
| WAD | Whiplash Associated Disorder |
| MVAs | Motor Vehicle Accidents |
| WHO | World Health Organization |
| RTC | Road Traffic Collision |
| UN | United Nation |
| CT | Computer Tomography |
| ABGs | Arterial Blood Gases |
| ECG | Electrocardiogram |
| CXR | Chest X R |
| MRI | Magnetic Resonance Image |
| FAST | Focused Abdominal Sonography for Trauma |
| DPL | Diagnostic Peritoneal Lavage |
| NPO | Nothing Per Oral |
| NG | Nasogastric |

| | |
|------|--------------------------------------|
| OPSS | Overwhelming Post–Splenectomy Sepsis |
| ARDS | Acute Respiratory Distress Syndrome |
| DIC | Deiminated Intravascular Coagulation |
| EMS | Emergency Medical Service |
| MODS | Multiple Organ Dysfunction Syndrome |
| ATLS | Advance Trauma Life Support |
| GCS | Glasgow Coma Scale |
| ACLS | Advance Cardiac Life Support |
| ICP | Increased Intracranial Pressure |
| MTP | Massive Transfusion Protocol |
| RIDE | Reduce Impaired Driving Everywhere |

CHAPTER ONE

Introduction

Objectives

Justification

1

Introduction

Road traffic accidents (RTAs) represent a leading and increasing contributor to regional and global disease burden. Each year nearly 1.3 million people die as a result of a road traffic collision in the world, more than 3500 deaths each day. Moreover, twenty to fifty million more people sustain nonfatal injuries from a collision, and these injuries are an important cause of disability worldwide(1).

Road traffic accidents (RTAs) are projected to become the 3rd largest contributor to global disease burden by 2020(2).

According to the WHO road traffic injuries caused an estimated 1.24 million deaths worldwide in the year 2010, down from 1.26 million in 2000(3).

Half of all road traffic deaths are among pedestrians, cyclists, and motorcyclists, and adults aged between 15 and 44 years account for 59% of deaths. Three out of 4 road deaths are among men. The average rate was 18 per 100,000 people (down from 20.8 in 2000). 92% occurred in low- and middle-income countries, with South-East Asia and Africa having the highest rates in the world due to risk factors such as speed and alcohol, and exacerbated by inadequate enforcement of traffic safety regulations and public health infrastructure(4).

There is marked variation across the world in the way that roads are used and injuries are caused, which have important implications for road safety policy and practice(5).

The injuries caused by road traffic accidents (RTAs) become a major public health problem worldwide and a major cause of morbidity and mortality with temporary or permanent disability(6).

Road traffic accidents have become one of the most important disadvantageous impacts of man's interrelationship with technology(7).

In Sudan, road traffic Accidents problem is one of the major health concerns because of the high rate of population growth, the large percentage of young drivers, large number of vehicles, the absence of strict law enforcement and the poor road conditions(8).

1.2 General objectives:

Assessment Nurse's knowledge Regarding Road Traffic Accident and Emergency Management.

Specific objectives:

- 1- To assess the level of nurses knowledge regarding understanding of road traffic accident and importance of its management.
- 2- To assess nurses knowledge regarding assessment and management of road traffic accident.
- 3- To assess the knowledge regarding complication and how to prevent it.

1.3Justification

The treatment of seriously injured patients requires the rapid assessment of injuries and institution of life-preserving therapy. Because timing is crucial, a systematic approach that can be rapidly and accurately applied is essential. So, conduct this study to find out how the knowledge of nurses' staff about road traffic accident emergency management that may improve outcome and reduce the mortality rate.

Chapter Two

Literature review

1. Literature review:

Review of literature is the task of reviewing literature which involves the identification, selection critical analysis and reporting of existing information on the topic of interest. It provides the bases to locate the data, new ideas that need to be included in the present study it helps the researcher to find the accurate data that could be used for supporting the present finding and drawing conclusion.

This chapter deals with a review of published and unpublished research studies and related material for the present study the review helped the researcher to develop on insight into the problem area and helped to build the foundation of the study.

The Review of literature is presented under the following broad heading:

- a) Review related to incidence of road traffic accidents.
- b) Review related to knowledge on road traffic accidents.
- c) Review related to importance of prevention of road traffic accidents.
- d) Review related to factors influencing road traffic accidents.
- e) Review related to effects of RTA.

a) Review related to incidence of road traffic accidents:

A conducted study in 2010 was done to elucidate the magnitude, risk factors and outcome of RTI in Qassim region of Saudi Arabia, and compare the pattern of accidents, the result confirmed that rate for non-fatal RTI is higher in the 10–19 years age group and also males had twice or more incidence rate

for RTI requiring recovery period of ≤ 7 days as compared with females. So suggests that active efforts to audit and monitor data quality are clearly necessary(9).

A descriptive study of road traffic accidents was done in Sudan to investigate the epidemiological profile of RTA, The study revealed that, The majority of victims were males of working age (25 – 44). The main causes behind these accidents were incorrect passing of vehicle, incorrect crossing of pedestrian, high speed and driving under influence of alcohol. The study concluded that, road traffic accidents still occurred in high proportion and it is a major death-leading cause(10).

This cross-sectional study was conducted in Rafsanjan city in Iran, result was age, gender and location of accident, had significant association with the number of mortalities. And conclude that young people and motorcyclists had most accidents. Teaching the laws and regulations to the people of the city, is the most effective method in reducing accidents and mortality(11).

b) Review related to knowledge on road traffic accidents:

A conducted study done to determine the knowledge, attitudes and practice and the factors influencing university students in Malaysia concerning road traffic accident, the result shown that age and attitude were significantly associated with the exposure to the accident , and strongly advised for seat belts importance(12).

A case control studies suggest that, cycle helmets offer their wearers protection from injury in the event of an accidents. It can be confirmed that, head injuries are falling faster among cyclists than pedestrians. Although case control studies suggest cycle helmets are not effective in reducing over all injuries(13).

A conducted study done in Malawi, Drivers of motor vehicles had the lowest odds of mortality following RTCs Compared to pedestrians had the highest odds of mortality, Pedestrians were particularly vulnerable, exhibiting very high odds of mortality when involved in a road traffic collision. We encourage protect pedestrians and other road users from RTCs(14).

C. Review related to importance of prevention at road traffic accidents:

A Study conducted to assess whether drowsy driving can increase road traffic accident related deaths and injuries and findings was suggest a significant association between crash involvement and drowsy driving. And conclude that need establishment of strategies to reduce any risk factors of road traffic accident such as drowsy driving can be effective in decreasing traffic crashes(15).

A Study reported that the enhancement of Kuwait's seat belt law in January 1994 to examine the impact of seat belt use in road accident fatalities and injury types in this affluent Persian Gulf Nation. Nonusers of belts experienced higher frequencies of head, face, abdominal and limb injuries. Users of the belts on the other hand(16).

A conducted studies done To assess whether area-wide traffic calming schemes can reduce road crash related deaths and injuries and confirmed that Eight studies reported the number of road user deaths, and Sixteen studies reported the number of injuries (fatal and non-fatal) and they conclude that Area-wide traffic calming in towns and cities has the potential to reduce road traffic injuries(17).

D. Review related to factors influencing road traffic accidents:

This study conducted to determine risk factors that occurrence time of traffic accidents and the result was the non-occurrence rate of traffic accidents involving injury is mostly affected by gender, age, education, number of vehicles involved in accident, road surface material, daylight, type of road, direction of road and time of the day. The non-occurrence rate of fatal traffic accident duration is mostly affected by gender, age, education, daylight and horizontal alignment, and conclude that as the non-occurrence time increases, occurrence of accidents in earlier years will decrease. In other words, the number of accidents in earlier years will be lower. This will cause a decrease in the number of accidents in total(18).

A study conducted to evaluate the effect of variables such as personality traits, driving behavior and mental illness on road traffic accidents among the drivers with accidents and those without road crash, and the results revealed that some mental disorders affect the incidence of road collisions. And conclude with Consideration the importance and sensitivity of driving behavior, it is necessary to evaluate multiple psychological factors influencing drivers before and after receiving or renewing their driver's license(19).

A study conducted done in Oman to assess the extent of medical conditions and medications influencing road traffic safety among drivers involved in road accidents. And the finding was majority of victims were male, and the victimized drivers had a history of medical conditions with diabetes and hypertension they were on medications of which insulin was the most common. Loss of control, followed by dizziness, sleep amnesia, and blurred vision. Other effects blamed by victimized drivers include vertigo, phonophobia, photophobia, back pain, loss of sensation, and headache, and conclude that medical conditions and medications influence road traffic safety to some extent(20).

E. Review related to effects of Road Traffic Accidents:

A conducted study report that Motor vehicle collisions (MVCs) are a substantial contributor to the global burden of disease and lead to subsequent post-traumatic stress disorder (PTSD). PTSD was significantly associated with low respondent education, someone dying in the MVC, the respondent or someone else being seriously injured, childhood family adversities, prior MVCs, and number of prior anxiety disorders. And conclude that PTSD is a relatively rare outcome of life-threatening MVCs, a substantial minority of PTSD cases occur among the relatively small proportion of people with highest predicted risk([21](#)).

A concluded study to determine the psychological impact associated with motor vehicle crash (MVC)-related physical injuries. And the result was elevated psychological distress was associated with MVC-related injuries. And Increased psychological distress remains elevated in spinal cord injury (SCI), moderate traumatic brain injury (mTBI)and whiplash-associated disorder (WAD) for at least 3 years post-MVC. And conclude with need for rehabilitation strategies to minimize distress subsequent to MVC-related physical injuries and the scientific robustness of studies requires improvement([22](#)).

A conducted study was to compare the prevalence of neck pain and disability in a group exposed to motor vehicle accidents (MVAs) with those in the general population and the result was seventeen years after the MVA neck pain reported. And conclusion that a past history of exposure to an MVA with sequelae of neck pain appears to have a substantial impact on future persistent neck pain and associated disability([23](#)).

2.1 Background:

Over 1.2 million people die each year on the world's roads, with millions more sustaining serious injuries and living with long-term adverse health consequences. Globally, road traffic crashes are a leading cause of death among young people, and the main cause of death among those aged 15–29 years. Road traffic injuries are currently estimated to be the ninth leading cause of death across all age groups globally, and are predicted to become the seventh leading cause of death by 2030(24).

Road traffic injuries are a major but neglected global public health problem, requiring concerted efforts for effective and sustainable prevention. Worldwide, the annual number of people killed in road traffic crashes is estimated at almost 1.2 million, while the number of injured could be as high as 50 million. WHO African Region has the highest mortality rate, with 28.3 deaths per 100,000 Populations(25).

Despite the fact that the cost of road trauma is larger than from cancer and cardiovascular diseases, the attention and effort paid by health policymakers and by the medical community, to trauma-related care and research has been disproportionately small so far. Morbidity and mortality due to injuries from (MVA) contribute considerably to human suffering amongst both victims and their relatives leading to tremendous socio-economic costs. Many victims belong to younger age groups resulting in many years of life either lost or crippled by severe disability(26).

Health consequences of (MVA) can be influenced by preventative actions before the crash (active or primary safety), during the crash (passive or secondary safety) and post-crash (rescue, treatment and rehabilitation). The appropriate management of road casualties is a crucial determinant of the chance and quality of survival(8).

The category of injuries worldwide is dominated by those incurred in road crashes. According to World Health Organization data, deaths from road traffic injuries account for around 25% of all deaths from injury. Around 85% of all global road deaths, 90% of the disability-adjusted life years lost due to crashes, and 96% of all children killed worldwide as a result of road traffic injuries occur in low-income and middle-income countries. Over 50% of deaths are among young adults in the age range of 15–44 years(7).

Estimates of the annual number of road deaths vary as a result of the limitations of injury data collection, analysis and problems of underreporting and differences in interpretation(27).

2-2 Definition:

2-2-1. Road traffic accident:

A road traffic accident (RTA) is defined as an accident, which took place on the road between two or more objects, one of which must be any kind of a moving vehicle(28).

A collision involving at least one vehicle in motion on a public or private road that results in at least one person being injured or killed(25).

Road traffic crash: a collision or incident that may or may not lead to injury, occurring on a public road and involving at least one moving vehicle(25).

Road traffic fatality: a death occurring within 30 days of the road traffic crash(25).

Road traffic injuries: fatal or non-fatal injuries incurred as a result of a road traffic crash(25).

Road user: a person using any part of the road system as a non-motorized or motorized transport user(25).

Fatalities are deaths that occur within 30 days as result of a(MVA)(29).

while disability is any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being(30).

The burden of RTC is a leading cause of all trauma admissions in hospitals worldwide(31).

Trauma is the leading cause of death for all age groups younger than 44 years. Injury costs the United States hundreds of billions of dollars annually. It is one of the most pressing health problems in the United States today, but the problem continues to go largely unrecognized(32,p.850-880).

Injury as a result of trauma is no longer considered to be an accident.

The term *motor vehicle accident* (MVA) has been replaced with *motor vehicle crash* (MVC), and the term *accident* has been replaced with *unintentional injury*. Unintentional injury is no accident. Accident traditionally has implied an act of God or an unpredictable event(32,p.850-880).

2-3. Risk Factors:

The Safe system approach: accommodating human error.

The Safe System approach to road safety aims to ensure a safe transport system for all road users. Such an approach takes into account people's vulnerability to serious injuries in road traffic crashes and recognizes that the system should be designed to be forgiving of human error. The cornerstones of this approach are safe roads and roadsides, safe speeds, safe vehicles, and safe road users, all of which must be addressed in order to eliminate fatal crashes and reduce serious injuries(24).

Speeding:

An increase in average speed is directly related both to the likelihood of a crash occurring and to the severity of the consequences of the crash. For example, an increase of 1 km/h in mean vehicle speed results in an increase of 3% in the incidence of crashes resulting in injury and an increase of 4–5% in the incidence of fatal crashes. An adult pedestrian's risk of dying is less than 20% if struck by a car at 50 km/h and almost 60% if hit at 80 km/h(24).

Driving under the influence of alcohol and other psychoactive substances:

Driving under the influence of alcohol and any psychoactive substance or drug increases the risk of a crash that results in death or serious injuries. In the case of drink-driving, the risk of a road traffic crash starts at low levels of blood alcohol concentration (BAC) and increases significantly when the driver's BAC is ≥ 0.04 g/dl. In the case of drug-driving, the risk of incurring a road traffic crash is increased to differing degrees depending on the psychoactive drug used. For example, the risk of a fatal crash occurring

among those who have used amphetamines is about 5 times the risk of someone who hasn't(24).

Non-use of motorcycle helmets, seat-belts, and child restraints:

Wearing a motorcycle helmet correctly can reduce the risk of death by almost 40% and the risk of severe injury by over 70%. Wearing a seat-belt reduces the risk of a fatality among front-seat passengers by 40–50% and of rear-seat passengers by between 25–75%. If correctly installed and used, child restraints reduce deaths among infants by approximately 70% and deaths among small children by between 54% and 80% (24).

Distracted driving:

There are many types of distractions that can lead to impaired driving. The distraction caused by mobile phones is a growing concern for road safety. Drivers using mobile phones are approximately 4 times more likely to be involved in a crash than drivers not using a mobile phone. Using a phone while driving slows reaction times (notably braking reaction time, but also reaction to traffic signals), and makes it difficult to keep in the correct lane, and to keep the correct following distances. Hands-free phones are not much safer than hand-held phone sets, and texting considerably increases the risk of a crash(24).

Unsafe road infrastructure:

The design of roads can have a considerable impact on their safety. Ideally, roads should be designed keeping in mind the safety of all road users. This would mean making sure that there are adequate facilities for pedestrians, cyclists, and motorcyclists. Measures such as footpaths, cycling lanes, safe crossing points, and other traffic calming measures can be critical to reducing the risk of injury among these road users(24).

Unsafe vehicles:

Safe vehicles play a critical role in averting crashes and reducing the likelihood of serious injury. There are a number of UN regulations on vehicle safety that, if applied to countries' manufacturing and production standards, would potentially save many lives. These include requiring vehicle manufacturers to meet front and side impact regulations, to include electronic stability control (to prevent over-steering) and to ensure airbags and seat-belts are fitted in all vehicles. Without these basic standards the risk of traffic injuries – both to those in the vehicle and those out of it – is considerably increased(24).

Inadequate post-crash care:

Delays in detecting and providing care for those involved in a road traffic crash increase the severity of injuries. Care of injuries after a crash has occurred is extremely time-sensitive: delays of minutes can make the difference between life and death(24).

Inadequate law enforcement of traffic laws:

If traffic laws on drink-driving, seat-belt wearing, speed limits, helmets, and child restraints are not enforced, they cannot bring about the expected reduction in road traffic fatalities and injuries related to specific behaviours. Thus, if traffic laws are not enforced or are perceived as not being enforced it is likely they will not be complied with and therefore will have very little chance of influencing behaviour. Effective enforcement includes establishing, regularly updating, and enforcing laws at the national, municipal, and local levels that address the above mentioned risk factors. It includes also the definition of appropriate penalties(24).

Forms of Road Traffic Accidents:

When a car comes to a stop, the energy from the moving vehicle will be transferred to the vehicle itself, and then in turn to the occupants. If deceleration (slowing down) takes place slowly, such as over a longer distance, injuries can be less severe. However, deceleration forces, and therefore significant injury, can be much greater if the vehicle comes to a sudden stop(33). This is because the energy level, or velocity, exceeds the tolerance level of the tissue. This leads to tissue disruption and injury(34). The nature of the materials involved in the collision and the way in which the energy is dispersed is significant(33). Modern vehicles are fitted with impact or 'crumple' zones at the front and back which collapse progressively, to absorb as much impact as possible and keep the energy away from the occupants. 3 Larger vehicles tend to be safer than smaller ones. However, regardless of safety features, any significant transfer of energy puts the occupant at risk of serious injury(35).

RTAs can be categorized according to the type of impact(35).

The sub-category refers to the nature of the injury that the patient sustains, i.e. *occupant collision* indicates a collision between the occupant and the inside of the vehicle, or outside if they are ejected; and *organ collision* indicates the impact between the patient's organs and the internal framework of the body. Some patients can suffer both(35).

Occupant collision: frontal impact

A frontal impact is a collision with an object in front of the vehicle, which suddenly reduces its speed(34). It accounts for the majority of injuries and

deaths sustained in RTAs. As the vehicle comes to a stop the occupant(s) continue to move forward with the same speed as the vehicle, until something stops them(34). This could be the steering wheel, dashboard, windscreen, or ground if the occupant is ejected. Frontal impacts cause shortening of the car as the bonnet caves in and the engine and dashboard are forced backwards into the passenger compartment(35). Any such deformity of the passenger compartment indicates a significant impact(33). In this type of impact, lower limb injuries are common as they get trapped by the engine and dashboard, or impact against pedals(35). The occupant hitting the steering wheel can result in blunt torso injuries to structures such as the liver, spleen and stomach, as well as fractured ribs, sternum and flail chest. Finally head, face and cervical spine injuries can result from impact against the steering wheel or windscreen. The occupant can also follow a *down and under* pathway, whereby they slide under the dashboard(35). This can lead to fractures and dislocations of the ankle, knee, femur and femoral head(34, 35). Rear passengers can sustain injuries as well, especially if unrestrained. Any unrestrained passenger can sustain severe facial injuries from being thrown forward. In addition front seat passengers are at risk of being injured by unrestrained rear passengers who are thrust forward(35).

Occupant collision: lateral impact

A lateral impact occurs when a vehicle is hit from the side and the occupant is accelerated away from the point of impact(35).

Lateral impact RTAs are second only to frontal impacts in terms of injury and death,1 and 75% of victims of lateral impacts are over the age of 50(35).

Injuries will relate to which side the force was applied, so a lateral impact to the driver's side could potentially result in injuries to the right side of the body, such as a liver laceration, whereas a left-sided impact may result in a passenger sustaining a ruptured spleen(35).

Victims can also sustain lateral flail chest injuries, pulmonary contusion and kidney injury. If the force is significant enough the occupant may be pushed from one side of the car to another, leading to injuries on both sides. The head can also be injured if the victim strikes another occupant of the vehicle or hits their head on the window the same side as the collision(33).

A lateral impact may also cause upper and lower musculoskeletal injuries, typically fractures to the pelvis, ribs and upper arm, with associated internal injuries(35). Neck injuries can occur in addition, as a result of a lateral impact(35).

Occupant collision: rear impact

These impacts differ from frontal and lateral impacts, as they often occur when the vehicle involved is already stationary, and is struck from behind.

However, like a lateral impact, the occupant is accelerated forward due to the energy transfer from behind(34). This may subsequently lead to the vehicle being propelled forward leading to an additional frontal impact(35). Injuries that occur in this type of impact are predominantly whiplash injuries, caused by hyperextension of the neck and often exacerbated by a poorly functioning head-rest(34, 36). Fractures of the cervical spine can also occur(35).

Occupant collision: rollover

When a car rolls over the energy can be dissipated over a long distance, which can sometimes minimise injury to the occupants, particularly if they are restrained(33, 36). However, the chaotic and multiple movements sustained in a rollover can and do cause significant injury and these should always be excluded(35).

During a rollover, injury severity can depend on whether the occupant was restrained or unrestrained. An unrestrained occupant can impact on any part of the vehicle interior or could be ejected(36). Musculoskeletal injuries to any part of the body may occur, with associated internal organ damage. Roof collapse can lead to significant head injury and compression fractures of the spine are common(36).

Occupant collision: ejection

If the patient is ejected from the vehicle, the likelihood of serious injury increases by 300% as there has been sufficient energy transfer to force them from the vehicle and they will have hit the ground at considerable speed(34, 36). Anyone else in the vehicle that has not been ejected may still have been subjected to severe energy force(36).

Organ collision: compression injury

Compression injuries occur when the anterior (front) part of the torso stops moving forwards and the posterior (back) portion of the torso and internal organs continue to move forward. This leads to compression of the organs from the posterior part of the internal chest and abdomen(34), but can also occur inside the skull causing brain injury(33).

Examples of compression injuries include:

- Blunt myocardial injury
- Lung contusion
- Flail chest
- Pneumothorax
- Bowel injury(35).

Organ collision: deceleration injury

These injuries occur when a vehicle or person comes to a sudden halt, after moving at speed(33). When the body stops moving forwards the stabilising part of an organ also stops moving, but the organ itself continues to do so(35). This can lead to a shearing force which can detach the stabilising structure from its organ (36). Examples of this type of injury are to the kidney and spleen, which both shear away from their respective pedicles.

In the brain, the posterior part of the brain separates from the skull, tearing vessels in the process(34), leading to cerebral contusion(33). The aorta can rupture in a high speed RTA, where deceleration leads to the aortic arch shearing off from the descending aorta, an injury which is usually fatal in seconds(35).

Organ collision: restraint injury

The use of three-point restraint seat belts has been shown to reduce death in RTAs by up to 70%.¹ However, if used incorrectly, and sometimes when used correctly, injuries can occur(36).

To function correctly the lap portion of the seat belt must be below the anterior/superior iliac spines and above the femur, and must be tight enough to remain in place during any impact(34).

If it is worn incorrectly, such as too high, then the forward motion of the posterior abdominal wall and spine can trap organs such as liver, pancreas, spleen or kidney against the belt at the front. This can result in burst injuries and lacerations to these organs¹ such as duodenal rupture(35). The shoulder portion of a seat belt can cause neck injury if worn too high(33).

Even when a belt is applied correctly the energy exchange can be sufficient to lead to injuries such as:

- Fractures of the clavicle
- Cardiac contusions
- Pneumothorax
- Rib and sternal fractures(36).

Pattern bruising over the abdomen or chest from a seat belt suggests significant energy exchange and the trauma team should be suspicious of associated internal injury(35).

Availability of airbags in vehicles may reduce injuries in frontal impacts, and side impacts(34, 36). They work by spreading the deceleration forces over a large area and so reduce forward movement and impact(33). However, they provide no protection in rollovers or rear impact and can actually cause injury to patients who are not in the usual position, such as facing backwards when the airbag is set off(36). Once activated airbags can cause friction and heat burns(36).

Assessment and Management of Specific Injuries

Although this section discusses traumatic injuries related to specific areas of the body, every trauma patient requires head-to-toe physical assessment([37,p.475-485](#)).

Thoracic Trauma

Thoracic injuries range from simple to life-threatening. In thoracic injury, the first priority is always airway management. Airway obstruction may be the primary problem or the result of another injury. Airway obstruction can be caused by the tongue, avulsed teeth, dentures, or blood, or by injuries to the trachea, thyroid cartilage, or cricoid([37,p.475-485](#)).

Tracheobronchial Trauma

Tracheobronchial injuries can be caused by blunt or penetrating trauma and frequently are accompanied by esophageal and vascular damage. Ruptured bronchi often are present in association with upper rib fractures and pneumothorax. Tracheobronchial injury is considered whenever pneumothorax persists despite management. Diagnosis usually is made with bronchoscopy or during surgery. Small lung lacerations or pleural tears can be managed conservatively with mechanical ventilation delivered through an endotracheal tube or tracheostomy. Larger injuries may require surgical repair. Nursing responsibilities include assessing oxygenation and gas exchange and providing pulmonary care ([37,p.475-485](#)).

Bony Thorax Fractures

Rib fractures, sternal fractures, and flail chest are common in trauma patients. Rib fractures are clinically significant as markers of serious intrathoracic and abdominal injuries, sources of significant pain, and predictors of pulmonary deterioration. The greatest concerns for nurses caring for patients with bony thorax fractures are pain management, effective ventilation, and secretion control. Flail chest involves multiple adjacent rib fractures or involves sternal fracture. These fractures can be anterior, posterior, or lateral, and usually a sternal fracture is present as well. The flail segment follows pleural pressure instead of respiratory muscle activity, producing paradoxical breathing (ie, the affected portion of the chest wall moves in on inspiration and out on expiration). Ventilation is decreased, leading to hypoxia. As the patient's pulmonary status worsens, the paradoxical movement of the flail segment increases. Initial management of flail chest and other bony thorax fractures includes airway management, pain management, and oxygen therapy to maintain adequate saturation. A patient with flail chest may be positioned with the injured side down to improve oxygenation; however, this is often difficult because of the need to maintain cervical spine

immobilization. Other treatment modalities for flail chest include internal splinting (accomplished by providing positive pressure ventilation) and surgical repair([37,p.475-485](#)).

Pleural Space Injuries

Pleural space injuries include pneumothorax (intrapleural air collection), hemothorax (intrapleural blood collection), and hemopneumothorax (interpleural air and blood collections). Normally, the pressure within the pleural space is negative, which assists with maintaining lung expansion. The introduction of air or blood into the pleural space causes the pressure in the pleural space to become positive, which causes the lung to collapse. In a patient with a pleural space injury, respiratory distress and signs of impaired gas exchange may be seen. Ongoing reassessment is necessary because even if the original pleural tear is small, it can expand, putting the patient at risk for tension pneumothorax (a life-threatening emergency).

Chest radiography or chest CT is usually used to diagnose pleural space injuries. Treatment entails management of the patient's airway, ventilation, and oxygenation. A large-bore chest tube is inserted to drain the air or blood from the plural space and reexpand the lung. The nurse monitors the amount of blood that drains into the chest tube drainage device. Drainage of more than 200 mL/h for 2 consecutive hours may indicate a significant injury and the need for further follow-up([37,p.475-485](#)).

Massive Hemothorax

A massive hemothorax (1.5 to 4 L of intrathoracic blood loss) is a life threatening injury. The source of bleeding is often a large systemic blood vessel or mediastinal structure. Left massive hemothorax is most common and is often associated with aortic rupture. Patients with massive hemothorax may go into cardiopulmonary arrest and require immediate thoracotomy to control bleeding. Patients who are not in cardiopulmonary arrest present with signs of hypovolemic shock, dyspnea, tachypnea, and cyanosis. Initial management of these patients includes treatment of the shock state([37,p.475-485](#)).

Tension Pneumothorax

Tension pneumothorax is caused by air continuing to enter the pleural space without being able to leave the pleural space. The resultant compression of the trachea, heart, lungs, or great vessels can result in ventilatory failure, compromised venous return, and insufficient cardiac output. Tension pneumothorax may result from primary injury to the thorax, or it may be a delayed complication related to tracheobronchial injury or mechanical ventilation. Treatment of tension pneumothorax involves the administration of supplemental oxygen and emergent decompression with chest tube placement. If a chest tube cannot be placed rapidly, the decompression can be achieved by

placing a 16- or 18-gauge needle into the second intercostal space, midclavicular, to release the trapped air. After emergent decompression, the needles are changed to chest tubes to allow the lungs to expand and to prevent a reoccurrence([37,p.475-485](#)).

Pulmonary Contusion

Pulmonary contusion (bruising of the lung parenchyma) is the most common lung injury and is potentially lethal. Rupture of the capillary cell walls causes hemorrhage and extravasation of plasma and protein into alveolar and interstitial spaces, resulting in noncardiogenic pulmonary edema that causes intrapulmonary shunting and hypoxemia. Pulmonary contusion should be anticipated in any patient who sustains significant high-energy blunt chest trauma, such as that caused by an MVC. The presence of a scapular fracture, rib fractures, or a flail chest also raises suspicion for a possible underlying pulmonary contusion. It may take 6 hours or more for a pulmonary contusion to become apparent on a chest radiograph; CT is more sensitive. Treatment of pulmonary contusion is supportive. Patients with a mild contusion require close observation with frequent monitoring of ABGs and pulse oximetry. Patients with a severe contusion may require ventilatory support. Additional nursing interventions include pulmonary care, pain control, and fluid management. The contused lung should show radiographic signs of improvement within 72 hours. The presence of persistent infiltrates may indicate complications, such as pneumonia or superimposed ARDS([37,p.475-485](#)).

Cardiac Contusion

Cardiac contusions are usually caused by blunt chest trauma as the heart impacts the sternum during rapid deceleration or is compressed between the sternum and back. Symptoms vary in severity from none (common), to chest pain and hypotension, to heart failure and cardiogenic shock. Most patients with cardiac contusions have ECG abnormalities on admission; however, there is no correlation between the complexity of the dysrhythmia and the degree of the cardiac contusion. Echocardiography may reveal myocardial depression. The patient is placed on continuous cardiac monitoring, hemodynamics are monitored, and blood is drawn for cardiac isoenzyme. Therapy is primarily aimed at supporting cardiac function and relieving symptoms([37,p.475-485](#)).

Cardiac Tamponade

Cardiac tamponade, a life-threatening injury, can result from penetrating or blunt trauma. Cardiac tamponade is caused by blood filling the pericardial space and compressing the heart. The resultant decreased cardiac filling leads to reduced cardiac output, reduced contractility, and eventually shock. Only a small amount (50 to 100 mL) of blood in the pericardial sac can create an

increase in pericardial pressure. Continued bleeding increases the pressure rapidly, leading to cardiac tamponade.

Signs and symptoms may be obscured in a hypovolemic patient.

Echocardiography is most useful in making the diagnosis. Definitive and life-saving treatment entails draining the blood from the pericardial sac([37,p.475-485](#)).

Penetrating Cardiac Injury

The mortality rate associated with penetrating cardiac injury is 50% to 85%. Those who survive do so because of cardiac tamponade. Occasionally, small stab wounds to the ventricles seal themselves because of the thick ventricular musculature. For some hemodynamically stable patients, monitoring with serial CT scanning or with pericardial and pleural ultrasound is acceptable. For other patients, surgery to create a thoracoscopic pericardial window may be necessary to aid in the diagnosis of ongoing hemorrhage and to drain pericardial fluid collection. In the presence of ongoing hemorrhage and shock, the patient is immediately transported to the operating room for a median sternotomy and exploration. After surgical repair, the nurse monitors hemodynamics, maintains blood pressure and perfusion, and corrects metabolic abnormalities. Complications include continued hemorrhage and postcardiotomy syndrome (symptoms of pericarditis, with or without fever, appearing weeks to months after cardiac surgery)([37,p.475-485](#)).

Aortic Transection

Aortic transection (tearing or rupturing of the aorta) is the leading cause of immediate death from blunt trauma; most patients die at the scene or before reaching the hospital. Aortic injury is usually associated with sudden deceleration forces, such as those sustained during an MVC or a fall. Because the thoracic aorta is very mobile, tears typically occur at points of fixation, especially at the level of the isthmus (ie, the descending portion of the arch). During a sudden deceleration, the aorta continues to travel forward but at the point of the isthmus, the ligamentum arteriosum holds the aorta back, typically causing transection of all three layers of the vessel wall. If the adventitia (outer layer) remains intact, an aneurysm or a partial circumferential hematoma (which has a tamponading effect) may form and can prolong survival, but only for a limited time. Early diagnosis and treatment are critical. Aortography is the gold standard for diagnosis. A CXR identifies changes which indicate an aortic injury. These include widened mediastinum; loss aortic knob; and apical cap. Other diagnostics include CTA, MRA and echocardiogram. Surgical repair may involve placement of a synthetic graft. Cardiopulmonary bypass may be necessary for repair of the ascending aorta or the aortic arch. Nursing care focuses on hemodynamic monitoring and

blood pressure management. Postoperative nursing care includes monitoring for complications of distal organ ischemia([37,p.475-485](#)).

Abdominal Trauma

Abdominal trauma can be blunt or penetrating, and can rapidly lead to death secondary to hemorrhage, shock, and sepsis. In abdominal trauma, single organ injuries are rare; usually, several abdominal organs are involved. Detection of injuries caused by blunt abdominal trauma can be difficult, especially if other injuries are present, and missed abdominal injuries are a frequent cause of death. In blunt abdominal trauma, compression forces lead to fractures of solid organ capsules and parenchyma, whereas hollow organs collapse and absorb the force. Solid organs usually respond to trauma with bleeding, whereas hollow organs rupture and release their contents into the peritoneal cavity, causing inflammation and infection. Penetrating trauma can result in “dirty” wounds, which are associated with high mortality rates secondary to infection caused by bacterial contamination and subsequent multisystem organ failure. Diagnostic testing may include focused abdominal sonography for trauma (FAST), diagnostic peritoneal lavage (DPL), chest radiography (to detect organ displacement or the presence of free air), and abdominal CT. FAST is performed by passing an ultrasound probe over the abdomen to detect the presence of free fluid. DPL is the instillation of normal saline or lactated Ringer’s solution into the abdominal cavity; the returned lavage fluid is then analyzed for the presence of blood RBCs and WBCs, bile, bacteria, or fecal matter, which would indicate intra-abdominal injury. If the results of FAST or DPL are positive and the patient is hemodynamically unstable, an exploratory laparotomy is performed([37,p.475-485](#)).

Clinicians divide the abdomen into three main regions to facilitate description of the location of the injury :

- The peritoneal area, which includes the diaphragm, liver, spleen, stomach, transverse colon, and the portion covered by the bony thorax
- The retroperitoneal area, which includes the aorta, vena cava, pancreas, kidney, ureters, and parts of the duodenum and colon
- The pelvis, which includes the rectum, bladder, uterus, and the iliac vessels([37,p.475-485](#)).

Esophageal Trauma

Penetrating trauma is the most common cause of esophageal injury. Most often, the cervical esophagus is injured. Signs and symptoms are subtle. A hemothorax or pneumothorax without rib fractures raises suspicion for an esophageal injury. CT scan of the chest, abdomen, and pelvis with and without contrast; esophagoscopy; flexible endoscopy; and swallow studies are used in the diagnosis. Treatment is surgical repair. The patient is kept NPO with a

nasogastric tube to continuously suction, and antibiotic therapy is initiated. Nursing interventions include airway, ventilation, oxygenation, and hemodynamic support([37,p.475-485](#)).

Diaphragm Rupture

Diaphragm rupture is more common in blunt injury than in penetrating injury. A suspected diaphragm rupture raises suspicion for thoracic and abdominal injury. Movement of abdominal organs into the thorax can cause bowel strangulation. Respiratory compromise, resulting from displacement of lung tissue, may also be seen. Diagnosis is through chest radiography (often normal or nonspecific), ultrasound, CT, and exploratory laparotomy. DPL may be falsely negative. Definitive treatment is surgical repair([37,p.475-485](#)).

Stomach Trauma

Patients with blunt gastric injuries can present with blood in the nasogastric aspirate or hematemesis. Physical signs often are absent, and CT findings may be subtle and nonspecific. Close observation is required; often, the diagnosis is not made until peritonitis develops. Penetrating injuries usually cause positive results on DPL. Although a mild bowel contusion can be managed conservatively (gastric decompression and withholding oral intake), surgery usually is necessary to repair penetrating wounds. Postoperative decompression with a gastric tube is maintained until bowel function returns. In most cases, a jejunostomy tube is placed distal to the repair site, and tube feedings are initiated early in the postoperative course. Potential complications related to stomach trauma include intolerance to tube feedings, peritonitis (from irritation caused by gastric acid), and postoperative bleeding([37,p.475-485](#)).

Pancreatic Trauma

Most injuries to the pancreas are related to penetrating trauma. Signs and symptoms of pancreatic trauma may include an acute abdomen, increased serum amylase levels, epigastric pain radiating to the back, nausea, and vomiting. Abdominal CT is most useful for diagnosis; the retroperitoneal location of the pancreas makes pancreatic injuries difficult to diagnose with DPL. Small lacerations or contusions of the pancreas may require only the placement of drains, whereas larger wounds need surgical repair. Most pancreatic injuries require postoperative closed-suction drainage to prevent fistula formation. Postoperative nursing assessment and care involves ensuring the pancreas is rested (eg. NPO, NG tube to low wall suction). Care also involves ensuring the patency of drains and monitoring for the development of fistulas. If a cutaneous fistula does develop, skin protection is necessary because of the high enzyme content of pancreatic fluid, and ongoing

assessment of fluid and electrolyte balance is required because a pancreatic fistula results in fluid, potassium, and bicarbonate loss([37,p.475-485](#)).

Colon Trauma

Usually, injury to the colon results from penetrating trauma. Spillage of the contents of the colon predisposes the patient to intra-abdominal sepsis and abscess formation. Exploratory laparotomy is usually necessary. Whenever possible, lacerations are treated with primary repair. In some situations, an exteriorized repair or colostomy is required. The subcutaneous tissue and skin of the incision site are often left open to decrease the chance of wound infection. Postoperative nursing care focuses on assessing for abnormal infections (eg. peritonitis). Dressing changes are necessary for open incisions, and prophylactic antibiotics may be used. The exteriorized colon must be kept moist and covered with a nonadherent dressing or bag to protect the integrity of the sutures. Because sepsis is a major complication of colon injuries, a series of radiographic and surgical procedures may be required to locate and drain abscesses([37,p.475-485](#)).

Splenic Trauma

The spleen is the most commonly injured abdominal organ, usually as a result of blunt trauma. Because of its vascularity, the spleen has a tendency to lose blood rapidly. Injuries include hematomas and lacerations, and are graded on a scale of I to V. DPL or abdominal CT is usually necessary for diagnosis. Minor injuries are treated nonoperatively with observation and gastric decompression (to reduce pressure on the injured spleen). The preferred surgical treatment is splenorrhaphy, although in some cases splenectomy is necessary. Splenic autotransplantation (implanting splenic fragments into pockets of omentum) may be performed after splenectomy to retain normal splenic immune function. Early complications include recurrent bleeding, subphrenic abscess, and pancreatitis (from surgical trauma). Rupture of an expanding subscapular hematoma may present days or weeks later. Other late complications include thrombocytosis and overwhelming post-splenectomy sepsis (OPSS). OPSS frequently occurs with the onset of pneumococcal pneumonia, which progresses to a fulminant sepsis. Splenic autotransplantation and immunization with a polyvalent pneumococcal vaccine may decrease the patient's risk for developing OPSS([37,p.475-485](#)).

Liver Trauma

After the spleen, the liver is the most commonly injured abdominal organ. Hepatic injury can be caused by either blunt or penetrating trauma, and may result in hematomas or lacerations. Hepatic trauma can cause a large blood loss into the peritoneum. A hemodynamically stable patient may be

managed nonoperatively with serial CT scans and hemoglobin and hematocrit levels to verify bleeding cessation. Hemodynamically unstable patients require surgery to ligate or embolize bleeding vessels, repair small lacerations, or resect and debride large areas of injured liver. When hemorrhage is uncontrollable, the liver is packed to tamponade the bleeding. After packing, the patient's abdomen may be simply covered and left open and the patient transferred to the critical care unit for management of coagulopathy. After the coagulopathy is corrected, a second surgical procedure is performed to remove the packing and repair the laceration. Patients with hepatic injuries require postoperative drainage of bile and blood with closed-suction drains. Nursing care of patients with liver injuries includes replacing blood products and monitoring hematocrit and coagulation studies, tube drainage, and fluid balance. Potential complications include hepatic or perihepatic abscess, biliary obstruction or leak, sepsis, ARDS, and DIC([37,p.475-485](#)).

Kidney Trauma

Trauma to the kidney may lead to a "free" hemorrhage, contained hematoma, the development of an intravascular thrombus, laceration or contusion of the renal parenchyma, or rupture of the collecting system. Signs and symptoms, when present, consist of hematuria, pain, a flank hematoma, or ecchymosis over the flank. A helical CT scan, ultrasound, or intravenous pyelography usually provides the diagnosis. Many kidney injuries can be managed with observation and bedrest until gross hematuria resolves. However, vascular injury may necessitate surgical repair or nephrectomy. Optimal fluid balance must be maintained. Low-dose dopamine may be ordered to promote kidney perfusion. Complications may include arterial or venous thrombosis, acute kidney failure, bleeding, urinary fistula formation, and late-onset hypertension([37,p.475-485](#)).

Bladder Trauma

The bladder can be lacerated, ruptured, or contused, most often as the consequence of blunt trauma (usually because of a full bladder at the time of injury). Bladder injuries frequently are associated with pelvic fractures. Injuries to the urethra, which may be evidenced by blood at the urethral meatus, a scrotal hematoma, or a displaced prostate gland, must be ruled out before placing a urinary catheter. A bladder injury can cause intraperitoneal or extraperitoneal urine extravasation. Extraperitoneal extravasation can often be managed with urinary catheter drainage. Intraperitoneal extravasation requires surgery and is associated with a high mortality rate because of associated injuries that occur secondary to the force involved and peritonitis. A suprapubic cystostomy tube may be placed temporarily after intraperitoneal rupture. Complications are infrequent, but infection from the urinary catheter

or sepsis from extravasation of infected urine can occur. Patients may experience an inability to void or shoulder pain (caused by urine extravasation into the peritoneal space)([37,p.475-485](#)).

Musculoskeletal Injuries

Major causes of trauma-related musculoskeletal injuries include MVCs; falls; industrial, farming, and home injuries; and assaults. Musculoskeletal injuries require prompt recognition and stabilization to promote optimal recovery and function. There are many types of musculoskeletal injuries:

- **Fractures** are classified according to type, cause, and anatomical location. Open fractures are further classified as grade I, II, or III, depending on the tissue damage involved([37,p.475-485](#)).
- **Dislocations** occur when the articulating surfaces of a joint are no longer in contact. Injuries to vessels, nerves, and ligaments are often associated with dislocations([37,p.475-485](#)).
- **Amputations** are classified according to the amount of tissue, nerve, and vascular damage([37,p.475-485](#)).

A cut (guillotine) amputation has clean lines and well defined edges, whereas a crush amputation has ill-defined edges and more soft tissue damage.

An avulsion amputation occurs when part of the body is stretched and torn away([37,p.475-485](#)).

Musculoskeletal assessment is usually part of the secondary survey. If limb swelling, echymosis, or deformity is noted, the nurse tests the extremities for capillary refill, pulses, crepitus, muscle spasm, movement, sensation, and pain. Physical examination for pelvic fractures includes inspection for abrasions, lacerations, contusions, and symmetry of the lower extremities, and palpation to assess for rotational and vertical instability. Rectal and vaginal examinations are performed to assess for a urethral tear in males and an open fracture in females. Appropriate imaging studies (eg, radiographs, CT, magnetic resonance imaging [MRI]) are ordered according to physical examination findings([37,p.475-485](#)).

Pelvic fractures are classified in a variety of ways. Treatment goals are to control bleeding and to prevent loss of function and infection caused by open fractures. A pelvic binder or external fixator is applied for temporary stabilization and to control bleeding. Embolization of arterial bleeding in the pelvic region is indicated for hemorrhage control. Permanent repair with internal fixation is usually performed within 24 to 72 hours of injury when the patient is adequately resuscitated and hemodynamically stable([37,p.475-485](#)). Patients with musculoskeletal trauma require continuous assessment. Infection is common in open injuries. Any musculoskeletal injury involving bone or soft tissue can cause neurological or vascular compromise because nerves and

blood vessels are located in such close proximity to the bones and muscles. Serious complications of musculoskeletal injuries include compartment syndrome, fat embolus syndrome, deep venous thrombosis, and pulmonary embolus([37,p.475-485](#)).

Compartment Syndrome

Compartment syndrome occurs when the pressure within the fascia–enclosed muscle compartment is increased, compromising blood flow to the muscles and nerves in the compartment and resulting in tissue ischemia. Prolonged elevation of compartmental pressure leads to death of the tissues involved. Patients with higher diastolic pressures are able to tolerate higher tissue pressures without ischemic damage. Hypotensive trauma patients may experience significant muscle ischemia at lower compartment pressures. If the compartment syndrome progresses to the point that the patient is showing late signs, loss of the affected extremity is threatened. If signs or symptoms of compartment syndrome are present, the orthopedic or general surgeon must be notified immediately. Treatment is with fasciotomy (opening of the fascia) of the involved compartment([37,p.475-485](#)).

Fat Embolism Syndrome

Fat emboli are fat globules in the lung tissue and peripheral circulation after a long bone fracture or major trauma. Although fat emboli may not cause systemic symptoms, some patients develop fat embolism syndrome (progressive respiratory insufficiency, thrombocytopenia, and decreased mental status)([37,p.475-485](#)).

Maxillofacial Trauma

Fractures of the facial bones can be classified according to Le Fort's classification. Maxillofacial trauma can cause airway obstruction and death if an airway and breathing are not adequately and urgently established. When the primary survey is completed, the maxillofacial injuries are assessed. The nurse inspects the face for symmetry and then palpates systematically to observe for any movement of bony structures. Because maxillofacial injuries often coincide with head injuries, a thorough neurologic examination is necessary. Many maxillofacial injuries require multiple surgeries before the patient is definitively treated. Because most maxillofacial injuries involve the soft tissue, measures to prevent infection and scarring are taken. The nurse continuously assesses the patient's neurological status and seeks to relieve pain and anxiety (caused by an inability to see, smell, taste, or speak secondary to the injury)([37,p.475-485](#)).

TREATMENT OF MVC CONSEQUENCES

The treatment of MVC sequelae is probably the most important concern for injured persons. Although injured persons are being treated every day for MVC sequelae, there is a relative paucity of treatment studies specifically involving MVC injuries. In the trauma literature, MVCs injuries are often mixed in with slip and falls or intentional injuries like assault. Still, there are number of medical and surgical procedures available for the treatment of certain types of MVC injuries (e.g., fractures and soft-tissue). Research examining the influence of demographic and psychological variables on medical outcomes is indicated. More recently, there have been a number of studies supporting physical therapy or exercise for the early treatment of whiplash-associated disorder(38, 39), but the long-term benefits of this type treatment remains to be determined. Another approach found that a psycho-educational video used in the emergency room was successful in reducing pain and medical utilization in whiplash-associated disorder(40).

Treatment studies of MVC-related psychological sequelae have largely focused on posttraumatic stress disorder. Blanchard and Bryant and their respective colleagues have been especially instrumental in this area(41, 42). Other promising treatment approaches include group treatment and virtual reality exposure for posttraumatic stress symptoms in MVC cases(43, 44). As noted earlier, more studies evaluating the treatment of other psychological conditions and more studies evaluating the treatment of multifaceted clinical presentations with prominent psychological features (e.g., chronic pain and traumatic brain injury) are needed.

Care of trauma victims during wartime enhanced principles of triage and rapid transport of the injured to medical facilities. The military experience has demonstrated that more lives can be saved by decreasing the time from injury to definitive care. It also has enhanced incentives and models for improvements in civilian trauma care, such as emergency medical service (EMS) systems and trauma care centers. The goal with critically injured patients is to minimize the time from initial insult to definitive care and to optimize prehospital care so that the patient arrives at the hospital alive. Statistics demonstrate that deaths as a result of trauma occur in a trimodal distribution.⁹ The first peak includes victims who die before medical attention can be provided. The second peak occurs within a few hours after injury. This peak commonly is referred to as the *golden hour* for those critically injured. The golden hour is a 60-minute time frame that incorporates activation of the EMS system, stabilization in the prehospital setting, transportation to a medical facility, rapid resuscitation on arrival in the emergency department, and provision of definitive care. For the critically injured patient, the primary

goal is to minimize the time from injury to definitive care. The third death peak occurs days to weeks after injury as a result of complications, including infection or multiple organ dysfunction syndrome (MODS). It is a nursing challenge to influence the quality of care the trauma patient receives in an attempt to “beat” the trimodal distribution of trauma deaths([32,p.850-880](#)). Nursing management of the patient with traumatic injuries begins the moment a call for help is received and continues until the patient’s death or return to the community. Care of the trauma patient is seen as a continuum that includes six phases: prehospital resuscitation, hospital resuscitation, definitive care and operative phase, critical care, intermediate care, and rehabilitation([32,p.850-880](#)).

Prehospital Resuscitation

The goal of prehospital care is immediate stabilization and transportation. This is achieved through airway maintenance, control of external bleeding and shock, immobilization of the patient, and immediate transport (ground or air) to the closest appropriate medical facility. Prehospital personnel should communicate information needed for triage at the hospital. Advanced planning for the injured patient is essential([32,p.850-880](#)).

Emergency Department Resuscitation

The American College of Surgeons developed guidelines (advanced trauma life support [ATLS]) for rapid assessment, resuscitation, and definitive care for trauma patients in the emergency department. These guidelines delineate a systematic approach to care of the trauma patient: rapid primary survey, resuscitation of vital functions, more detailed secondary survey, and initiation of definitive care. This process constitutes the ABCDEs of trauma care and assists in identifying injuries([32,p.850-880](#)).

Surveys:

1.Primary Survey:

On arrival of the trauma patient in the emergency department, the primary survey is initiated. During this assessment, life- threatening injuries are discovered and treated. The five steps in the trauma primary survey are performed in **ABCDE** sequence:

Airway maintenance with cervical spine protection

Breathing and ventilation

Circulation with hemorrhage control

Disability: neurologic status

Exposure or environmental control([32,p.850-880](#)).

Airway. The patient's airway is assessed for ineffective airway clearance and airway obstruction. The trauma patient is at risk for ineffective airway clearance, especially in the presence of altered consciousness, drugs and alcohol, and maxillofacial or thoracic injuries. Airway obstruction can be caused by foreign bodies, blood clots, or broken teeth. Airway patency should be assessed by inspecting the oropharynx for foreign body obstruction, listening for air movement at the nose and mouth, and auscultation of lung fields. Airway assessment must incorporate cervical spine immobilization. The patient's head should not be rotated, hyper flexed, or hyperextended to establish and maintain an airway. The cervical spine must be immobilized in all trauma patients until a cervical spinal cord injury has been definitively ruled out. If the patient can verbally communicate, it is likely that the airway is patent. Patients who display non- purposeful motor movements or who have a Glasgow Coma Scale (GCS) score of 8 or less usually require the placement of a definitive airway([32,p.850-880](#)).

Breathing. The patient is assessed for ineffective breathing patterns and impaired gas exchange; an open, clear airway does not ensure adequate ventilation and gas exchange. Assessment includes chest wall integrity and respiratory rate, depth, and symmetry. Auscultation is performed to assess gas flow in the lungs. Air or blood in the chest may be identified by percussion. Decreased breath sounds or alteration in chest wall integrity necessitate chest tube placement. Endotracheal intubation may be required for patients who have compromised airways caused by mechanical factors,

who are unconscious, or who have ventilatory problems. Supplemental oxygen is administered to all injured patients([32,p.850-880](#)).

Circulation. The next step is to assess for decreased cardiac output, impaired tissue perfusion, and deficient fluid volume. External exsanguination is identified and controlled by direct manual pressure on the wound. Rapid assessment of the circulatory status includes assessment of level of consciousness, skin color, and pulse. Level of consciousness provides data on cerebral perfusion. Ashen, gray facial skin color or white, pale extremities may be ominous signs of hypovolemia. Central pulses (femoral or carotid artery) are assessed bilaterally for rate, regularity, and quality. If a pulse is not present, advanced cardiac life support (ACLS) protocols are instituted. ECG monitoring is initiated to assess for rhythm disturbances. Life-threatening dysrhythmias are treated according to ACLS protocols([32,p.850-880](#)).

Disability. A rapid neurologic assessment is performed. During this step, the nurse assesses the potential for injury by completing a brief neurologic assessment to establish the patient's level of consciousness and pupil size and reaction. The **AVPU** method can be used to quickly describe the patient's level of consciousness:

A: Alert

V: responds to Verbal stimuli

P: responds to Painful stimuli

U: Unresponsive

The patient's GCS score can be used([32,p.850-880](#)).

Exposure. The final step in the primary survey is exposure and environmental control. All clothing is removed to facilitate a thorough examination of all body surfaces for the presence of injury. After all clothing is removed, the patient must be protected from hypothermia. This can be accomplished through external blankets, warm ambient room temperature, and warmed intravenous fluids([32,p.850-880](#)).

2.Resuscitation Phase:

After the primary survey the resuscitation phase begins. Hypovolemic shock is the most common type of shock that occurs in trauma patients. Hemorrhage must be identified and treated rapidly. Two large-bore(14-to16-gauge) peripheral intravenous catheters, intra osseous catheter, or central venous catheter is inserted. During the initiation of intravenous lines, blood samples are drawn([32,p.850-880](#)).

Resuscitation is aimed at ensuring adequate perfusion of tissues with oxygen and nutrients to support cellular function. Resuscitation end points (variables or parameters) must be viewed across the continuum of resuscitation from shock. During resuscitation from traumatic hemorrhagic shock, normalization of standard clinical parameters such as blood pressure, heart rate, and urine output are not adequate. The optimal resuscitation end point is a major focus of research in trauma care. During resuscitation, attempts should be made to improve cellular oxygenation. Base deficit and lactate and other assessment parameters have been well-studied to determine adequacy of cellular oxygenation during trauma resuscitation([32,p.850-880](#)).

Damage Control Resuscitation: Resuscitation practices have been a focus for research in trauma care. Damage control resuscitation (DCR) is an emerging concept in trauma care. DCR is a strategy to provide only interventions to

control hemorrhage and contamination. The strategy involves permissive hypotension, the use of blood products over isotonic fluid for volume replacement, and the rapid and early correction of coagulopathy with component therapy and begins in the field and continues through the emergency departments, operating rooms, and critical care units([32,p.850-880](#)).

Massive Transfusion Protocols: Given the emphasis on use of blood products over crystalloids and correction of traumatic coagulopathy, many trauma centers have developed massive transfusion protocols for the 1% to 3% of all trauma patients who require DCR. Having a defined protocol serves as a system-based strategy to facilitate early, timely release of blood products in what can be an often-chaotic situation. The massive transfusion protocol outlines the ratio of packed red blood cells, fresh frozen plasma, platelets, and cryoprecipitate to be administered. Additional interventions during the resuscitation phase involve placement of urinary and gastric catheters. A gastric tube is inserted to reduce gastric distention and lower the risk of aspiration([32,p.850-880](#)).

3.Secondary Survey:

The secondary survey begins when the primary survey is completed, resuscitation is well established, and the patient is demonstrating normalization of vital signs. During the secondary survey, a head-to-toe approach is used to thoroughly examine each body region. The history is one of the most important aspects of the secondary survey. Often, head injury, shock, or the use of drugs or alcohol may preclude a good history, so the history must be pieced together from other sources. The pre-hospital providers (paramedics, emergency medical technicians) usually can provide most of the vital

information pertaining to the unintentional injury. Specific information that must be elicited pertaining to the mechanism of injury. This information can help predict internal injuries and facilitate rapid intervention. The patient's pertinent past history can be assessed by use of the mnemonic **AMPLE**:

Allergies,

Medications currently used

Past medical illnesses/pregnancy

Last meal, and

Events/environment related to the injury([32,p.850-880](#)).

During the secondary survey the nurse ensures the completion of special procedures, such as an ECG, radiographic studies (chest, cervical spine, thorax, and pelvis), ultrasonography, and, when required, diagnostic peritoneal lavage. Throughout this survey the nurse continuously monitors the patient's vital signs and response to medical therapies. Emotional support to the patient and family also is imperative([32,p.850-880](#)).

4.Definitive Care and Operative Phase:

After the secondary survey has been completed, specific injuries usually have been diagnosed. Definitive care related to specific injuries is described throughout this chapter. Trauma is sometimes referred to as a —surgical disease because the nature and extent of injuries usually requires operative management. After surgery, depending on the patient's status, transfer to the critical care unit may be indicated([32,p.850-880](#)).

5.Critical Care Phase:

Critically ill trauma patients are admitted into the critical care unit as direct transfers from the emergency department or operating room. Information the nurse must obtain from the emergency department or operating room nurse, or both, is summarized using the SBAR method: Situation, Background, Assessment, and Recommendations. This information must be obtained before the patient's admission to the critical care unit to ensure availability of needed personnel, equipment, and supplies. This information also helps the nurse to assess the impact of trauma resuscitation on the patient's presentation and course. summarizes the pre hospital, emergency department, and operating room resuscitative measures that can affect the trauma patient's care([32,p.850-880](#)).

After the patient's arrival in the critical care unit, the nurse uses the primary and secondary surveys and resuscitative measures in accordance with ATLS guidelines to assess the trauma patient's status. Priority nursing care during the critical care phase includes ongoing physical assessments and monitoring the patient's response to medical therapies. The nurse constantly is aware that the third peak of the trimodal distribution of trauma deaths occurs in the critical care setting as a result of complications, including acute respiratory distress syndrome (ARDS), sepsis, prolonged shock states, and MODS. Ongoing nursing assessments are imperative for early detection and treatment of complications([32,p.850-880](#)).

One of the most important nursing roles is assessment of the balance between oxygen delivery and oxygen demand. Oxygen delivery must be optimized to prevent further system damage. The trauma patient is at high risk for impaired oxygenation as a result of a variety of factors. Risk factors

must be promptly identified and treated to prevent life-threatening sequelae. Prevention and treatment of hypoxemia depend on accurate assessment of the adequacy of pulmonary gas exchange, oxygen delivery, and oxygen consumption. Frequent and thorough nursing assessments of all body systems are the cornerstone of medical and nursing management of the critically ill trauma patient. The nurse can detect subtle changes and facilitate the implementation of timely therapeutic interventions to prevent complications often associated with trauma. The nurse must be knowledgeable about specific organ injuries and their associated sequelae([32,p.850-880](#)).

DIAGNOSTIC STUDIES:

Numerous diagnostic tests may be performed, depending on the patient's underlying condition and overall status. Blood studies and radiologic and imaging studies are commonly performed. Additional tests may be used based on facility policy and body area or systems affected. For example, angiography may be done to evaluate for vessel injury; more specifically, cerebral angiography may be used to evaluate cerebral blood flow. Cardiac monitoring and hemodynamic monitoring may be used to evaluate the patient's cardiac function and overall hemodynamic status([45,p.474-475](#)).

Blood studies

Although specific blood studies may vary among facilities, some more common studies ordered for patients with shock or multisystem trauma include:

- complete blood count (CBC)
- electrolytes
- coagulation studies, such as prothrombin time (PT) and partial thromboplastin time (PTT)
- serum amylase, lipase

- liver function tests
- blood cultures([45,p.474-475](#)).

Less common but important

In addition, arterial blood gas (ABG) analysis is commonly performed to evaluate the patient's acid–base balance. In trauma situations, a blood type and cross-match is done in anticipation of the need for a blood and blood products transfusion([45,p.474-475](#)).

Practice pointers

- Tell the patient that the test requires a blood sample.
- Check the patient's medication history for medications that might influence test results([45,p.474-475](#)).

Radiologic and imaging studies

Specific radiologic and imaging studies completed for these patients depend on the underlying mechanism causing the shock and the body areas or organs affected by the trauma. The most common studies include X-rays of the chest, pelvis, cervical spine, thoracic and lumbar spine, and extremities. In addition, computed tomography (CT) scan of the head, chest, spine, and abdomen may be performed. Focused assessment with sonography for trauma (FAST) exam may be performed at the bedside. The FAST exam has widely replaced diagnostic peritoneal lavage([45,p.474-475](#)).

Practice pointers

- Prepare the patient for the X-ray or CT scan to be performed, including the reason for the study.
- Verify that the order includes pertinent history, such as trauma, and identifies sites of injury, tenderness, or pain.
- Make sure that all jewelry is removed from the patient([45,p.474-475](#)).

Prevention of Motor Vehicle Collisions:

Interventions for preventing trauma caused by motor vehicle collisions fall into a 4-part framework that has not changed in decades and mostly excludes physicians: enforcement, engineering, economic forces and education([46](#)). Enforcement involves regulating behaviour using roadside police control (e.g., RIDE [Reduce Impaired Driving Everywhere] checkpoints to deter impaired driving and to allow police to verify passenger restrictions, roadway restrictions and alcohol restrictions for new drivers under graduated licensing programs)([47](#)). Engineering emphasizes changes to roads or vehicles for

collision avoidance and protection (e.g., divided highways and collapsible steering columns)([48](#)). Economic forces include incentives that reduce total driving or specific driving patterns (e.g., economic recessions and fuel prices)([49](#)). Educational interventions involve promoting safety messaging (e.g., broadcast warnings and formal driver education)([50](#)).

Here we have some Interventions and their effects on mortality in motor vehicle collisions:

1. Use of seat belts Reduced mortality for vehicle occupants using a seat belt when compared with unbelted passengers in the same vehicle([51](#)).
2. Conviction for traffic infraction Reduced risk of driver being involved in a fatal crash during the first month after a conviction for a traffic infraction([47](#)).
3. Use of air bags Reduced mortality attributed to airbag use for drivers in head-on collision compared with other driver in the same collision([52](#)).
4. Use of helmets by motorcyclists Reduced mortality for motorcyclists wearing helmets in a crash compared with passengers, as analyzed by double pairs([53](#)).
5. Graduated licensing Reduced risk of a fatal crash for 16-year-old drivers who have graduated licences compared with those with regular licences([54](#)).
6. Treatment at level 1 trauma centres Reduced in-hospital mortality for patients treated at level 1 trauma centres compared with patients at non trauma centres([55](#)).
7. Traffic-calming measures Reduced fatal and nonfatal collisions on traffic-calmed roadways before and after intervention([56](#)).
8. Daytime running headlights Reduced odds of multivehicle daytime collision before and after implementation of daytime running lights([57](#)).

9. Increased speed limits Reduction in fatality after increased speed limits compared with same roads before increased speed limits(58).

Nursing Management:

Nursing diagnoses for the patient with TBI and Priority nursing goals include stabilization of vital signs, prevention of further injury, and reduction of increased ICP. Ongoing nursing assessments are the cornerstone to the care of patients with TBI. These assessments are the primary mechanism for determining secondary brain injury from cerebral edema and increased ICP. If secondary injury is to be prevented, the nurse must respond immediately to hypotensive events and, in collaboration with physicians, maximize CPP through reduction of ICP and restoration of mean arterial pressure.

All aspects of care, including hemodynamic management, pulmonary care, maintenance of body temperature, and control of the environment, can impact outcome after TBI. Hemodynamic and fluid management are vital. Arterial blood pressure should be monitored because hypotension in a patient with TBI is rare and may indicate additional injuries. CPP should be maintained at a minimum of 60 mm Hg(32,p.850-880).

In the absence of cerebral ischemia, aggressive attempts to keep CPP above 70 mm Hg with intravenous fluids and vasopressors should be avoided secondary to the risk of ARDS(32,p.850-880).

Close monitoring of hemodynamic status is of paramount importance in patients with TBI because in addition to fluid management, changes in cardiovascular function and circulating catecholamines contribute to hemodynamic instability(32,p.850-880).

More invasive hemodynamic monitoring may be required to optimize fluid status and cardiac output. *Capnography* (monitoring of exhaled carbon dioxide levels) is suggested to prevent inadvertent hypocapnia or hypercapnia(32,p.850-880). Aggressive pulmonary care must be instituted. However, endotracheal suctioning can elevate ICP. Cerebral oxygen consumption is increased during periods of increased body temperature, and therefore euthermia (36° to 37° C) may be achieved with early workup and intervention for infection, use of antipyretics, and cooling measures such as evaporative cooling(32,p.850-880).

A tremendous catecholamine surge after TBI has been associated with infectious complications and potentially preventable mortality(32,p.850-880). The use of beta-blockers to suppress this catecholamine surge in patients with TBI has been shown to decrease mortality(32,p.850-880).

In the early postinjury phase, the patient's environment must be controlled. Stimuli that produce pain, agitation, or discomfort can increase ICP([32,p.850-880](#)). Analgesics and sedatives should be administered, and patients should be given rest periods. After ICP stabilization, stimulation programs for patients in a coma may be employed. These programs provide stimulation to the tactile, kinesthetic, olfactory, gustatory, auditory, and visual senses. Several methods have been used to stimulate coma patients with various degrees of intensity:

- Intense Multisensory Stimulation Program: stimulatory cycles lasting approximately 15 to 20 minutes, repeated every hour for 12 to 14 hours per day, 6 days per week
- Formalized Not-Intensive Stimulation Program: cycles of stimulation of 10 to 60 minutes twice daily
- Sensory Regulation Program: single brief sessions of stimulation in a quiet environment completely free of noise

Whatever program is used, a stimulation schedule should be established, and accurate documentation of the stimulus and response is essential. Coma stimulation programs should be individualized and family members encouraged to participate([32,p.850-880](#)).

New pharmacologic agents have started to demonstrate promise in the treatment of patients awakening from head trauma. Amantadine has been prescribed to facilitate awakening. While its full mechanism is only partially understood, it appears to act as an *N*-methyl-D-aspartate antagonist and indirect dopamine agonist([32,p.850-880](#)). It has been shown to help patients who are undergoing active rehabilitation to awaken faster([32,p.850-880](#)).

Nursing diagnoses and management for the patient with SCI and goal during the critical care phase is to prevent life-threatening complications while maximizing the function of all organ systems. Nursing interventions are aimed at preventing secondary damage to the spinal cord and managing the complications of the neurologic deficit. Because almost all body systems are affected by SCI, nursing management must include interventions that optimize nutrition, elimination, skin integrity, and mobility. Patients with SCIs have complex psychosocial needs that require a great deal of emotional support from the critical care nurse([32,p.850-880](#)).

Nursing diagnoses for the patient with maxillofacial trauma and nursing interventions are aimed at protecting the airway by reducing the risk of emesis and aspiration. Proper orogastric tube functioning must be ensured([32,p.850-880](#)). Antiemetics may be administered. Unless contraindicated, the head of the bed is elevated 30 degrees. If vomiting occurs, the patient is placed in a side or forward position and oral or nasal suctioning is used. Wire cutters must

be available at the bedside in case the vomit cannot clear the wires and occludes

the airway. Although this seldom is necessary, the intention in cutting the wires is to cut the vertical attachments, not the horizontal ones([32,p.850-880](#)).

Nursing diagnoses that can be applicable in caring for a patient with genitourinary trauma include Risk for Gastrointestinal Perfusion, Risk for Infection, and Deficient Fluid Volume. After the patient is admitted to the critical care unit, the nurse makes an assessment according to the ATLS guidelines. After the patient's condition has stabilized, nursing management of postoperative kidney trauma is similar to that for genitourinary surgery. The primary nursing interventions include assessment for hemorrhage, maintenance of fluid and electrolyte balance, and maintenance of patency of drains and tubes. Measurement of urinary output includes drainage from the urinary catheter and the nephrostomy or suprapubic tubes. Drainage from these areas is recorded separately. Urine output is measured frequently until bloody drainage and clots have cleared. Gentle irrigation of drainage tubes may be required to clear clots and maintain the patency of the tubes([32,p.850-880](#)).

Initial assessment of the patient with a pelvic fracture in the critical care unit proceeds according to ATLS guidelines. Massive blood loss contributes to alterations in tissue perfusion. On admission to the critical care unit, the patient may have hemodynamic instability with abnormal coagulation factors. Interventions include intravenously administered blood products and fluids, recognizing that a massive transfusion protocol (MTP) may need to be initiated. The nurse must ensure that an appropriate amount of blood, plasma, and platelets remains cross-matched and available if needed([32,p.850-880](#)).

The patient is at high risk for injury caused by neurovascular compromise, development of abdominal compartment syndrome, fat embolism syndrome, and wound infection. These syndromes are discussed further later in this chapter. Before the patient is moved, the nurse should know whether the physician has classified the closed pelvic fracture as *stable* or *unstable*. A stable pelvic injury implies that no further pathologic displacement of the pelvis can occur with turning or moving. An unstable pelvic fracture means that further pathologic displacement of the pelvis can occur with turning or moving([32,p.850-880](#)).

Routine nursing assessments include neurovascular assessments of the lower extremities. Neurologic injury as a result of pelvic fracture may be transient and temporary. Open pelvic fractures may necessitate complex, time-consuming dressing changes. Aggressive pain management strategies should be employed during these dressing changes, because they can be

quite painful([32,p.850-880](#)).

Patients with open pelvic fractures may have a prolonged critical care course with various degrees of complications. The patient with pelvic fractures is at risk for infection because of associated injuries and internal or external fixation devices. Nursing management of external fixation insertion sites is directed at preventing infection. Most institutions have protocols for pin care that require strict compliance([32,p.850-880](#)).

Nursing Diagnosis:

- Ineffective Breathing Pattern related to neuromuscular impairment,
- Risk for Aspiration: impaired laryngeal sensation or reflex; impaired pharyngeal peristalsis or tongue function; impaired laryngeal closure or elevation; increased gastric volume; decreased lower esophageal sphincter pressure,
- Impaired Gas Exchange related to ventilation–perfusion mismatching,
- Imbalanced Nutrition: Less Than Body Requirements related to lack of exogenous nutrients and increased metabolic demand,
- Powerlessness related to lack of control over current situation,
- Decreased Intracranial Adaptive Capacity related to failure of normal compensatory mechanisms,
- Risk for Ineffective Cerebral Tissue Perfusion,
- Decreased Cardiac Output related to sympathetic blockade,
- Autonomic Dysreflexia related to excessive autonomic response to noxious stimuli,
- Impaired Gas Exchange related to alveolar hypoventilation,
- Ineffective Breathing Pattern related to decreased lung expansion,
- Ineffective Breathing Pattern related to musculoskeletal fatigue or neuromuscular impairment,
- Disturbed Body Image related to actual change in body structure, function, or appearance,
- Ineffective Coping related to situational crisis and personal vulnerability,
- Risk for Aspiration risk factors: impaired pharyngeal peristalsis or tongue function; impaired laryngeal sensation or reflex; impaired laryngeal closure or elevation,
- Deficient Fluid Volume related to absolute loss,
- Imbalanced Nutrition: Less Than Body Requirements related to lack of exogenous nutrients and increased metabolic demands,

- Acute Pain related to transmission and perception of cutaneous, visceral, muscular, or ischemic impulses([32,p.850-880](#)).

COMPLICATIONS:

Delayed Complications of Multiple Trauma Hematologic

- Hemorrhage, coagulopathy, disseminated intravascular coagulation (DIC)

Cardiac

- Dysrhythmia, heart failure, ventricular aneurysm

Pulmonary

- Atelectasis, pneumonia, emboli (fat or thrombotic), acute respiratory distress syndrome (ARDS)

Gastrointestinal

- Peritonitis, a dynamic ileus, mechanical bowel obstruction, acalculous cholecystitis, anastomotic leak, fistula, bleeding, abdominal compartment syndrome.

Hepatic

- Liver abscess, liver failure

Renal

- Hypertension, myoglobinuria, kidney failure

Orthopedic

- Compartment syndrome

Skin

- Wound infection, dehiscence, skin breakdown

Systemic

- Sepsis([37,p.475-485](#)).

Chapter three

Methodology

Methodology

3-1. Study design:

The study was descriptive cross-sectional Hospital based study conducted in military hospital in Omdurman, aim to assess nurses knowledge regarding road traffic knowledge emergency management done in period from January to March 2018.

3-2. Study area:

Military hospital is the public hospital in Sudan / Khartoum State - which is the capital of Sudan, located at the confluence point of the White Nile and Blue Nile, governance center in Sudan. Omdurman is the second largest city in Sudan and Khartoum state, lying on the western banks of the River Nile, opposite the capital, Khartoum.. Omdurman city - near National Assembly it contain Emergency department , Intermittent coronary care unit , intensive care unit ,and cardiac care unit, dialysis unit, General ward of female and male, psychiatric and orthopedic department , echocardiogram , X-ray department, urology department , obese and gynecological department, pediatric department, surgical department, ENT and ophthalmic department , nutrition department and educational department and facilities. beds number in hospital 1080 bed.

3-3. Study setting.

Trauma and emergency hospital located near the junction of blue and white Nile from western line and behind Aalia hospital ,limited by Gasr of young and children from northern area, its has triage , trauma unit ,asthma unit,[C1-29 C2],room A and B [resuscitation room],2 critical care unit,2 ward VIP, Pharmacy and LAB.

There are Doctors, Laboratories' , Pharmacist, Nursing Staff and other personnel staff like cleaners and security staff.

3-4. Study population:

all the nurses working in trauma unit room A&B and Triage area during study period were included .

3-4-1. Inclusion criteria:

The Registered Nurses in the ED were included in the study.

3-4-2. Exclusion criteria:

Assistant nurse and Nurses in holidays.

3-5. Sample size and technique:

(61) nurses were participate in the study.

This study done by total coverage.

3-6.Data Collection Tools:

Closed ended, standard questionnaire used, composed of (29) questions, and 4parts, part one demographic data [5 questions], part two Nursing Knowledge about Road Traffic Accident [7 question], part three Emergency Management of Road Traffic Accident [8 question] and part four about Nurse's Intervention and Knowledge of Complication and Prevention of Road Traffic Accident [9 questions].

Rational scaling (good, satisfy, or poor knowledge) Good knowledge for more or equal 75 percent Satisfy knowledge for more or equal 50 percent Poor knowledge for less than 50 percent.

3-7.Data collection technique:

The data was collected during four weeks, during the all shift, after the purpose of the study was explained to the participant, every nurses were allowed enough time to fill the questionnaire.

3-8. Data analysis :

The data was coded and analyzed manually by simple statistical technique (master sheet) then entered into the computer by use of the statistical package of social scientific (SPSS) 22), different statistical measures were used e.g. (frequency, percentage, mean, median, standard deviation, and CHI-square). Then the data was presented in the forms of figures and tables.

3-9. Ethical consideration:

The approved was taken from ethical committee of the faculty of graduate study and scientific research, permission was taken from the hospital director and the head nurse, verbal consent was taken from participant after explanation the purpose of the study.

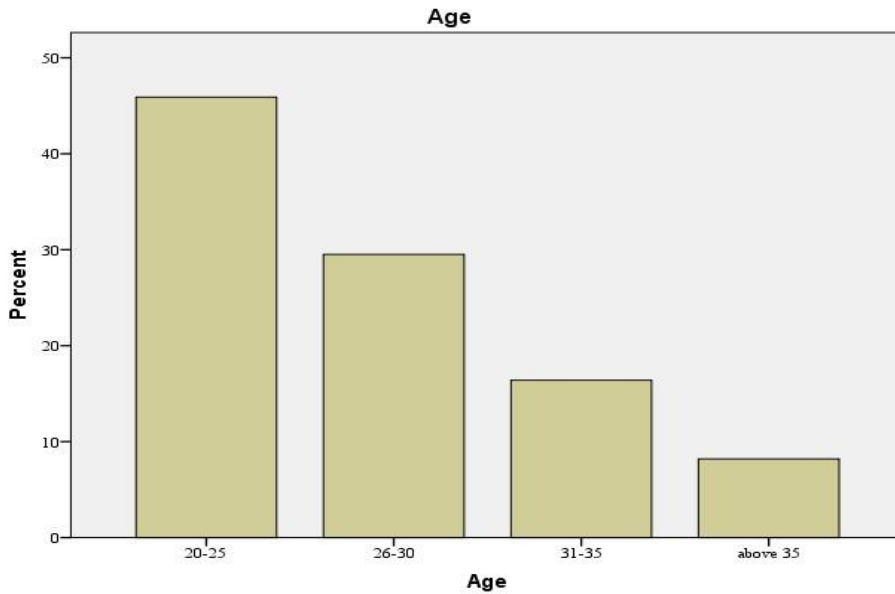
Chapter four

Result

Results

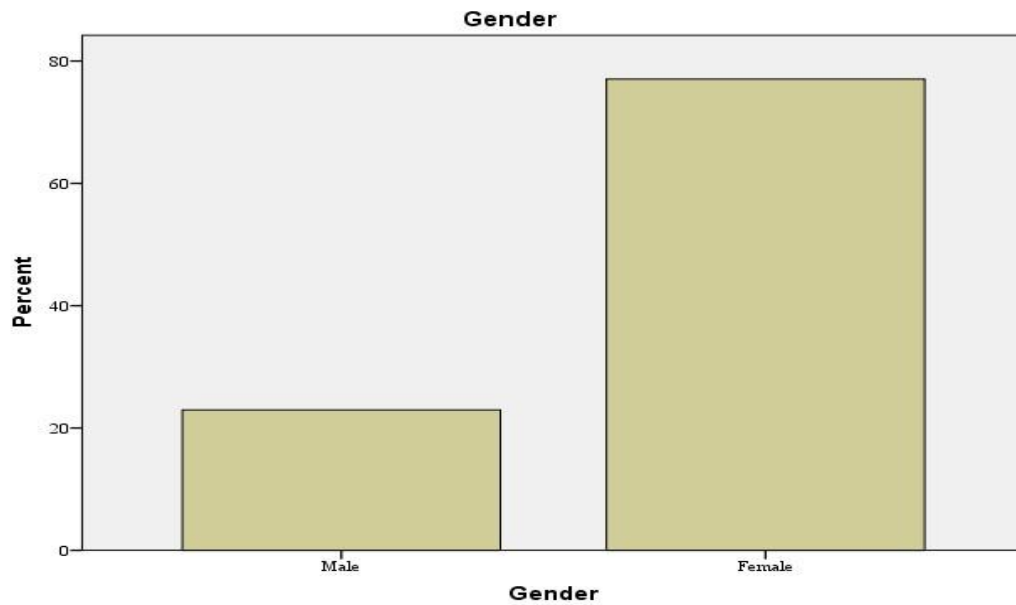
4-1. figure picture:

1.Age:



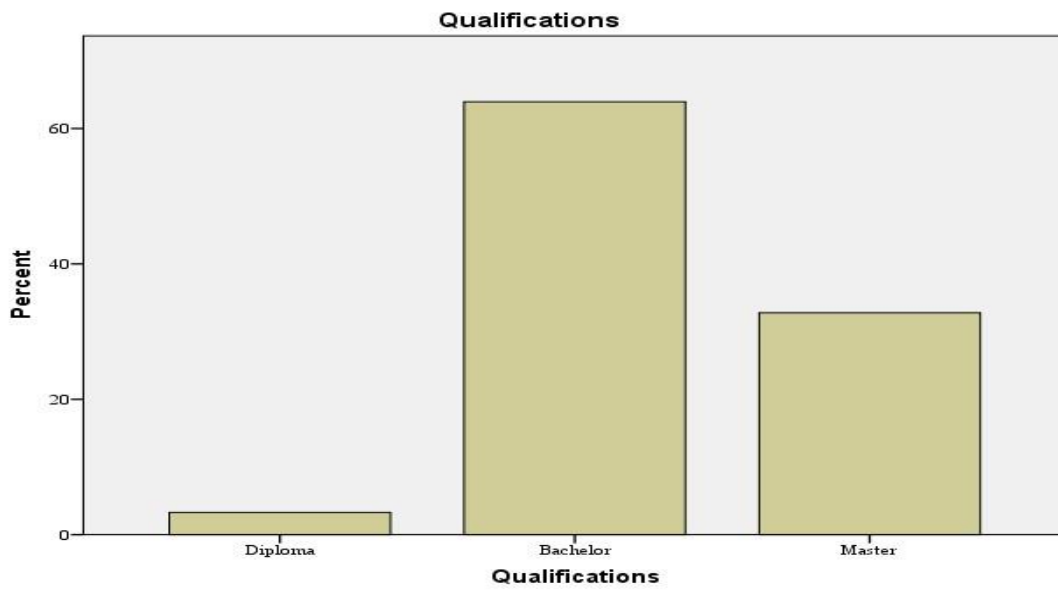
Figure(1) :Distribution of study group according to their Age.

2.Gender:



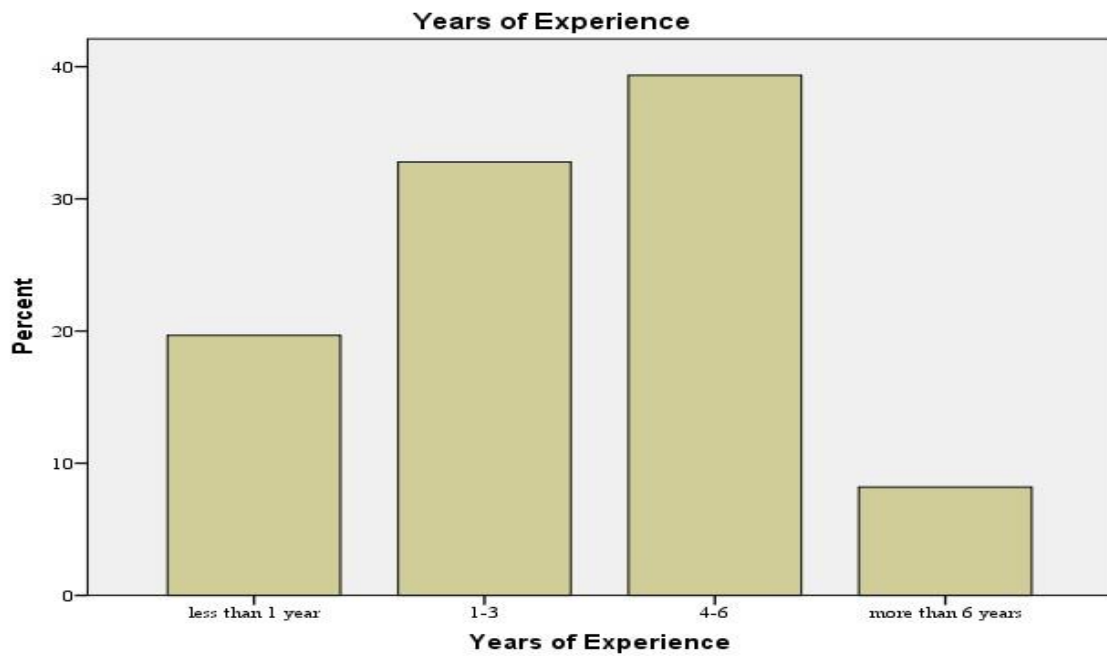
Figure(2) :Distribution of study group according to their gender

3. Qualifications:



Figure(3) :Distribution of study group according to their level of education.

4. Years of Experience:



Figure(4) :Distribution of study group according to their years of experience.

5.Learning Courses:

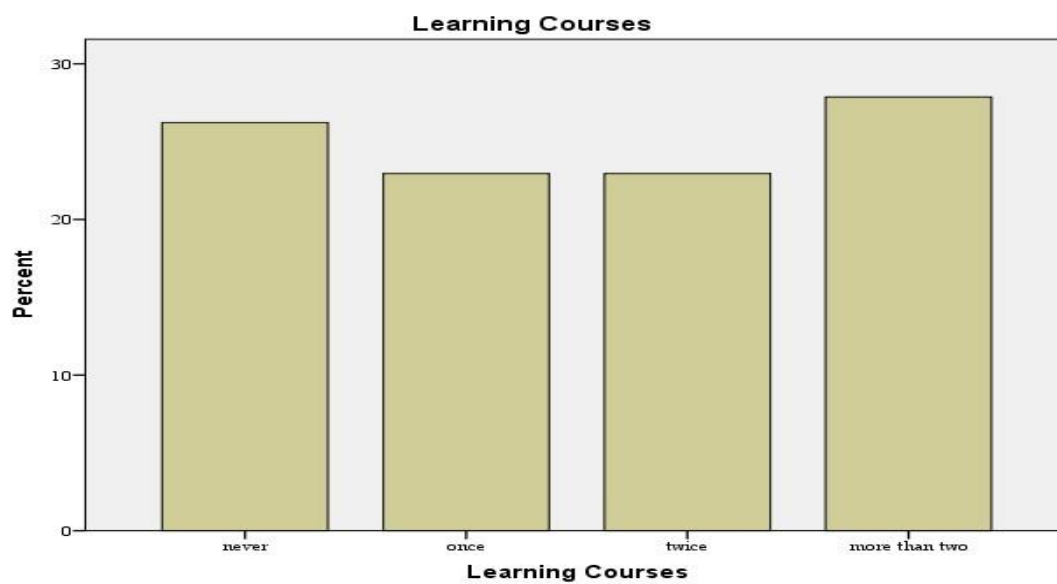


Figure (5): Distribution of study group according to their Attending training program.

4-2. frequent table:

Table (1) Distribution of study group according to their knowledge about definition of road traffic accident.

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Satisfy | 40 | 65.6 |
| Not Satisfy | 21 | 34.4 |
| Valid Total | 61 | 100.0 |

Table (2) Distribution of study group according to their knowledge about risk factors for all types of injury:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Poor | 23 | 37.7 |
| Satisfy | 38 | 62.3 |
| Good | 0 | 0 |
| Valid Total | 61 | 100.0 |

Table (3) Distribution of study group according to their knowledge about cause of RTA:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Poor | 15 | 24.6 |
| Satisfy | 0 | 0 |
| Good | 46 | 75.4 |
| Valid Total | 61 | 100.0 |

Table (4) Distribution of study group according to their knowledge about Kind of generalized mechanism of injury:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Satisfy | 40 | 65.6 |
| Not Satisfy | 21 | 34.4 |
| Valid Total | 61 | 100.0 |

Table (5) Distribution of study group according to their knowledge about one of the basic mechanism of motion injury:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Satisfy | 11 | 18.0 |
| Not Satisfy | 50 | 82.0 |
| Valid Total | 61 | 100.0 |

Table (6) Distribution of study group according to their knowledge about motor vehicle collisions occur as:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Poor | 23 | 37.7 |
| Satisfy | 38 | 62.3 |
| Good | 0 | 0 |
| Valid Total | 61 | 100.0 |

Table (7) Distribution of study group according to their knowledge about classification of trauma according to the position:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Poor | 17 | 27.9 |
| Satisfy | 44 | 72.1 |
| Good | 0 | 0 |
| Valid Total | 61 | 100.0 |

Table (8) Distribution of study group according to their knowledge about kind of injury happening in RTA:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Poor | 21 | 34.4 |
| Satisfy | 40 | 65.6 |
| Good | 0 | 0 |
| Valid Total | 61 | 100.0 |

Table (9) Distribution of study group according to their knowledge about type of surveys:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Poor | 20 | 32.8 |
| Satisfy | 41 | 67.2 |
| Good | 0 | 0 |
| Valid Total | 61 | 100.0 |

Table (10) Distribution of study group according to their knowledge about application of primary survey:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Satisfy | 47 | 77 |
| Not Satisfy | 14 | 23 |
| Valid Total | 61 | 100.0 |

Table (11) Distribution of study group according to their knowledge about classification AVPU method:

| Level of knowledge | Frequency | Percent |
|--------------------|-----------|---------|
| Satisfy | 31 | 50.8 |
| Not Satisfy | 30 | 49.2 |
| Valid Total | 61 | 100.0 |

Table (12) Distribution of study group according to their knowledge about the method to take history:

| Level of knowledge | | Frequency | Percent |
|--------------------|-------------|-----------|---------|
| | Satisfy | 31 | 50.8 |
| | Not Satisfy | 30 | 49.2 |
| Valid | Total | 61 | 100.0 |

Table (13) Distribution of study group according to their knowledge about fluid resuscitation:

| Level of knowledge | | Frequency | Percent |
|--------------------|---------|-----------|---------|
| | Poor | 16 | 26.2 |
| | Satisfy | 45 | 73.8 |
| | Good | 0 | 0 |
| Valid | Total | 61 | 100.0 |

Table (14) Distribution of study group according to their knowledge about secondary assessment:

| Level of knowledge | | Frequency | Percent |
|--------------------|---------|-----------|---------|
| | Poor | 15 | 24.6 |
| | Satisfy | 0 | 0 |
| | Good | 46 | 75.4 |
| Valid | Total | 61 | 100.0 |

Table (15) Distribution of study group according to their knowledge about diagnostic test:

| Level of knowledge | | Frequency | Percent |
|--------------------|---------|-----------|---------|
| | Poor | 15 | 24.6 |
| | Satisfy | 0 | 0 |
| | Good | 46 | 75.4 |
| Valid | Total | 61 | 100.0 |

Table (16) Distribution of study group according to their knowledge about nursing intervention:

| Level of knowledge | | Frequency | Percent |
|--------------------|-------------|-----------|---------|
| | Satisfy | 15 | 24.6 |
| | Not Satisfy | 46 | 75.4 |
| Valid | Total | 61 | 100.0 |

Table (17) Distribution of study group according to their knowledge about care of traumatic wound:

| Level of knowledge | | Frequency | Percent |
|--------------------|-------------|-----------|---------|
| | Satisfy | 37 | 60.7 |
| | Not Satisfy | 24 | 39.3 |
| Valid | Total | 61 | 100.0 |

Table (18) Distribution of study group according to their knowledge about life support:

| Level of knowledge | | Frequency | Percent |
|--------------------|-------------|-----------|---------|
| | Satisfy | 20 | 32.8 |
| | Not Satisfy | 41 | 67.2 |
| Valid | Total | 61 | 100.0 |

Table (19) Distribution of study group according to their knowledge about environmental factors that can be modified:

| Level of knowledge | | Frequency | Percent |
|--------------------|---------|-----------|---------|
| | Poor | 27 | 44.3 |
| | Satisfy | 34 | 55.7 |
| | Good | 0 | 0 |
| Valid | Total | 61 | 100.0 |

Table (20) Distribution of study group according to their knowledge about prevention of road traffic accident:

| Level of knowledge | | Frequency | Percent |
|--------------------|-------------|-----------|---------|
| | Satisfy | 19 | 31.1 |
| | Not Satisfy | 42 | 68.9 |
| Valid | Total | 61 | 100.0 |

Table (21) Distribution of study group according to their knowledge about medication to be avoided :

| Level of knowledge | | Frequency | Percent |
|--------------------|-------------|-----------|---------|
| | Satisfy | 26 | 42.6 |
| | Not Satisfy | 35 | 57.4 |
| Valid | Total | 61 | 100.0 |

Table (22) Distribution of study group according to their knowledge about complication:

| Level of knowledge | | Frequency | Percent |
|--------------------|---------|-----------|---------|
| | Poor | 9 | 14.8 |
| | Satisfy | 0 | 0 |
| | Good | 52 | 85.2 |
| Valid | Total | 61 | 100.0 |

Table (23) Distribution of study group according to their knowledge about hematologic complication:

| Level of knowledge | | Frequency | Percent |
|--------------------|-------------|-----------|---------|
| | Satisfy | 31 | 50.8 |
| | Not Satisfy | 30 | 49.2 |
| Valid | Total | 61 | 100.0 |

Table (24) Distribution of study group according to their knowledge about compartment syndrome:

| Level of knowledge | | Frequency | Percent |
|--------------------|-------------|-----------|---------|
| | Satisfy | 4 | 6.6 |
| | Not Satisfy | 57 | 93.4 |
| Valid | Total | 61 | 100.0 |

4-3. Crosstab:

Table NO (1):

correlation between years of experience of study group and their qualifications:

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------------|----------|-----------------------|
| Pearson Chi-Square | 18.694^a | 6 | .005 |
| Likelihood Ratio | 20.368 | 6 | .002 |
| Linear-by-Linear Association | 11.703 | 1 | .001 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO (2):

correlation between definition of road traffic accident and qualifications of study group:

Chi-Square Tests

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 1.615 ^a | 6 | .951 |
| Likelihood Ratio | 1.996 | 6 | .920 |
| Linear-by-Linear Association | .001 | 1 | .974 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(3):

correlation between cause of road traffic accident and years of experience of study group:

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 8.912 ^a | 9 | .445 |
| Likelihood Ratio | 10.930 | 9 | .281 |
| Linear-by-Linear Association | 2.266 | 1 | .132 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(4)

correlation between Age of study group One of the basic mechanisms of motion injury:

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 18.512 ^a | 9 | .030 |
| Likelihood Ratio | 23.183 | 9 | .006 |
| Linear-by-Linear Association | .982 | 1 | .322 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(5):

Correlation between Qualifications and Types of Surveys we can applied for patient with road traffic accident:

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 3.563 ^a | 6 | .736 |
| Likelihood Ratio | 4.068 | 6 | .667 |
| Linear-by-Linear Association | .003 | 1 | .953 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(6):

Correlation between Years of Experience and Application of primary survey through:

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 17.800 ^a | 9 | .038 |
| Likelihood Ratio | 20.427 | 9 | .015 |
| Linear-by-Linear Association | 1.348 | 1 | .246 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(7):

Correlation between Years of Experience and The patient's pertinent past history can be assessed by use of the mnemonic:

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 8.049 ^a | 9 | .529 |
| Likelihood Ratio | 11.344 | 9 | .253 |
| Linear-by-Linear Association | .614 | 1 | .433 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(9):

Correlation between Years of Experience and Fluid Resuscitation include:

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 16.560 ^a | 9 | .056 |
| Likelihood Ratio | 21.380 | 9 | .011 |
| Linear-by-Linear Association | .005 | 1 | .946 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(10):

Correlation between Qualifications and Secondary assessment:

| Chi-Square Tests | | | |
|------------------------------|--------------------|----|-----------------------|
| | Value | df | Asymp. Sig. (2-sided) |
| Pearson Chi-Square | 6.590 ^a | 6 | .360 |
| Likelihood Ratio | 4.801 | 6 | .570 |
| Linear-by-Linear Association | 1.947 | 1 | .163 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(11):

Correlation between Qualifications and Diagnostic test of patient follow RTA:

| Chi-Square Tests | | | |
|------------------------------|-------------------|----|-----------------------|
| | Value | df | Asymp. Sig. (2-sided) |
| Pearson Chi-Square | .677 ^a | 6 | .995 |
| Likelihood Ratio | 1.154 | 6 | .979 |
| Linear-by-Linear Association | .085 | 1 | .770 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(12):

Correlation between Years of Experience and Nursing intervention of patient follow RTA:

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 15.375 ^a | 9 | .081 |
| Likelihood Ratio | 15.761 | 9 | .072 |
| Linear-by-Linear Association | 7.814 | 1 | .005 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(13):

Correlation between Years of Experience and Life support:

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 9.660 ^a | 9 | .379 |
| Likelihood Ratio | 12.611 | 9 | .181 |
| Linear-by-Linear Association | .009 | 1 | .926 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(14):

Correlation between Qualifications and Prevention of road traffic accident can be done

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 8.789 ^a | 6 | .186 |
| Likelihood Ratio | 10.091 | 6 | .121 |
| Linear-by-Linear Association | 2.012 | 1 | .156 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(15):

Correlation between Qualifications and Complications of multiple trauma from RTA .

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 3.463 ^a | 6 | .749 |
| Likelihood Ratio | 4.161 | 6 | .655 |
| Linear-by-Linear Association | .108 | 1 | .743 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(16):

Correlation between Application of primary survey through * Complications of multiple trauma from RTA.

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 22.379 ^a | 9 | .008 |
| Likelihood Ratio | 12.789 | 9 | .172 |
| Linear-by-Linear Association | 3.380 | 1 | .066 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(17):

Correlation between Types of Surveys we can applied for patient with road traffic accident and Complications of multiple trauma from RTA.

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 22.802 ^a | 9 | .007 |
| Likelihood Ratio | 17.025 | 9 | .048 |
| Linear-by-Linear Association | 4.753 | 1 | .029 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(18):

Correlation between Types of Surveys we can applied for patient with road traffic accident and Hematologic complication.

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|--------------------|----|-----------------------|
| Pearson Chi-Square | 6.842 ^a | 9 | .654 |
| Likelihood Ratio | 9.011 | 9 | .436 |
| Linear-by-Linear Association | .675 | 1 | .411 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

Table NO(20):

Correlation between Types of Surveys we can applied for patient with road traffic accident and Compartment syndrome is one of orthopedic complication.

| | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square | 12.497 ^a | 9 | .187 |
| Likelihood Ratio | 10.968 | 9 | .278 |
| Linear-by-Linear Association | 1.513 | 1 | .219 |
| N of Valid Cases | 61 | | |

P value <0.05 significant.

P value >0.05 not significant

P value =0.00 high significant

4-4. Cross Table:

Table. (1) The relation between the level of education and knowledge about road traffic accident emergency management (n=61).

| | | Road traffic accident emergency management | | Total | P-Value |
|--------------------|----------|--|-----------------------|-------|-------------|
| | | Satisfy knowledge | Not satisfy knowledge | | |
| level of education | Diploma | 0 | 2 | | .736 |
| | Bachelor | 39 | 0 | | |
| | Master | 0 | 20 | | |
| Total | | | | 61 | |

*** Significant at P. value ≤ 0.05**

**** Highly significant at p. value ≤ 0.001**

Discussion

The nurse's knowledge regarding road traffic accident emergency care is an important because Motor vehicle collisions (MVCs) are the leading cause of trauma related mortality in people aged 1 to 44 years.

Over 1.2 million people die each year on the world's roads, with millions more sustaining serious injuries and living with long-term adverse health consequences. Globally, road traffic crashes are a leading cause of death among young people, and the main cause of death among those aged 15-29 years. Road traffic injuries are currently estimated to be the ninth leading cause of death across all age groups globally, and are predicted to become the seventh leading cause of death by 2030.

The result showed that more than two third (39, 63.9 %) from nurses has bachelor degree , and about one third (24 , 39.3%) the experience years between (4-6yr) , the study group they received training course about road traffic accident emergency management about one third (17, 27.9%) and more than two third (40,65.6%) from the nurses are know the meaning of road traffic accident.

The study showed that more than two third from nurses has good knowledge about the causes(46,75.4%)and more than two third (41, 67.2%)about road traffic accident management ,the most common level of knowledge are satisfy ,there are more than half from study group with good knowledge (47,77.0%)about application of primary survey, more than half (31,50.8%) from nurses has satisfy knowledge about AVPU method, also more than half (31,50.8%) about component of taking history, there are 2 third from study group with satisfy knowledge (45,73.8%)about fluid resuscitation.

The level of education and experience affected in the nurse's knowledge by significant association and also age and basic mechanism of motion injury, experience and application of primary survey (P value <0.05 significant). Not significant between the educational level and definition of road traffic accident, experience and causes, and also educational level and type of surveys P value >0.05 not significant.

Conclusion :

The current study revealed that most of study group had satisfy knowledge regarding definition and risk factors, Kind of generalized mechanism of injury ,how can RTA occur, complication and road traffic accident emergency management.

Good knowledge about the primary survey, and causes, diagnostic test and application of secondary survey.

Poor knowledge or not satisfy about basic mechanism of motion injury, the compartment syndrome complication and life support.

Recommendation:

Enhance nurse's education level by periodic training.

Provide educational posters in ED and trauma unit about protocol of road traffic accident management.

Utility from the researches finding to improve nurse's knowledge.

Intensives and continuing education.

Provide resources including practice guidelines.

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Shendi University

Faculty of graduate studies and Scientific Research

Questionnaire Nurse's knowledge Regarding Road Traffic Accident Emergency Management in Omdurman Military Hospital in 2018

Part One: Socio-demographic Data:

1. Age:

A.20-25 B.26-30

C.31-35 D. Above 35

2. Gender:

A. Male: B. Female:

3. Qualifications:

A. Diploma B. Bachelor

C. Master D.PHD

4. Years of Experience:

A. Less than 1year B.1-3

C.4-6 D. More than 6years

5. Learning Courses:

A. Never B. Once

C. Twice D. More than tow

Part Two: Nursing Knowledge about Road Traffic Accident:

1. Road Traffic Accident:

- A. Motor Vehicle Collision (MVC) B. Ventilator Associated Pneumonia (VAP)
C. International Normalized Ratio (INR) D. Fall

2. Risk factors for all Types of injury include:

- A. Male gender B. Low income C. Young age D. All the Above

3. Cause of road traffic accident:

- A. Speed B. Phones C. Fog D. All the Above

4. Kind of Generalized Mechanism of Injury:

- A. Road traffic accident B. Stab wound
C. Discrete areas of the body D. Amputation

5. One of the basic mechanisms of motion injury is:

- A. Blunt B. Head trauma
C. Bleeding D. Headache

6. Motor Vehicle Collisions (MVCs) occur as:

- A. Machine collision B. Body collision
C. Organ collision resulting in rupture, shearing, or bruising D. All the Above

7. Classification of Trauma according to the position:

- A. Spinal injury B. Chest trauma C. Multiple trauma D. All the Above

Part Three: Emergency Management of Road Traffic Accident:

1.Kinds of injury happening in road traffic accident:

A. Head injury B. Pelvic trauma C. Abdominal Trauma D. All the Above

2. Types of Surveys we can applied for patient with road traffic accident:

A. Primary survey B. Secondary survey C. Tertiary survey D. All the Above

3. Application of Primary Survey through:

A. Airway, Breathing, Circulation, Disability, Exposure (ABCDE)

B. Palpitation C. Monitoring D. Relaxation Technique

4. The AVPU method can be used to quickly describe the patient's level of:

A. Thinking B. Trauma C. Consciousness D. None of the Them

5. The patient's pertinent past history can be assessed by use of the mnemonic:

A. Motor Vehicle Collisions MVCs

B Airway, Breathing, Circulation, Disability, Exposure(ABCDE)

C. Allergies, Medications, Past medical illnesses, Last meal Events /environment related to the injury(AMPLE)

D. Road Traffic Accident(RTA)

6. Fluid Resuscitation include:

A. Crystalloids B. Colloids C. Blood Products D. All the Above

7.Secondary Assessment:

A. History Taken

B. Take the Vital Sign

C. Clinical Examination

D. All the above

8.Diagnostic Test of Patient follow RTA:

A.X-ray B. CT-scan C.CBC/ABG D. All the above

Part Four: Nurse's Intervention and Knowledge of Complication and Prevention of Road Traffic Accident:

1. Nursing intervention of patient follow RTA:

- A. Immobilization B. Maintain Oxygenation
C. Maintain Vital Sign D. Fluid Replacement

2. Care of traumatic wound:

- A. Control bleeding B. Cleaning wound
C. Giving drugs D. Prepare for surgery

3. Life Support :

- A. Monitor cardiac rhythm B. Initiate CPR
C. Administration drugs D. DC Shock

4. Environmental factors can be modified to reduce injury risk such as:

- A. Implementing safer road B. Removing throw rugs
C. Separating bicycle paths from roadways D. All the Above

5. Prevention of road traffic accident can be done by:

- A. Use seat belt B. Use phone C. Eating D. None of them

6. Some Medications provided on discharge create another challenge and should be avoided because of the increased risk for RTA:

- A. Paracetamol B. Furosemide C. Benzodiazepines D. Cough Syrup

7. Complications of Multiple Trauma from RTA include which of this system:

- A. Hematologic B. Cardiac C. Pulmonary D. All the Above

8.Hematologic complication include:

- A. Hemorrhage B. Renal failure C. Head trauma D. Cardiac Tamponed

9.Compartment syndrome is one of orthopedic complication and it include:

- A. Disseminated Intravascular Coagulation DIC B. Liver Abscess
C. Fat Embolism Syndrome D. All the Above

*Thank you for your Cooperation
And Participation in this Study*

بسم الله الرحمن الرحيم

جامعة مدني

كلية الدراسات العليا والبحث العلمي

مركز التطعيم

الرمز : 2018/2/11

2018/2/11

إلى من ينهم الأمر

المحترمين

السلام عليكم ورحمة الله وبركاته

الموضوع : الطالب/ أحمد الصبيح أحمد سيد

والإشارة إلى الموضوع أعلاه فيبينكم بأن الطالب المذكور من ضمن طلاب الكلية
بالفصل الدراسي الرابع - ببرنامج ماجستير علوم التمريض، تخصص حالات طارئة، وقد
يخوض فوزيع اسئلة لدراسة الحالة لبحث التخرج والذي عنوانه :

Assessment of nursing knowledge regarding the road traffic accident
emergency management in Omdurman military hospital.

ولكم جزيل الشكر ...



الجمهورية العربية السورية

Army Forces
Dep. Chief of Joint
C. I. Of Medical Services
Training Directorate
No :
Date :



الرقم
التاريخ
المكان
الجهة
الدرجة
الترتيب
الوظيفة

السيد / مدير مستشفى الطوارئ والإصابات
السلام عليكم ورحمة الله تعالى وبركاته

توزيع إستبيان - الطالب أحمد الحسين أحمد محمد

المرجع :

أ. خطاب مسجل مركز الخرطوم بجامعة شندي بتاريخ ٢٠١٨/٢/١١ م .

١. بالإشارة للمرجع (أ) أعلاه نرجو شاكركم السماح للطالب المذكور اعلاه بتوزيع إستبيان لدراسة الحالة لبحث التخرج لنيل درجة الماجستير في علوم التمريض (حالات طارئة) لعدة أسبوع ابتداءً من يوم ١٢ مارس ٢٠١٨ م .

٢. للتكرم بالإستيلام والإجراء .

وجزاكم الله خيراً



١٤
لواء طبيب
القاسم الزين النقري
مدير إدارة التدريب

لا مانع لدينا من
تصديقات مع حفظ السرية
السيد / رئيس شعبة الإستخبارات والأمن .
مرفقاته :
الخطاب اعلاه .

لقد تم تسليم
الخطاب
السيد / رئيس شعبة الإستخبارات والأمن .
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