

## Assessment of Postoperative Nurses' practices Concerning Care of Fracture Treated by External Fixation.

### تقييم ممارسات الممرضين مابعد الجراحة بخصوص العناية بالكسر المعالج بواسطة التثبيت الخارجي

Thani A.Radhi , Academic Nurse, Department of Adult Nursing , College of Nursing / University of Baghdad .

Dr. Narmeen B. Tawfiq, PhD. Prof. and Academic Supervisor, Department of Adult Nursing, College of Nursing/ University of Baghdad.

E- mail: [thanishimaa@yahoo.com](mailto:thanishimaa@yahoo.com)

#### الخلاصة

**الهدف:** تهدف الدراسة لتقييم مستوى ممارسات الممرضين تجاه العناية بالكسر المعالج بالتثبيت الخارجي.  
**المنهجية:** دراسة وصفية اجريت في ردهات جراحة العظام في مستشفى الزهراوي الجراحي- محافظة ميسان للمدة من 11 تشرين الثاني 2014 ولغاية 15 حزيران 2015. اختيرت عينة غرضية "غير احتمالية" مكونة من (50) ممرضا وممرضة من العاملين في ردهات الكسور. جمعت البيانات من خلال استبانة مصممة ومكونة من ثلاثة اجزاء، الجزء الاول شمل الخصائص الشخصية للمرضين ويحتوي على (8) فقرات، والجزء الثاني تخص ممارسات الممرضين تجاه المرضى الذين يجرى لهم جراحة التثبيت الخارجي مكونة من (25) فقرة و الجزء الثالث يتكون من (9) فقرات تختص بممارسات الممرضين بخصوص العناية بجهاز التثبيت الخارجي. جمعت البيانات بطريقة الرصد للمرضين العاملين في ردهات الكسور. حددت مصداقية استبانة من خلال عرضها على (15) خبير من ذوي الاختصاص وحدد ثباتها من خلال اجراء الدراسة المصغرة للمدة من 22 كانون الثاني 2014 ولغاية 10 شباط 2015. تم وصف تحليل البيانات باستعمال اساليب الاحصاء الوصفي و الاحصاء الاستنتاجي.  
**النتائج:** بينت النتائج ان غالبية فقرات الدراسة قد اظهرت ضعفا في التداخلات التمريضية بعد اجراء جراحة التثبيت الخارجي.  
**الاستنتاج:** نستنتج ان هناك نقصا و قلة في ممارسات الممرضين العاملين في ردهات الكسور بعد اجراء جراحة التثبيت الخارجي .  
**التوصيات:** يوصي الباحث بضرورة اعداد برامج خاصة لتدريب الملاكات التمريضية العاملة في وحدات الكسور تجاه العناية بالكسر المعالج بالتثبيت الخارجي. تصميم كتيب او كراس حول كيفية تقديم العناية التمريضية للمرضى بعد اجراء جراحة التثبيت الخارجي .

#### Abstract

**Objectives:** to assess nurses' practice level toward care of fracture treated with external.

**Methodology:** A descriptive study was carried out at orthopedic wards in Al-Zhrawi Surgical Hospital -Missan Governorate. The study started from November 11<sup>th</sup>, 2014 to June 15<sup>th</sup>, 2015. A non-probability sample of (50) orthopaedic nurses (male & female) who were working in orthopedic wards. The data were collected through the use of questionnaire, which consists of three parts, part(1)Demographic data form that consists of (8) items, part(2) concerning nurses' practices level toward patient treated with external fixation consist from (25)items, part(3) consist from(9) items concerning with external fixation device care. Checklist was used to collect data for orthopedic nurses. The validity of the checklist was determined through presenting it to (15) specialist expert and its reliability were determined through a pilot study which was carried out through the period from (22Jan-to 10th Feb, 2015). Descriptive statistical analysis procedures inferential analysis procedures were used for the data analysis.

**Results:** Discussions of the study result indicated that the majority of items had low M.S (less than1.66)

**Conclusion:** From the results it conclude that the orthopedic nurses have inadequate or deficit in some aspects related to postoperative care for patient undergoing external fixation surgery in orthopedic wards.

**Recommendations:** The researcher recommend a special training sessions should be designated and presented to all orthopedic nurses that include specific training programs about nurses' intervention concerning care of fracture treated with external fixation. Authorizing and distributing a manual handbook or pamphlet to all nurses who work in orthopedic wards including nursing interventions in postoperative.

**Keywords:** Nurses' practices, Fracture, External fixation.

## INTRODUCTION

Traumatic bone injury consider as a common injury when the human body exposure to the trauma or accident. It's common in the field of orthopedic trauma and requires careful treatment to avoid refractory disability. Fractures are common injuries with an incidence of

(4) fracture per 100 people per year. The lifetime fracture prevalence exceeds 50% in middle age men and 40% in women over age 50 years<sup>(1)</sup>.

Approximately 66% of all injuries that involve musculoskeletal system fracture, dislocation and injuries of soft tissues. Thus, musculoskeletal injuries are commonly seen in health care setting and a major part of nursing profession. Modern industrialized life and increasing incidents of road accidents and violence have led to an increased incidence of fractures<sup>(2)</sup>. Fracture can be treated by immobilization, cast application or by internal or external fixation, placement of metal pins, a plate and screw<sup>(3)</sup>.

Management is one of the important components in the patient care administration. It consists aiding the patients in observing personal hygiene, helping in nutrition, examination, environmental sanitation, maintaining body temperature, providing safety and comfort, helping in respiration, rest, sleep and exercise, helping in adaptability, providing health education etc. Nursing has always been directed to save people healthy and provide comfort, care and assurance to the patients. Nursing intervention may involve any number of activities ranging from carrying out complicated technical procedures to something as simple as holding a hand of the patient. There are several different techniques and fixation devices to treat different types of fractures have been discovered over the years. The different types of fixation techniques rely on a different approach and also a different biological process of healing<sup>(4)</sup>.

Treatment of fractures surgically underwent important alterations around the middle of the last century. For many years, external fixation device been the gold standard for treatment many types of fractures that's cannot treated by traction or cast. External fixators have been increasingly used not only in fracture treatment, but also in correction of extremity lengthening, deformities, nonunion, osteomyelitis or tumors<sup>(5)</sup>.

External fixation prevents further soft tissue damage, allows recovery of traumatized skin and subcutaneous tissue, permits wound management, allows elective reconstruction of complex fractures and periarticular injuries and does not negatively impact systemic complications in multiply injured patients. When it comes to patients with a high quality of care (in pre and post operative) and good patient outcomes are closely related to correct assessment, monitoring and caring. Poor caring lead to appear dangerous complication that would burden the community with heavy financial costs<sup>(6)</sup>.

The usage of external fixation to treat fractures allow for the adjustment of fractures in three dimensions. Apart, it allows the adjustment and maintenance of limb length, and facilitates wound care and soft tissue reconstruction. Furthermore, the early function of muscles and joints is allowed, and the patients' comfort is enhanced. With all these advantages, fixation usage may induce complications like pin site infection, pain, skin breakdown and dermatitis under traction, and complications related to immobilization<sup>(7)</sup>.

The management of fracture takes up more time and resources. Surgical fixation of fracture fragment can give sufficient stability and short hospital stay. External fixation is common method in open fracture treatment. Bone healing may extend for more 7 months so the patient needs special and long term care for these devices<sup>(8)</sup>.

Orthopedic patient will have (3) types of complications, complications related to bone fracture, complications related to surgery-immobility and complications related to biomaterial implant<sup>(9)</sup>.

Around 70% of patients experience complications such as infections, which can delay healing. Among these complications, pin site infection is the most common infection among patients who have undergone external fixation, and about 20% of these suffer from major infection while 80% suffer from minor infection. Minor complications from pin site infection include pain and delayed mobilization. Major complications caused by pin site infection include osteomyelitis, delayed healing of fractures, non-union, loss of fracture alignment, systematic infection, failure of orthopaedic surgery, long term pain and disability<sup>(10)</sup>.

External fixation have greatest level of infection occurrence than other biomaterial "external fixation: 12-17%, arterial catheter:0.4-0.7%, dental implant:2-4%" <sup>(11)</sup>.

Although quality of life (QOL) appears to effect following fixation, research appeared that patients experience depression and anxiety, for instance due to the cumbersome frame, pain and indefinite rehabilitation period .On the individual level, complications lead to prolonged hospitalization and decrease healing process, and psychological impact on the patient and his family <sup>(12)</sup>.

When considering treatment of fracture, some of the factors that should be possessed into account are age, associated injuries, injury type, type and localization of the fracture, social and psychological considerations, economic considerations and the family's potential for taking care of the patient <sup>(13)</sup>.

In modern treatment, growingly used to help or restore human body function such as heart valve, catheter, external and internal fixation. Biomaterial lead to greatest improvement in medicine but these biomaterials lead to occurrence of biomaterial associated infection. Complications were much easiest to prevent than to treated throw good practice in postoperative and patients obligation toward educational and instructional teaching <sup>(14)</sup>.

After discharge, Self-care and follow up routine are a vital to prevent muscle wastage and infection. Physical activity must be maintained and pin-sites must be cleaned daily or weekly depending on the recommendations of the attending nurses. Nurses play a major role in preventing complication and succeed surgery through good knowledge and practice in postoperative intervention <sup>(15)</sup>.

**Objective of the study:** to assess postoperative nurses' practices level regarding care of fracture that treated by external fixation.

## **METHODOLOGY**

### **Design of the Study**

A descriptive analysis study design was carried out at Al –Zahrawy surgical hospital; Missan Governorate, started from November 11<sup>th</sup>, 2014 to 15<sup>th</sup> June 2015.

### **Study Sample**

A non-Probability "purposive" sample of (50) nurses are selected for the present study. The sample include male and female nurses,nurses who have been work in private and public adult orthopedic ward, nurses who have been work at morning shift, nurses who have one year in employment at least and nurses from different level of education.

### **Instruments (Observational Check-list)**

From a literature review and previous studies concerning care of fracture treated external fixation device were conducted to constructed & developed for the study instrument. Check-list from this review, a draft instrument was reviewed by (15) experts and the reliability tested throw pilot study for (10) orthopedic nurses.The final study instrument consisted of three major parts:

**Part I:** Socio-demographic Characteristics of the Study Sample: The part is composed of socio-demographic characteristics sheet which is consisted of (8) items, they include gender, age, level of education, type of ward, years of employment in nursing, years of experience in orthopedics word, training session concerning orthopedic care, duration of training session.

**Part II:** Postoperative nurses' practices for patient undergoing external or internal fixation surgery. Second part of the questionnaire was comprised of (7) domains which implicate (25) items that concerned with the nurses practice in observing and managing postoperative patient to help him to return to normal function.

**Part III: Postoperative nurses' practice regarding pin site care.** The final part consist of (9) items that deal with external fixation device care.

**Data Collection**

The data were collected through the application of observational technique, after that the investigator interviewing the nurses to collect the data regarding to demographic characteristic. The data collection process started in February 17<sup>th</sup> 2015. to the 8<sup>th</sup> of April 2015. The observational checklist which used and took about (1-2) days at morning shift, each nurse was observed on an individual basis

**Data Analyses**

In order to achieve the early stated objectives, the data of the study were analyzed through the use of statistical package of social sciences (SPSS) version 20 through the descriptive and inferential statistical analyses.

**RESULTS**

**Table (1): Distribution of(50) nurses by their demographic characteristic:**

No.	Variables	(n=50)	F	%
1-	Age (year)	20-29	18	36.0
		30-39	21	42.0
		40-49	8	16.0
		50 and more	3	6.0
		<b>Total</b>	<b>50</b>	<b>100.0</b>
2-	Gender	Male	28	56.0
		Female	22	44.0
		<b>Total</b>	<b>50</b>	<b>100.0</b>
3-	Level of education	Nursing institute graduate	32	64.0
		Secondary school of nursing graduates	13	26.0
		School of nursing graduates	5	10
		<b>Total</b>	<b>50</b>	<b>100.0</b>
4-	Type of ward	Private	14	28.0
		Public	36	72.0
		<b>Total</b>	<b>50</b>	<b>100.0</b>
5-	Years of employment	1-5 years	16	32.0
		6 -10 years	15	30.0
		11 – 15 years	14	28.0
		16-20 years	5	10.0
		<b>Total</b>	<b>50</b>	<b>100.0</b>
6-	Years of Experience	1-5 years	26	52.0
		6 -10 years	11	22.0
		11 -15 years	10	20.0
		16 and more	3	6.0
		<b>Total</b>	<b>50</b>	<b>100.0</b>
7-	Training courses	Not share	23	46.0
		1-2 training session	23	46.0
		3 and above	4	8.0
		<b>Total</b>	<b>50</b>	<b>100.0</b>
8-	Duration of training courses	3 day and less	6	22.2
		1week	16	59.3
		2- 3 week	4	14.8
		More than (4) weeks	1	3.7
		<b>Total</b>	<b>27</b>	<b>100.0</b>

No. = number of Variable, n = number of sample, F=frequencies, % = Percentages.

Table (1) shows that the majority of age group to the study sample were within (30-39) years (42%). The above table also shows that the majority of participants were male (56%). Also in regarding to the subjects level of education, the results show that more than half of them has nursing institute graduate (64%). In addition, majority of them has (1-5) years of employment in nursing (32%). The more of the half of the sample has (1-5) years of experience in orthopedic ward (52%).

In regarding to the subjects type of ward, the majority of the study sample were public ward (72%). In the above table the results show that Sharing in training session concerning orthopedic care the major of the study sample was equally between they have not share in training courses and who have (1-2 training courses) related to nurses intervention for orthopedic care (46%). Finally, concerning duration of training course the majority of study sample (59.3%) have (1-2 weeks)

**Table (2 ):Nurses' intervention during the 1<sup>st</sup> day after external or internal fixation surgery**

No	Items	Always		Sometime		Never		M.S.	Ass.
		F	%	F	%	F	%		
1	Read the operative notes.	35	70.0	15	30.0	0	0	2.70	High
2	Patient orientation to person, place & time.	16	32.0	19	38.0	15	30.0	2.02	Moderate
3	Check & record vital signs .								
3.1	Pulse every 30 minutes and less if the patient more stable	28	56.0	21	42.0	1	2.0	2.54	High
3.2	B.P every 30 minutes and less if the patient more stable	9	18.0	29	58.0	12	24.0	1.94	Moderate
3.3	Resp. every 30 minutes and less if the patient more stable	0	0	0	0	50	100.0	1.00	Low
3.4	Record temperature every (4hr)	41	82.0	9	18.0	0	0.00	2.82	High
	<b>Average M.S : 2.08</b>								
4	Nurses' intervention concerning pain.								
4.1	Assess level & characteristic of pain.	0	0	0	0	50	100.	1.00	Low
4.2	Change patient position.	4	8.0	17	34.0	29	58.0	1.50	Low
4.3	Help the patient during walking.	6	12.0	17	34.0	27	54.0	1.58	Low
4.4	Gives analgesic as Dr order.	48	96.0	2	4.0	0	0.00	2.96	High
	<b>Average M.S : 1.75</b>								
5	Assess for S & S of hypovolemic shock	0	0.00	0	0.00	50	100.0	1.00	Low
6	Nurses' intervention regarding skin integrity and drainage								
6.1	Assess postoperative dressing for bleeding or discharge	23	46.0	27	54.0	0	0.00	2.46	High
6.2	Assess color of the skin or mucous membranes	0	0.00	1	2.0	49	98.0	1.02	Low
6.3	check the effected part for pulse .	0	0.00	0	0.00	50	100.0	1.00	Low
6.4	Record color & amount of drainage.	7	14.0	22	44.0	21	42.0	1.72	Moderate
6.5	Assess for any swelling in operation site	4	8.0	23	46.0	23	46.0	1.62	Low
6.6	Assess for numbness or parasthesia	1	2.0	1	2.0	48	96.0	1.06	Low
6.8	Assess for cyanotic or edema of the effected part	1	2.0	1	2.0	48	96.0	1.06	Low
	<b>Average M.S : 1.42</b>								
7	Nurses' intervention regarding nutritional status								
7.1	Gives I.V. fluid as prescribed.	46	92.0	3	6.0	1	2.0	2.90	High
7.2	Check and record bowel sound.	0	0.00	0	0.00	50	100.0	1.00	Low
7.3	Assess fluid intake and output	0	0.00	1	2.0	49	98.0	1.02	Low
7.4	Assess for any G.I symptom such as vomiting	0	0.00	1	2.0	49	98.0	1.02	Low
7.5	Ask patient about F.B.M.	1	2.0	19	38.0	30	60.0	1.42	Low
7.6	Asses patient appetite and swallowing.	4	8.0	21	42.0	25	50.0	1.58	Low
7.7	Follow up for Diet	4	8.0	25	50.0	21	42.0	1.66	Low
	<b>Average M.S : 1.51</b>								
	<b>Total average M.S for all items : 1.66</b>								

No. = number of item, F=frequencies, % = Percentages, M.S.= mean of score. Ass. = assessment, Cut-off-point interval: 1-1.67 = Low; 1.68-2.33 = Moderate; 2.34-3.00 = High

Table (2) presents that there are low mean of score postoperative nurses' intervention after external fixation surgery for item number (3-c, 4-a, 4-b, 4-c, 5, 6-b, 6-c,6-e,6-f, 6-g, 7-b, 7-c, 7-d,7-e,7-f,7-g). In addition, the study sample implementation demonstrates moderate in item number (2, 3-b,6-d), and high practices at the item number (1, 3-a, 3-d, 4-d, 6-a, 7-a ). Total average M.S (1.66).

**Table (3)Postoperative nurses' practice regarding pin site car**

No	Items	Always		Sometime		Never		M.S.	Ass.
		F	%	F	%	F	%		
1	Checked physician's orders regarding pin site care.	36	72.0	13	26.0	1	2.0	2.70	<b>High</b>
2	Gathered necessary equipment.	25	50.0	24	48.0	1	2.0	2.48	<b>High</b>
3	Washed hands.	3	6.0	14	28.0	33	66.0	1.40	<b>Low</b>
4	Assessed for infection at pin site. Noted any local pain, redness, heat, or drainage.	2	4.0	16	32.0	32	64.0	1.40	<b>Low</b>
5	Cleaned area with prescribed cleansing agent	4	8.0	17	34.0	29	58.0	1.50	<b>Low</b>
6	Using non shedding cleansing gauze.	6	12.0	17	34.0	27	54.0	1.58	<b>Low</b>
7	Let the wound dry after cleaning.	0	0.00	16	32.0	34	68.0	1.32	<b>Low</b>
8	Checked for circulation, motion, and sensation in affected extremity.	0	0.00	12	24.0	38	76.0	1.24	<b>Low</b>
9	Document finding.	1	2.0	10	20.0	39	78.0	1.24	<b>Low</b>
10	<b>Average</b>							<b>1.65</b>	<b>Low</b>

Table(3) reveals that there are low mean of scores for all items nurses' practices regarding pin site care except item (1, 2) show were high mean of score, with average mean score of (1.65).

## **DISCUSSION**

Through the data analysis distribution of demographic variables, (Table1) revealed the most samples were male (56%). This result disagree with Sickder,(2011) who found that the most orthopedic nursing staff (60%) were female<sup>(16)</sup>.The highest proportion (42%) of them within age group (30-39)yrs and (36%) within age group (20-29)yrs, which indicate that approximately (78%) of studied samples within age group (20-39)yrs, this result disagree with Venkatramana, et al., 2010 who showed that the majority (70%) of the nursing staff in orthopedic ward within age group (40-60)yrs<sup>(17)</sup>. Regarding the subject of the educational levels, approximately (64%) of the study sample were nursing institute graduate, this finding comes with Bader, (2012) who found that the (40-60%) of sample were nursing institute<sup>(18)</sup>. Concerning type of ward, the majority of participant (72%) from public ward, there is no literature related to this variable. Regarding years of employment in nursing field, (32%) of the study sample had (1-5) yrs employed in nursing field and (30%) had (6-10)yrs employed in nursing field so the more than half of study sample (62%) had (1-10)yrs employed in

nursing field, this result disagree with Abdalrahim, (2009) who found that the (54%) of nurses in orthopedic ward had (10-15)yrs employed in nursing field<sup>(19)</sup>. Concerning years of experience in orthopedic ward, (52%) of sample had (1-5)yrs of experience in orthopedic ward, this result comes in agreement with Wulff,(2012) who reported the (55%) of orthopedic nurses had experience less than 5 yrs in orthopedic ward<sup>(20)</sup>.The findings indicated that the more than half of study sample ( 54%) had sharing in training sessions concerning external and internal fixation care, this result agree with Solomon et al.,(2012) who found that 61% of study sample sharing in training session<sup>(21)</sup>. Concerning duration of training session, approximately (59.3%) from those who share in training has period (1) weeks, this result disagree with Kadhim, (2013) who demonstrate that the (80%) of studied sample had training session period less than (3) days <sup>(22)</sup>.Table (2) shows seven domains were named "Read the operative notes, vital signs, pain relieving, nutrition status, skin integrity and drainage reported low M.S (average 1.66) as a total domains. This means that the patients get inadequate nursing intervention and low level of nursing practice. This result disagree with Smeltzer, et al, (2008) who stated the nurse responsible for postoperative intervention and important the intervention in preventing risks of complications and save patient life<sup>(23)</sup>. When we talk about vital signs as separate domain, the results show that there is moderate M.S with cut of point (2.08) as average for vital sign. Pulse check and record has high M.S (2.54), but in respiration check has low M.S (1.0) which means no anyone from participant check respiration. This result disagree with Smeltzer, et al.,(2010) who stated that the nurse should check and record pulse, B.P and respiration every 30 minutes and less if the patient more stable and temperature checks every 4hr<sup>(24)</sup>. Concerning pain relief, the result show moderate M.S (1.75) as total domain and low M.S for items (4.a, 4.b, 4.c) which mean that the nurses' practice for pain relieve in adequate. This result agree with Williams & Hopper, (2007) who stated that the nurse should plays a major role in managing postoperative pain<sup>(25)</sup>. In regarding hypovolumic shock assessment, table (2) shows low M.S(1.0) this mean there was any respondents for this item. This result disagree with Johnson, (2011) who conclude that the assessment for hypovolumic shock very important after orthopedic surgery because the patient may loss more blood during injury and surgery <sup>(26)</sup>. Table (2) concerning nurses' intervention regarding skin integrity and drainage, table (2) shows low M.S (1.42) as total items of this domain. This result disagrees with postoperative care standard which stated by Zarate, (2012) who recommended to important assess operative site for any bleeding, swelling, cyanotic or edema in the effected part<sup>(27)</sup>. Finally, in last domain (nurses' intervention regarding nutrition status) table (2) show that there were low level in nurses practice regarding this domain M.S (1.51). This result disagree with Joy, (2013) who stated that the nurse should observe/ undertake and record nutrition assessment for postoperative patient <sup>(28)</sup>.Table (3) shows in last domain (nurses' intervention concerning pin site care) low M.S for all items except (1,2) get high M.S. while the average of M.S for all items (1.65) that indicated a weak follow up and poor practice for nurses' staff. This result disagree with Smith,(2012) who stated that the health walker should give high quality to control or prevent pin site infection<sup>(29)</sup>.

## **CONCLUSION:**

From the results it conclude that the orthopedic nurses have inadequate or deficit in some aspects related to postoperative care for patient undergoing external fixation surgery in orthopedic wards.

## **RECOMMENDATIONS:**

1. Special training sessions should be designated and presented to all orthopedic nurses that include specific training programs about nurses' intervention concerning care of fracture treated with external fixation.

2. Designating and distributing a booklet to all nurses who work in orthopedic wards including nursing interventions in postoperative, Duration of training session should be more than (2) weeks. Increasing the number of professional nurses' graduates from colleges of nursing to enrolled in orthopedic wards and provides them with scientific resources related to postoperative intervention.

## **REFERENCES:**

- 1- World Health Organization: Postoperative note and orders, Geneva, 2012, Vol.5. No.1, Pp.660.
- 2- Walker, H. Adolescent Experience with Trauma and Orthopedic External Fixation. University of Massachusetts Medical School. 2008 GSN Dissertations, 2 Retrieved from [http://escholarship.umassmed.edu/gsn\\_diss/7](http://escholarship.umassmed.edu/gsn_diss/7).
- 3- Nash, C. Mickan, S. Del. Mar, C.: Injured limbs recover better with early mobilization- *The Journal of Bone and Joint Surgery*, 2005, Vol.3, No.2, Pp. 1167 .
- 4- Bucholz and Browner: Functional outcomes for unstable distal radial fractures treated with open reduction and internal fixation or closed reduction and percutaneous fixation. A prospective randomized trial. *J Bone Joint Surg Am*. 2006; 91:1837–1846
- 5- Royal College of Nursing: Guidance on pin site care. Cavendish Square, London W1G 0RN. Accessed 25 April 2011. Available from URL: [http://www.rcn.org.uk/data/assets/pdf\\_file/0009/413982/004137.pdf](http://www.rcn.org.uk/data/assets/pdf_file/0009/413982/004137.pdf)
- 6- Lethaby, A., Temple, J., & Santy, J.: Pin site care for preventing infections associated with external bone fixators and pins, Lon- UK, Sep. 2011, Vol.1, Pp.22-27, 65-71.
- 7- Santy, J, Vincent M, Glossop N, Jomeen J, Pearcey P.: Calm, irritated or infected? The experience of the inflammatory states and symptoms of pin site infection and irritation during external fixation. A grounded theory study. *Journal of Clinical Nursing*. 2012, Vol.3.No.12, P. 3163–3173
- 8- Sandra ,N & Mills, E: Lippincott Manual of Nursing Practice, 8th Edition, Lippincott Williams & Wilkins company, 2006, Pp.6,1050,1055
- 9- Sue, H.: Complication of orthofix, *Nursing orthopedic association journal*, 2013, Vol.26, No.4, Pp.12-25.
- 10- Stephan, M: Fracture management. *The journal of bone and joint surgery*: Nov. 2011, Vol.1, 174(2):123.
- 11- Tahlawy, E. Surgical site infection and associated risk factors in Egyptian orthopaedic patients. *Journal of American Science*, 2012; 6(7). Available <http://www.americanscienc>
- 12- Bohler L. Diagnosis, pathology, and treatment of fracture the orthopedic journal, Harvard, 2013. Vol. 15,
- 13- Patron, M.: The cost of hemiarthroplasty compared to that of internal fixation for femoral neck fractures, Thesis, Un. Royal college of nursing, 2010, Pp.5,16,34.
- 14- Handoll, H. Huntley, J. Madhok ,R. External fixation versus conservative treatment for distal radial fractures in adults. *Cochrane Database Syst Rev*. 2007;3:CD006194.
- 15- Davies, R., Holt, S., Nayangam, N. The care of pin sites with external fixation. *Journal of Bone & Joint Surgery British*. 2007, Vol.1, Pp. 87-100.



- 16- Sickder, H.: Nurses' knowledge and Practices Regarding Prevention of Surgical Site Infection.(Thesis) prince of Songkla University. 2011. P.60.Available : <http://www.UO.Prince songkla.com>
- 17- Venkatramana, M., Jayadevan, S. and Jayakumay, M. Opinion and practice of gloving among orthopaedic nurse in a university teaching hospital, 2010, Vol. 4, issue. 2
- 18- Bader, T.: Evaluation of Nurss Practices toward Orthopedic Wound Infection.(Thesis) University of Baghdad, College of Nursing. 2012. P.98
- 19- Abdalrahim, M. : Postoperative Pain Assessment and Management  
The Effects of an Educational program on Jordanian nurses' practice, knowledge, and attitudes .Göteborg 2009. Available on [www.CutePDF.com](http://www.CutePDF.com)
- 20- Wulff, T.: Knowledge and Clinical Practices of Nurses for Adult Post operative Orthopedic Pain Management. (Thesis). Faculty of Health Sciences – Stellenbosch University, 2012. Available online Stellenbosch University <http://scholar.sun.ac.za>.
- 21- Solomon,L.; David,W.; Nayagam,S.: Apleys system of orthopaedics and fracture : 10<sup>th</sup>ed .,Hachette UK company, 2012, Pages. 22-27-55.
- 22- Kadhim, J.: Postoperative nursing intervention for laparoscopic cholecystectomy. (Thesis) University of Baghdad, College of Nursing. 2013. P.50
- 23- Smeltzer, S.; Bare, B.; Hinkle, J. and Cheever, K.: Brunner and suddarth Textbook of Medical-Surgical Nursing, 12<sup>th</sup>ed., Philadelphia: Lippincott- Williams and Wilkins, by Wolters Kluwer Business, 2008, Pp.400,409,2080.
- 24- Smeltzer, S. ; Bare, B.; Hinkle, J. and Cheever, K.: Brunner and suddarth Textbook of Medical-Surgical Nursing, 12<sup>th</sup>ed .,Philadelphia: Lippincott- Williams and Wilkins, by Wolters Kluwer Business, 2010, P. 2045.
- 25- Williams, L. and Hopper, P.: Understanding Medical Surgical Nursing. 3<sup>rd</sup> ., Philadelphia: F . A. Davis Company, 2007, P.1009.
- 26- Johnson, J.: Preoperative assessment of high-risk orthopedic surgery patients, The Nurse Practitioner. Lippincott Williams & Wilkins 2011,Vol. 36, No. 7, P.60.
- 27- Zarate, M.: Nursing Care Related to the Musculoskeletal System. Kindle edition. Stanmore, New Zealand, 2012: Powerhouse Publishing. ISBN 978-1-78258-128-4
- 28- Joy,L. : Postoperative nursing management. Watford general hospital England, UK 2013, PP.11.15.17.[WWW.motuelife](http://WWW.motuelife)\ UK
- 29- Simth M, Saleh M. External fixation. The incidence of pin site infection: A prospective audit. *Journal of Orthopaedic Nursing* 2012, Vol.4,**No.1**, p 59–63.