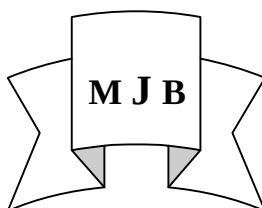


Intensive care unit in seven Iraqi hospitals present and future

***Mohammed S. Alkafaji ,** Amal Swidan,** Mazin Adnan**

***AL-Hilla teaching hospital**

****Al-Nahrain University-College of Medicine**



Abstract

ICU patients require higher levels of care than non-ICU patients do; they consume more resources (e.g. drugs and fluids) and require superior medical technology and interventions (e.g. mechanical ventilation), than patients located on the general ward.

The study aimed to assess the health care in the seven units studied regarding personal working in these units, unit design and architectural facilities, organizational system, use of diagnostic and interventional measures and outcome and compare the results with the high standards of intensive care .

The study done in 7 intensive care units in 3 large governorates in Iraq: Baghdad, Babil and Albasra. A questionnaire form designed by the investigators was distributed to the workers in these units, the questions are concerned with : unit design and architectural facilities, organizational featuring, medical and nursery usual practices organizational polices in admission and discharge of patients. Another set of data collected for the last one year including: no. of patients admitted to these units, no. of patients discharged a life, stayment of each patient and no. of the workers. All the data processed and interpreted by using SPSS v 11. The research shows: there is poor results regarding unit design, adequacy of intensive care beds in each governorate, staff improvement programs, adequacy of equipments and their handling, admission and discharge polices and cross infection .there is a real need to write standards and apply them to help in the provision of modernization and improvement programs.

الخلاصة

المرضى في العناية المركزة بحاجة إلى درجة من الرعاية الطبية أكثر من مرضى الردهات العامة وهم عادة يستهلكون موارد (مثل الأدوية والسوائل الوريدية) ويتطلبون تقنية وتدخلات طبية عالية المستوى (مثل التنفس الاصطناعي) أكثر من مرضى الردهات العامة.

هذه الدراسة تهدف إلى تقييم العناية الطبية في الوحدات السبعة موضوع البحث من ناحية الأفراد العاملين في هذه الوحدات، تصميم الردهات والتسهيلات المعمارية المتوفرة، البناء التنظيمي، استعمال الوسائل العلاجية والتشخيصية والحصولية ومن ثم مقارنة النتائج مع أعلى مقاييس ردهات العناية المركزة. الدراسة تمت في سبع وحدات عناية مركزة في ثلاث محافظات كبيرة في العراق (بعد استحصال موافقة وزارة الصحة): بغداد، بابل والبصرة. الاستبانة تم إعدادها من قبل الباحثين وزعت على العاملين في الردهات موضوع البحث، تناولت: تصميم ردهة العناية المركزة والتسهيلات المعمارية، الممارسات الطبية والتمريضية المعتادة، السياسات التنظيمية المتبعة لإدخال وإخراج المرضى. مجموعة أخرى من البيانات تم جمعها للسنة الماضية شملت: إعداد المرضى الذين ادخلوا العناية المركزة، عدد المرضى الذين أخرجوا متحسين، مدة بقاء كل مريض وعدد العاملين في ردهة العناية المركزة. كل هذه البيانات أدخلت وتم معالجتها باستخدام النظام الإحصائي (أس بي أس) النسخة الحادية عشرة. أظهر البحث إن هناك نتائج سلبية إذا ما قورنت مع القياسات العالمية من ناحية تصميم الردهة، كفاية أسرة العناية، برامج تطوير الكوادر، وفرة الأجهزة والتعامل معها، سياسات إدخال وإخراج المرضى وانتقال العدوى. كما أظهر البحث إن هناك حاجة ماسة لكتابة مقاييس وتطبيقها للمساعدة في تطبيق برامج التحديث والتطوير.

Introduction

The term intensive care has been defined as: A service for patients who have potentially recoverable conditions, who can benefit from more detailed observation and invasive treatment than can be provided safely in an ordinary ward or high-dependency area. It is usually reserved for patients with threatened or established organ failure, often arising as a result or complication of an acute illness or trauma, or as a predictable phase in a planned treatment Program. While high-dependency care defined as providing a level of care between that of a general ward and intensive care. Intensive care is regarded as an expensive specialty throughout the developed world (1). This is due to the fact that the sickest patients in the hospital are treated in the Intensive Care Unit (ICU).critically ill patients is defined as any patient who is at risk for decompensations or any patient who is physiologically unstable , requiring constant surveillance and minute-to- minute titration of therapy according to the evolution of the process. (2)

Intensive care comprises 1-2% of total bed numbers in the United Kingdom; this compares with proportions as high as 20% in the United States. Patients admitted in Britain therefore tend be more severely ill than those in America. Intensive care is expensive .the cost per bed per day is £1000-£1800 with salaries accounting for over 60%, pharmacy for 10%, and disposables for a further 10 %.(3)

ICU patients require higher levels of care than non-ICU patients do; they consume more resources (e.g. drugs and fluids) and require superior medical technology and interventions (e.g. mechanical ventilation), than patients located on the general ward. An ICU is treating "Patients requiring advanced respiratory support alone or basic respiratory support together with support of at least two organ systems. This level includes all

complex patients requiring support for multi-organ failure (2).

Staff input is greatest on the ICU, with at least one nurse allocated to each bed on the unit, compared with general ward staffing levels of only one or two nurses per ward. These factors all contribute to the expensive nature of intensive care. (4) The number of annual ICU admissions in the United State is estimated to be 4.4 million patients.(5) Due to an aging population and the increasing acuity of illness of hospitalized patients, both the total number of ICU patients and their proportional share of hospital admissions overall are expected to grow.(6)

Patients in the intensive care unit (ICU) require complex care relating to a broad range of acute illnesses and pre-existing conditions. The innate complexity of the ICU makes organizational structuring of care an attractive quality measure and a target for performance improvement strategies. In other words, organizational features relating to medical and nursing leadership, communication and collaboration among providers, and approaches to problem-solving(7) may capture the quality of ICU care more comprehensively than do practices related to specific processes of care.(8)

Patients are usually admitted to intensive care because of the severity of their illness, rather than solely on the underlying diagnosis. Severity can be assessed by the APACHE II scoring system, a physiologically-based scoring system that incorporates weightings for age, severity of acute illness, chronic illness and operative status. The APACHE II score increases with increasing severity of illness: the maximum is 71, but a score rarely exceeds 55. The severity score is closely correlated with risk of death in hospital (9, 10)

Large medical centers frequently have multiple ICUs or critical care centers separated and defined by specialty or

subspecialty practices. Examples include cardiothoracic surgical ICUs, trauma ICUs, coronary care units, and neuralgic/neurosurgical ICUs. Small hospitals may have only one intensive care unit designed to care for a large variety of critically ill patients including adult and pediatric populations. The use of intermediate care or step-down units in some hospital settings may provide a more efficient distribution of resources for patients whose critical illness requires less use of monitoring equipment and staffing than a high-acuity ICU. (11)

The study aimed to assess the health care in the seven units studied regarding personal working in these units, unit design and architectural facilities, organizational system, use of diagnostic and interventional measures and outcome and compare the results with the high standards of intensive care .

Method

Sample

The study was done in seven intensive care units after permission from the higher health administration authority (ministry of health) the units researched distributed as: 3 units in Baghdad, 3 units in AlBasrah and one unit in AlHilla. All these units are dealing with critically ill patients and offering advanced monitoring and care as compared to the general wards with the facility of artificial ventilation with flow generator ventilator, the study was conducted in the period "between February 2006 to June 2006.

Questionnaire

A questionnaire form designed by the investigators was distributed to the workers in each unit. First, a pilot study was done and reliability test calculated and it was 0.62 (which is acceptable) .the questionnaire contain 26 Likert scale items, 34 closed ended questions and one open ended question was: write one suggestions to improve the work in your unit. Interview done with the workers to explain the aim of the study and to explain

and discuss any comment about the questionnaire, the questionnaire form recollected from the workers at the same day, Frequent visits by the researchers to these units to observe the care and the organizational culture of these units and collect data.

Data collection and analysis

Data collected from these units: include number of the patients admitted in the last 12 months, number of deaths, length of ICU stay of each patient, no. of workers including doctors, nurses and other workers. Data are processed using SPSS v11

160 questionnaires form were distributed 140 were completed for a response rate of 86.5%, surveys questionnaire were completed by a unit leaders, physicians, nurses and other staff. Bed occupancy rate calculated according to the following formula

Bed occupancy rate= (Inpatient Days of Care / Bed Days Available) x 100

$(12936 / (61 * 365)) * 100 = 58.1\%$

Likert scale questions present a list of data ranked according to mean responses with a mean approaching 4 indicate the rare occurrence of the statement; those with means closer to 1 and 2 indicate frequency and usual occurrence of the statement

Results:

Response rate was 86.5% .The high response rate gives us confidence that the data are representative. The ICU bed /total hospital bed for the hospitals studied was 1.7%

Bed occupancy rate was 58.1%

Analysis(methodology): Tables 4, 5 and 6 regarding Likert scale questions present a list of data ranked according to mean responses with a mean approaching 4 indicate the rare occurrence of the statement; those with means closer to 1 and 2 indicate frequency and usual occurrence of the statement

Tables 7, 8 and 9 concern closed ended questions and expressed as the percentage

responding in the given category and the numerical average of all responses in the yes answer only taken.

Open-ended responses: Table 10 all the respondents except one chose to write comments to the open ended question: write one suggestions to improve the work in your unit.

Many respondents 46% represent most frequent area of comment was about providing regular and advanced training program for the workers in the Intensive care units inside and out side the country.

The second most frequent area of comment 19% was: to increase the monitoring and artificial ventilation equipments and their spare parts.

The third frequent comment was about increase the salary

Other respondent s comment in decreasing frequency was: increase staff no, increases the unit area and application of strict infection control program.

Discussion

All senior doctors in the units researched have degrees in anesthesia only, 2 from the 13 doctors interviewed have a degree in critical care and certified qualification in intensive care unit while 11 doctors have only local training in the intensive care unit those doctors are the directors and the intensivist responsible for these unit, no specialization in intensive care for nurses, Training is provided at a local level. Young and Birkmeyer have provided estimates of the relative reduction in annual ICU mortalities resulting from conversion of all urban ICUs to an intensivist's model of management. (5) Single largest affect arises from having an intensivist-led team (12)

ICU patients have, on average, mortality rates between 12 and 17 %.(13) While the units researched the over all mortality rate was 36.12%. From researchers observation this high mortality rate can be explained

because of the limited no. Of beds so only high risk patients admitted as compared with international figures, but these figures can be elevated because there is no available high dependency unit for caring less critical patients so admission to these units increased and the discharge of healthy patients increased. A recent review estimated that this mortality could be reduced by 15 to 60% using an intensivist model of ICU management.(14) mean patient stayment was 5.36 ± 16.18 , bed occupancy rate in units researched was 58.1%, which was not really representative because the no. of beds not constant throughout the year they many times decrease due to variable causes like monitoring and ventilation equipments malfunction and deficiency of other facilities and this will affect the result of the equation used also the length of stay in intensive care units must be defined in terms of fractions of days rather than whole days, because many patients are admitted for periods of only a few hours Ridley and Rowan advocate measuring length of stay in hourly units, because the duration of admission to intensive care is generally short but highly variable, and throughput is high. (15)

Admission and discharge strategies:

The respondents mean answer about real need for the facility and interference from out side the ICU team in the admission decision was at the mean score of 2.4 and 2.8 respectively that indicating there is no a strict policy in the admission criteria and there is pressure from out side the unit for admitting a patient that is not in real need to this facility and can be managed at the ward. Because of the utilization of expensive resources, ICUs should, in general, be reserved for those patients with reversible medical conditions who have a "reasonable prospect of substantial recovery.(16)

high score to the stayment of the patient which was $5.36 + SD 16.18$ day which is high

as compared to the international figures (17) indicate there is a real urgent need to improve the service to meet the increased demanding for this facility as these units represent a referral centers from the nearby hospitals.

Under ideal conditions patients would be admitted or discharged strictly on their potential to benefit from ICU care. Unfortunately, in many instances the number of potential ICU patients exceeds the available beds. A method of prioritizing or triaging patients is necessary (18). this goes with our observation to the admission policy of the unit and the admission criteria need to be evaluated to make the unit dealing with the most critical patients who are in real need, this seen clearly by Ridley S ,In the past, any spare capacity in an ICU has been used for patients who may have been considered 'borderline'. This 'open door' policy may establish a pattern whereby, in time, all such cases are admitted even though their severity of illness might not strictly justify it. Any lack of high-dependency facilities reinforces this pattern. (15)

Unit design and availability of architectural facilities:

Separated room in the ward for the physician on call: 64% said this facility rarely available. On-call rooms should be available close to the ICU(s). Toilet and shower facilities should be provided. On-call rooms must be linked to the ICU(s) by telephone and/or voice intercommunication system. In addition, cardiac arrest/emergency alarms must be audible in these rooms. (19)

The respondents answered “no” about availability of clean appliances and Dirty appliances room at rate of 72.8% and 85.1% respectively. Clean and dirty utility rooms must be separate rooms that lack interconnection. They must be adequately temperature controlled, and the air supply from the dirty utility room must be exhausted.

Floors should be covered with materials without seams to facilitate cleaning. (19)

Patient nourishment preparation room: 89.5% of the respondents said it is not available from the researchers observation there is great burden to the relatives in the patient nourishment because the hospital not prepare special food constituents to those group of patients. A patient nourishment preparation area should be identified and equipped with food preparation surfaces, an ice-making machine, a sink with hot and cold running water, a countertop stove and/or microwave oven, and a refrigerator. The refrigerator should not be used for the storage of laboratory specimens. (19)

Room for the staff dining : 83.3% answered it is not available

Availability of room for the changing of clothes to the staff: 55.3% this goes with researchers observation, there is separate room in the subspecialty hospital as it is newest hospital in Iraq.

65.8% of the respondents marked the no answer for the availability of W.C for the staff. A staff lounge must be available on or near each ICU or ICU cluster to provide a private, Comfortable and relaxing environment. Secured locker facilities, showers and toilets should be present. The area should include comfortable seating and adequate nourishment storage and preparation facilities, including refrigerator, a countertop stove and/or microwave oven. The lounge must be linked to the ICU by telephone or intercommunication system. (19)

63.2% of the respondents marked the no answer for the availability of conferences room, from the researcher's observations even if this facility available it is not usually used for the clinical meeting. A conference room should be conveniently located for ICU physician and staff use. The conference room may have multiple purposes including continuing education, house staff education,

or multidisciplinary patient care conferences. (19)

Administrative Offices:

64.9% of the respondents mark “no” for the availability of separated room for the nursing and medical management. It is often desirable to have office space available adjacent to the ICU(s) for medical and nursing management and administrative personnel. These offices should be large enough to permit meetings and consultations with ICU team members and/or patients' families. (19)

The respondents mean score of answer was 2.6 indicate poor arrangement of the equipment and adequacy of floor area that interfere with easy access to the patient's head to facilitate emergency airway management if needed. Patient modules should be designed to support all necessary healthcare functions. The floor space allocated for each bed be sufficient to accommodate all equipment and personnel that might be necessary to meet patient care needs, Ward-type ICUs should allow at least 225 square feet of clear floor area per bed. Personal valuables should not be kept in the ICU. Rather, these should be held by Hospital Security until patient discharge. (20)

Respondents answer about the no. of electrical power outlets and availability of emergency power supply at a mean score of 3.1, 3.5 respectively i.e. poor designing and preparation of the unit regarding this aspect. Grounded 110 volt (in Iraq it is 220 volt) electrical outlets with 30 amp circuit breakers should be located within a few feet of each patient's bed (21). Sixteen outlets per bed are desirable., Outlets at the sides and foot of the bed should be placed close to the floor to avoid tripping over electrical cords. (21)

Availability of Two oxygen outlets per bed, Two compressed air outlet per bed and Two vacuum outlets the mean score was 3.5, 3.7 and 3.6 respectively these figures make

the working environment very distressing to the worker and increase risk to patient life in case of failure of the single port At least two oxygen outlets per patient are required. One compressed air outlet per bed is required; two are desirable. At least three vacuum outlets per bed are required. (22)

Air conditioning working properly?: The respondent mean score of answer was 3.1 most of the respondent complains from the air conditioning systems in their hospitals. Suitable and safe air quality must be maintained at all times. A minimum of six total air changes per room per hour are required. (19)

availability of the senior who refer the patient to the unit: 70% says the senior not available and difficult to reach this goes with our observation, not only because of the general condition of the country but also it is the usual trend in these units, the doctor in charge of the ICU takes responsibility for the care of the patient .

the daily visits of the referring senior :52.6% said yes" for this question while 43.9 said no” these findings goes with the observations seen . these findings leads to the question about the categorization of these unit into which type whether open or closed , open refers to units wherein any physician could write medical orders and closed refers to units wherein only the ICU physicians staff could write medical orders (23) Single largest affect arises from having an intensivist-led team (24)

Therapeutic interventions and monitoring availability: (low score mean available and usually used), pulse oxymetry, ECG monitoring, NIBP while central venous catheter, pulmonary artery catheter not usually used and not available.

The respondents answer for the availability of the usual monitoring and therapeutic interventions used in the intensive care units , the more invasive interventions that need expertise and knowledge are not usually available and rarely used while simple, easy to

use equipment available but not to the degree that make every patient well monitored as the idea of the intensive care .An ICU should be able to manage all the common organ system failures and hence provide respiratory support (including mechanical ventilation), circulatory support and renal support and provide the full range of invasive monitoring required for such activity (25)

Routine administrative and nursery daily practice in the ward: there is absence of routine assessment of the nurse daily practices in the ward .

there is weak answers regarding questions about administration of the ward control over all the practice, we chose questions from the usual intensive care practice and the mean of “yes” answer indicate there was low implementation of the widely used practice by the administration and continuing training of the unit medical and nursery staff, there was sometimes availability of preventive measures of cross infection by wearing gloves by the staff, prevention of needle stick infection by insisting on needle safety disposal, while these are very important topics to the administration to insist on . there was very low mean “yes “response to the availability of the continuing education programs by lectures or morbidity and mortality conferences for the improvement of the practice and knowledge , regarding daily morning tour to the patients and medical reporting on the patient condition there was good mean of “yes” response .There is a need for the presence of trained intensive care medical staff round the clock. It is the duty of the consultant intensivist to appoint, train and teach junior medical staff and roster them so that the ICU is staffed by competent personnel, especially outside routine hours. Written protocols should be available for patient management, including but not limited to patient assessment, procedures, management of common emergencies and transport. (26)

There is poor mean % of yes answer regarding calling the referral senior calling in case of urgent need for his consultation, poor response regarding daily visit of the referring senior for follow up of his patient condition as the units are not a closed units and multidisciplinary approach is vital ,there was very poor results regarding responding of the other specialties to the intensive care unit staff consultations and there was very poor result for the availability of the physiotherapy which is important for care of the critically ill patients .Technical staff is needed. It is composed of two head nurses working in shifts. Medical residents on call should be provided. Consultants are in charge of the ICU to manage and organize consultation between other subspecialties in the hospital and do the patient rounds in the morning and evening. There should be one nurse per bed covering 24 hours shift and there should be a team of respiratory therapists and physiotherapist. There are also needs for laboratory assistant, porters, and other manual workers. (27)

Comprehensive critical care units should be directed by intensivist in collaboration with a defined nursing director. (28)

Patient management should be directed by an attending physician who is credentialed by the hospital medical staff to provide care to critically ill patients. Critical care attending physicians should be available to provide bedside care within 30 mins, and in-hospital ICU physician coverage must have sufficient expertise to provide emergency management including, but not limited to, airway emergencies. (29) 3.4 mean score of response for the pharmacist participation in the morning round with managing team indicate rarely this occur. Pharmacists on rounds are associated with a large reduction in adverse drug events. (30)

the nurse /patient ratio in the units researched was 1.3 nurse /bed /day this figure is very low as compared to the international

figures. (17)Nurse staffing levels affect health and cost outcomes. (33

Recommendations:

1-Strong leadership is needed based on knowledge and adequate training, to improve the knowledge by qualification of the physician in the field of the critical care medicine, this field absent in Iraq now. Training of the staff by regular training programs.

2- change the unit from a semi closed unit to closed units managed by highly qualified doctors(intensivist) as this improve the outcome and decrease problems.

3-the intensivist should have a direct role in the unit design.

4- The intensivist should have a clear role in the choice of equipment, drugs and other consumables like catheters, filters etc.

5- The intensivist should interact with the hospital administration to ensure that the ICU is staffed with adequate number of appropriately qualified staff, including junior medical staff, nurses and other paramedical staff.

6- there is urgent need to quantify the need for the intensive care bed based on scientific calculation compared to the total population , the total hospital beds and the referral facilities available.

7- Try to decrease nurse work load as defined by hours/patient/day or nurse /patient ratio by application of standards used by the high quality international centers

8-insist on the presence of the pharmacist as an integral part of the ICU team

9-intensivist and the administration of the ICU must ensure that hand hygiene becomes an indispensable part of their clinical culture.

10-physiotherapist should be available 24hr/day

11- Application of scoring systems to predict mortality of the admitted patients for the future assessment of quality of the health care in these complex units.

12- Gloves should be worn as single use items. They should be put on immediately before an episode of patient contact and removed as soon as the activity is completed.

References

1. Richard J. Brilli, critical care delivery in the intensive care unit: defining clinical roles and the best practice model. Crit Care Med, 2001;29:2010-2019
2. Nelson EC, Greenfield S. Comparing outcomes and charges for patients with acute myocardial infarction in three community hospitals: an approach for assessing "value". Int J Qual Health Care.1995; 7:95-108
- 3 .David Bennett, Organization of intensive care, BMJ. 1999; 318:1489
4. Groeger JS, Guntupalli KK, Strosberg M, Halpern N, Raphaely RC, Cerra F, et al. Descriptive analysis of critical care units in the United States: patient characteristics and intensive care unit utilization. Crit Care Med 1993; 21:279-291.
5. Young M, Birkmeyer J. Potential reduction in mortality rates using an intensivist's model to manage intensive care units. Eff Clin Pract 2000; 3:284-289.
6. Angus DC, MB C. Current and projected workforce requirements for care of the critically ill and patients with pulmonary disease: can we meet the requirements of an aging population? JAMA 2000; 284:2762-7270
7. Zimmerman JE, Shortell SM,. Improving intensive care: observations based on organizational case studies in nine intensive care units: a prospective, multi center study. Crit Care Med 1993; 21:1443-1451.
8. Shojania KG, Showstack J, Wachter RM. Assessing hospital quality: a review for clinicians. Eff Clin Pract 2001; 4:82-90.
- 9.Knaus W, Draper E, Wagner D, Zimmerman J. APACHE II: a severity of disease classification system. Crit Care Med 1985; 13: 818-29.

10. Knaus W. An evaluation of outcome from intensive care in major medical centers. *Ann Intern Med* 1986; 104: 410-18.
- 11-Marilyn T. Haupt, Guidelines on critical care services and personnel: Recommendations based on a system of categorization of three levels of care *Crit Care Med* 2677: 2003 Vol. 31, No. 11
12. Pronovost PJ, Jencks M, Dorman T, et al. (1999). Organizational characteristics of intensive care units related to outcomes of abdominal aortic surgery. *JAMA*. 281(17):1310-1312.
13. Al-Asadi L, Dellinger R, Deutch J, Nathan S. Clinical impact of closed versus open provider care in a medical intensive care unit. *American Journal of Respiratory & Crit Care Med* 1996; 153:A360
14. Pronovost PJ, Young T, Dorman T, Robinson K, Angus D. Association between ICU physician staffing and outcomes: A systematic review. *Crit.Care Med* 1999; 27:A43. Abstract.
- 15-Ridley S, Rowan K. Be wary of occupancy figures. *Health Trends* 1997; 29(4): 100-105.
16. Kollef MH, Shuster DP. Predicting ICU Outcomes with Scoring Systems: Underlying Concepts and Principles. *Crit Car Clin* 1994; 101-18
17. Miranda DR, Williams A Loirat Ph. Management of Intensive Care: Guidelines for the better use of resources. 1990 Kluwer Academic Publishers.
18. Wagner DP, Knaus WA, Harrell FE, et al. Daily Prognostic Estimates for Critically Ill Adults in Intensive Care Units: Results from a Prospective, Multi center, Inception Cohort Analysis. *Crit Care Med* 1994; 22(9):1359-1372
19. Guidelines for Intensive Care Unit Design, *Crit Care Med* 1995 Mar; 23(3):582-588
20. Hoyt JW. Complications of design and construction of the intensive care unit. In: Lumb PD, Bryan-Brown CW (eds). *Complications in Critical Care Medicine*. Chicago: Year Book Medical Publishers, 1988, pp. 312-25
21. Task Force on Guidelines, Society of Critical Care Medicine. Recommendations for critical care unit design.. *Crit Care Med* 1988; 16:796-80622. Piergeorge AR, Ceserano FL, Casanova DM. designing the critical care unit: A multidisciplinary approach. *Crit Care Med* 1983; 11:541-45.
22. Standards for Healthcare Facilities. National Fire Prevention Association, Quincy, MA, 1990, section 4-8.1.1.1.
23. Groeger Js, Strosberg MA, Halpern NA, et al: Descriptive analysis of critical care units in the united states. *Crit care Med* 1992; 20:846-863
24. Pronovost PJ, Jencks M, Dorman T, et al. (1999). Organizational characteristics of intensive care units related to outcomes of abdominal aortic surgery. *JAMA*. 281(17):1310-1312.
25. Intensive care society. Standards for intensive care units . London: intensive care society, 1997.
- 26-J. V. Divatia, A. K. Baronia, A. Bhagwati . Critical care delivery in intensive care units in India: Defining the functions, roles and responsibilities of a consultant intensivist *Indian J Crit Care Med* 2006 10 Issue 1 :60
27. Hilberman M. The evaluation of intensive care units . *Crit. Care. Med*. 1975; 3,159-165
28. Critical care services and personnel: Recommendations based on a system of categorization into two levels of care. *Crit Care Med* 1999; 27:422–426
29. Guidelines and levels of care for pediatric intensive care units. *Crit Care Med* 1993; 21:1077–1086
- 30- Leape LL, Cullen DJ, Demspey CM, et al. (1999)/ Pharmacist participation on physician rounds and adverse drug events in the intensive care unit. *JAMA*. 282:267-270.
- 31- Aiken LH, Clarke SP, Sloane DM et al. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA*. 288(16):1987-1998

Table (1) distribution of the respondents.

Hospital name	% of total respondents
AlKadhumiya teaching hospital	20
Subspecialty hospital	22.8
AlYarmuk teaching hospital	12.7
Babil maternity hospital	13.6
AlSader teaching hospital	13.63
Almawany hospital	10
AlBasra general hospital	7.27
Total	100.0

Table (2) Professional degree of the respondents.

Professional degree	Percent
Senior CCM	1.81
Senior anesthesia	12.74
resident doctor	10
Nurse	75.45
Total	100%

Table (3) the ICU Data.

Hospital name	No. of ICU beds	No. of hospital beds	No. of patients admitted to the units studied
AlYrmuk	6	650	60
Kadhumiya teaching hospital	10	655	149
Babil maternity	6	313	295
Subspecialty	17	650	358
Albasra general	8	600	332
Alsadar Teaching	8	600	1128
Almawany	4	350	203
Total	61	3468	2552

Table (4) Admission and discharge questions.

Statement	Likert score scale
1-real need to the ICU facility	2.4
2-Interference in admission from outside the ward	2.8
3-Patients stay more than their condition need	3.1

Table (5) unit design.

Statement	score
1-Easy to reach to patient head in case of emergency	2.6
2-area for each bed is adequate	2.7
3-no. of electrical ports is sufficient	3.1
4-availability of emergency light source and power supply	3.5
5-Two oxygen outlets per bed	3.5
6-Two compressed air outlet /bed	3.7
7-Two vacuum outlets	3.6
8-Air conditioning working properly	3.1
9-availability of fire safety	3.4
10-protocol for infection and contamination prevention	1.7
11-improvement programs usually held	2.9
12-I wearing gloves when dealing with the patients	1.4

Table (6) interventional therapeutic and diagnostic facilities availability.

The following is available:	score
1-Invasive BP monitoring	3.6
2-Pulmonary artery catheter	3.9
3-Pulse oxymetry, ECG, NIBP	2.0
4-Blood gas analyzer available 24hr/day	3.3
5-CV catheter	2.7
6-Parenteral nutrition	3.2
7-use disposable medical appliances more than single	2.5
8-Pharmacist participate in morning tour	3.4
9-Emergency cart ready to use at any time	2.2
10-Monitoring and ventilation equipment available in adequate amount	2.5
11-Haemodialysis available 24hr a day	3.6

Table (7) Unit design and availability of architectural facilities.

Architectural availability	% yes
1-conference room	33.3
2-Room for doctor on call	36.0
3-Room for nurse director	31.6
4-Room for dining	13.2
5-change clothes	41.2
6-pharmacy room	21.9
7-wound dressing and hypnotic drugs room	34.2
8-Patient nourishment preparation room	7.0
9-Clean appliances	23.7
10-Dirty appliances	11.4
11-W.C for the staff	17.5
12-patient and relatives personal belongings	64.9

Table 8 ICU environmental factors.

Statement	% yes
1-nurse director have a role in the administration of the ward	58.8
2-availability of routine assessment for NC	7.0
3-administration insist on the worker to wear gloves	57.0
4-I change gloves with each patient	40.4
5-administration insist on safety needle disposal	60.5
6-routine maintenance of medical equipments	20.2
6-lectures for resident doctors	28.9
7-lectures for the nurses	12.3
8-doctor nurse, nurse other worker fixed work protocols	26.3
9-routine quality of care assessment	25.4
10-morbidity conference	25.4
11-mortality conference	23.7
12-daily tour on patients	77.2
13- I don't feel tired because my ward well organized	30.7
14-usually help available when I feel tired	35.1
15-fixed medical reporting system	73.7

Table (9) medical care availability .

statements	% yes
1-we can call the senior who refers the patients at any time	27.2
2-daily the referring senior visit his pt in the ward	52.6
3-availability of senior ICU on call 24hr a day	21.9
4-senior ICU can be called and available within 30 min	44.7
5- other branches respond to consultations we send rapidly	33.3
6-physiotherapist available frequently	23.7

Table (10) open ended questions.

comment	% of yes
1-training program	46
2-increase monitoring and artificial ventilation equipments	19
3- Salary improvement	18.9
4- Increase the staff number	7.2
5- unit area	6.3
6- Institution of programs to infection control	2.6
Total	100