Analysis of Relationship Between ICU Admission Criteria and End Results of Caring of Obstetrics/Gynecologic ICU Patients

Shahram Borjian Boroojeny,1* Ghazaleh Parnian,2 and Elham Shaeikhveisi2

1Pregnancy Health Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
2Zahedan University of Medical Sciences, Zahedan, Iran

*Corresponding author: Shahram Borjian Boroojeny, Pregnancy Health Research Center, Zahedan University of Medical Sciences, Zahedan, Iran. Tel: +98-9151411084, E-mail: shahrambor@yahoo.com

Received 2016 May II; Revised 2016 December 07; Accepted 2017 April 15.

Abstract

Background: Taking good care of patients admitted to ICU is an important issue especially concerning pregnant women and of course estimating severity of the illness is necessary. The goal of the study is to analysis the association of admission criteria of obstetrics/gynecologic (OB/GYN) cases with end results of the caring in Imam Ali hospital ICU of Zahedan city on 2015.

Methods: In this analytical study 86 cases of OB/GYN were admitted to Imam Ali Hospital ICU on 2015. Sampling was based on head counting. The recorded information included acute physiology and chronic health evaluation (APACHE II) criteria, mortality rate, and duration of hospitalization and ventilation requirement. The data was analyzed via SPSS ver.18 software and through t-test, Chi-square.

Results: Age average of the patients was 27.3±5.3 years. Average APACHE.II score was: 11.3±4.7. Death rate of 75 (87.2%) cases was less than 10% and in one case it was more than 35% and in another case it was more than 75%. Death rate was 2.3% (2 patients died). Mean APACHE.II score associated with the dead was 32±4.2 and in case of the alive it was 10.8±3.5. Duration of hospitalization was 4.7±3.6 days which had a meaningful relationship with APACHE.II score of patients in need of ventilation was 14.7±6.1 and in other cases it was 9.9±3.1 (P = 0.0001, r = 0.693). In 25 cases, the average number of days which they used ventilator was 4.9±5.3, which of course it had significant relationship with APACHE.II score (P = 0.00, r = 0.88).

Conclusions: The study indicates that APACHE.II scoring system is capable of estimating death rate and end results associated with the care of OB/GYN patients hospitalized in ICU.

Keywords: ICU, Maternal Mortality, Apachi2

1. Background

Mother’s death during pregnancy or up to 42 days after the labor is defined as maternal mortality excluding the death caused by accidents [1]. Maternal mortality indicates the situation of women in a society, access to the required cares, quality and efficacy of the cares, capacity of caring system in response to a mother’s needs and finally level of socioeconomic status of the society [2]. Most of maternal deaths which occur almost instantly after the delivery are associated with heavy bleeding [3]. The causes of maternal death are not similar in different studies but in Iran the most common causes are the following: bleeding, hypertension, infection, hard labor [4, 5].

Many of mothers having complications of the delivery are transferred to ICU. Some of these mothers unfortunately die. Dissimilar manners are used to diagnose their severity of the complication and estimate the patient’s death probability [6]. One of these approaches is called APACHE II scoring system which is very practical and highly recommended worldwide [7, 8].

Acute physiology and chronic health evaluation is another severity of disease classification. It is applied within 24 hours of admission of a patient to an intensive care unit. Higher scores correspond to more severe disease and higher risk of death [9].

In the beginning, APACHE scoring system was so complex and confusing, until Knaus et al. made some modifications and then APACHE II was born that included 12 parameters, despite introducing many newer systems APACHE II stands between the most practical systems ever designed [8-10].

APACHE II has three components:

1. Acute physiologic signs including: rectal core temperature, respiratory rate, pulse rate, serum creatinine level, serum potassium level, mean arterial pressure, oxygenation level concerning receiving oxygen level and alveolar-arterial oxygen gradient, hematocrit level, white blood cell count, serum bicarbonate level, GCS level, and arterial blood pH.

2. Patient’s age

3. A positive history of previous chronic illness including elective or emergent surgical procedure [11-13].
It has to be mentioned that the most severe sign and highest lab results are recorded during first 24 hours and considered in the scoring system. According to APACHEII scoring system, the scores of 0-15, 16-19, 20-30, and higher than 30, are associated with related death probability, respectively: 10%, 15%, 35% and over 75% [11, 14, 15].

According to the importance of the subject, this study was designed and accomplished to analyze the association of relationship between ICU admission criteria and end results of caring of obstetrics/gynecologic patients hospitalized in Imam Ali hospital in Zahedan city on 2015.

2. Methods

Ethical approval was provided by ethical committee of Imam Ali hospital, Zahedan city, Iran. In this study, 86 OB/GYN patients hospitalized in ICU of Imam Ali hospital of Zahedan University of medical sciences were studied through studying their files. APACHE II score was quantified after considering the associated parameters during first 24 hours of the hospitalization.

Data was gathered through a questionnaire which was designed based on APACHE II scoring system. Patient’s final fate, duration of hospitalization, necessity of ventilation, the time spent on ventilator and their relationship with APACHE II scoring system were studied. At the end, the data was used by SPSS ver.20 software and the different aspects of the data were compared to each other via t-test and Chi-square.

3. Results

Average age of cases was 27.3±5.3 years. Average APACHE.II score was 11.3±4.7. Risk of death in 75 cases was 10%, in case of nine patients it was 15%, for one patient that was 35% and one patient had more than 75% risk of death, morality rate was 2.3% (Table 1).

Mean APACHE.II score for the deceased was 32±4.2 and in case of the living ones it was 10.8±3.5. Because of low mortality rate, Mann-Whitney U test was applied. Results revealed a meaningful relationship between APACHE.II criteria and mortality rate (P = 0.001) (Table 2).

The relationship between APACHE II scoring system and the duration of hospitalization were studied, then the Pearson score was 0.693 which indicated a meaningful relationship (P = 0.00).

Then the relationship between APACHE II scoring system and time spent on the ventilator was studied, the results were the following: Pearson score was 0.888, P value = 0.00, according to the findings mentioned above there is a statistically meaningful relationship between APACHE II scoring system and the time spent on ventilation.

![Figure 1. The Relationship Between Apache II Scores and the Duration of Hospitalization](image1)

![Figure 2. Relationship Between Apache II Scores and the Time Spent On Ventilator](image2)
Table 1. Risk of Death Based on APACHE II Scoring System

| Variables          | Values | Total |
|--------------------|--------|-------|
| Risk of death, %   | 10     | 15    | 35    | > 75  | -     |
| Abundance          | 75     | 9     | 1     | 1     | 86    |
| Percent of abundance, % | 87.2   | 10.5  | 1.2   | 1.2   | 100   |

*Deceased.

Table 2. Comparing Average APACHE II Scores Based on the Mortality and Necessity of Ventilation

| Variable                  | Abundance | APACHE II Score | P Value |
|---------------------------|-----------|-----------------|---------|
| Mortality of patients     |           |                 |         |
| Deceased                  | 2         | 32±4.2          | 0.001   |
| Alive                     | 85        | 10.8±3.5        |         |
| Ventilator requirement    |           |                 |         |
| Required                  | 25        | 14.7±6.1        | 0.001   |
| Not required              | 61        | 9.9±3.1         |         |

4. Discussion

The study revealed that the mean APACHE II score was 11.3 and the risk of death was associated with more than 87% of patients was less than 10%, only two patients had a high risk of death, which eventually died.

APACHE II score associated with the deceased, requirement of ventilator, longer hospitalization duration, and longer time spent on ventilator was higher meaningfully.

Pollock et al. studied 33 women hospitalized in ICU in Australia on 2011, the mean APACHE II score was 12.6 which had a meaningful statistical association with risk of death and severity of disease comparing to women hospitalized in the OB/GYN ward [16].

Wang et al. studied 101 women hospitalized in ICU in China on 2013, according to APACHE II scores, 12.9% of women were severely ill but only 2.3% of the cases studied in our research were severely ill with high risk of death. Average of duration of hospitalization in Wang et al. study was 7.5+/3.6 days comparing to the 4.7+/3.6 days of our study is considerably more. Comparing these two studies indicates that the higher APACHE II score the higher the duration of hospitalization [6].

Lin et al. studied 207 ICU patients on 2011. There was a high incidence of severely ill women with high APACHE II scores. Shortening of the time elapsed from initiation of acute and critical condition to start point of the hospitalization led to increment of the remission probability and decline of the hospitalization duration [17].

Zhang et al. compared the end results of APACHE II system and other disease-severity classifications the study revealed that APACHE II is a very practical approach and classification which helps a lot [18]. Amini et al. compared the ability of APACHE II modified APACHE II and TRISS to evaluate and assess the death risk of ICU patients with head trauma on 2010. The results demonstrated that all three of them are able to estimate the death risk equally [19].

Musavi et al. studied trauma cases hospitalized in ICU, according to their results 6 of 75 patients with APACHE II score under 15 died comparing to 12 deaths associated with 20 cases with APACHE II scores between 20 and 30, their study concludes that applying APACHE II scoring system to trauma cases hospitalized in ICU is reasonable and of course patients with high score has to be taken more seriously [20].

Acknowledgments

This study was financially supported by the deputy research center at Zahedan University of Medical Sciences (project No: 1579).

Footnotes

Authors’ Contribution: All the authors work equally.
Conflict of Interests: The authors declare that they have no conflict of interest.
Funding/Support: Zahedan University of Medical Sciences.

References

1. Farrokh Eslamloo H, Nambakhsh F, Heshmati F, Amirabi A. An epidemiological research of maternal mortality in East Azerbaijan 2001-2005 [In Persian]. Urmia Med J. 2006;17(1):23-31.
2. Abdollahipur P, Bahaei M, Ghasemi Y. Causes of maternal mortality in pregnant women in urban and rural areas of Ilam 2011 [In Persian]. J Health Syst Res. 2012;7(5):1278-87.
3. Azemikhah A, Amirikhani MA, Jallilvand P, Emami Afshar N, Radpooyan L, Changizi N. National maternal mortality surveillance system in Iran. Iran J Public Health. 2009;38(Suppl 1):90-2.
4. GelianTehrani S, Halakoei K, Zareei M. Factors affected on maternal mortality in kordestan province from 1998 to 2002 years [In Persian]. Hayat J. 2004;21:48–53.
5. Zolala F, Heidari F, Afsihar N, Haghdoot AA. Exploring maternal mortality in relation to socioeconomic factors in Iran. Singapore Med J. 2012;53(10):684–9. [PubMed: 23112022].
6. Wang YQ, Ge QG, Wang J, Niu JH, Huang C, Zhao YY. The WHO near miss criteria are appropriate for admission of critically ill pregnant women to intensive care units in China. Chin Med J [Engl]. 2013;126(5):895–8. [PubMed: 23489798].
7. Marino PI, editor. The ICU Book. 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2006. pp. 875–9.
8. Longo DL, Kasper DL, Jameson JL, editors. Harrison’s principles of internal medicine. 18th ed. New York: MC Graw Hill Medical; 2012. p. 2196.
9. Knaus WA, Draper EA, Wagner DP, Zimmerman JE. APACHE II: a severity of disease classification system. Crit Care Med. 1985;13(10):888-29. doi: 10.1097/00003246-198510000-00009. [PubMed: 3928249].
10. Gunning K, Rowan K. ABC of intensive care: outcome data and scoring systems. BMJ. 1999;319(7204):241-4. doi: 10.1136/bmj.319.7204.241. [PubMed: 1047092].
11. Barie PS, Hydo LJ, Fischer E. Comparison of APACHE II and III scoring systems for mortality prediction in critical surgical illness. Arch Surg. 1995;130(1):77-82. doi: 10.1001/archsurg.1995.0143000007906. [PubMed: 7802591].
12. Muckart DJ, Bhagwanjee S, Neijenhuis PA. Prediction of the risk of death by APACHE II scoring in critically ill trauma patients without head injury. Br J Surg. 1996;83(8):1123-7. [PubMed: 8869123].
13. Wong DT, Crofts SL, Gomez M, McGuire GP, Byrick RJ. Evaluation of predictive ability of APACHE II system and hospital outcome in Canadian intensive care unit patients. Crit Care Med. 1995;23(7):1477-83. doi: 10.1097/00003246-199507000-00005. [PubMed: 7600824].
14. Relman AS. Intensive-care units: who needs them? N Engl J Med. 1980;302(17):965-6. doi: 10.1056/NEJM198004243021716. [PubMed: 7160206].
15. Martin JT. Prognostic indices and severity scores therapeutic intervention scoring system. 2th ed. Melbourne: Churchill Livingstone; 1989, pp. 547–51.
16. Pollock WE, Harley NS, Nelson SM. Maternal severity of illness across levels of care: a prospective, cross-sectional study. Aust Crit Care. 2011;24(4):218-28. doi: 10.1016/j.auc.2011.03.002. [PubMed: 21543236].
17. Lin Y, Zhu X, Liu F, Zhao YY, Du J, Yao GQ, et al. Analysis of risk factors of prolonged intensive care unit stay of critically ill obstetric patients: a 5-year retrospective review in 3 hospitals in Beijing. Zhongguo Wei Zhong Bing Ji Jiu Yi Xue. 2011;23(8):449–53. [PubMed: 21878165].
18. Zhang Q, Wang X, Zhang H, Zhou X, He H, Liu D, et al. Score in APACHE derived from critical clinic information system is more accurate than artificial method. Zhonghua Yi Xue Za Zhi. 2015;95(39):3737-5. [PubMed: 26814412].
19. Amini S, Safari Malekabadi M, Roudbari M. Comparison of APACHE II, Adjusted APACHE II and TRISS scores in predicting mortality rate in head trauma patients admitted to ICU at Khatam-al-Anbia hospital of Zahedan [In Persian]. J Med Res Zahedan Univ Med Sci. 2009;11(3):25-31.
20. Musavi SM, Arjomand A, Kabudi SS. estimation of death risk of patients hospitalized in ICU of Shahid Beheshti hospital of Qom city using APACHE-II scoring system. J Sci Res Ilam Univ Med Sci. 2014;22(2).