

Post-transplantation versus non-transplantation intensive care unit admission: Paraclinical and demographic indexes

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ABSTRACT

Background: Intensive care unit (ICU) is one of the most expensive units in hospitals all over the world. Transplanted patients are groups of people in the ICU who need precise care due to their conditions.

Aim: Investigation of demographic and para-clinic indexes between transplanted (kidney or liver) and non-transplanted patients.

Methods: From February 2012 to April 2013, totally 610 patients were admitted in two major teaching intensive care units, Shiraz, Iran (24 post-transplanted and 586 non-transplanted patients). Using data gathering form, we collected the demographic (sex and gender) and paraclinical indexes (WBC, BUN, pH, PCO₂, Na, Ka, albumin, HCO₃, HCT, Bilirubin, pLT and creatinine). Data were analyzed by SPSS 11.5, using independent t-test and descriptive analysis.

Results: Men were predominant in both groups (75% for transplanted vs. 53% for non-transplanted, P value =0.000). The mean age of transplanted groups was almost 47 and non-transplanted was 45. The length of ICU stay in non-transplanted patients (10.3±13) was longer than the transplanted ones (8.9±12, P value=0.305). From para-clinical indexes, the amount of BUN and creatinine were significant between these two groups (P values respectively: 0.000, 0.026). The amount of BUN and creatinine were more in the transplanted cases (respectively: 70.9±50, 3.54±2.30).

Conclusion: Overall, the status of the transplanted patients was worse than the non-transplanted ones and either their length of stay in hospital. Also, these groups of patients needed CPR less than the other group.

Keywords: Para-clinical indexes, ICU, transplantation.

INTRODUCTION

Intensive care units (ICU) are one of the most expensive units in hospitals all over the world. Using certain indicators and criteria, many centers try to appropriately admit the patients in ICU wards. If patients who were admitted in intensive care units were chosen correctly and at the right time, the loss of function of the organs would be decreased, the outcome would be better and the final results would be cost beneficial^{1,2}.

The data gathered in the triage are used for making decision about admitting the patients in ICU³. The risk of infections and subsequently mortality and morbidity will increase with increase in the patients' age^{4,5}.

An investigation, from 1998 to 2003 on 2200 bed of ICU demonstrated that as the length of the admission increases, the post-discharge death will be increased too, but the incidence of death at the time the patients are in the hospital was not relevant to the time of admission⁶.

Liver transplantation is the solution for many acute and chronic liver diseases⁷. Liver transplantation has been started since 1981⁸, and nowadays every year 6000 operations are done and 17000 patients are in the waiting list^{6,7}. Health-related quality of life (HRQOL) score in patients who have not undergone the transplantation is very low but the score will improve within 18 months following transplantation⁹. There is strong evidence that diabetes increases the risk of mortality in postoperative period and coronary artery disease can considerably increase the rate of both mortality and morbidity^{10,11,12}.

Kidney transplantation is transplant of a kidney into patient with end-stage renal disease¹³. Approximately,

3000 patients every year are added to the transplantation list. In 2013, 17,600 patients underwent kidney transplantation in the United States of America^{14,15}. DWGF (death with graft function) occur due to several causes, which the most common one is cardiovascular problems^{10,16,17,18}. Evidence showed that hyperlipidemia, hypertension and Post-transplantation anemia (PTA), CVA, infections, and malignancies can increase the risk of mortality in patients undergoing kidney transplantation^{19,20,21}. One of the recent researches strongly evidenced that 90.4 of patients had at least one medical comorbidity, including diabetes, heart failure, non-ischemic heart diseases, visual disturbances, and joint disorders^{22,23}.

Due to limitations of financial resources in the health system, we need to accurately manage our budget. A big part of this budget is shifting to taking care of patients in the ICU. As there is not enough research about mortality and comorbidity of patients with transplantation in Iran, we aimed to investigate the mortality and comorbidity of these patients for policymakers to make better decisions, manage the whole financial resources and better follow up.

MATERIAL AND METHODS

From February of 2012 to April of 2013, with regular attendance at the bed of patients in Namazi and Shahid Faghihi hospitals on admission, the vital signs of each patient were recorded. The data gathering form contained demographic and para clinical indexes. Our Demographic variables were such as age (Year) and gender (Male or female). Para clinical indexes were contain pH, P CO₂ (mmHg), P O₂ (mmHg), HCO₃ (mEq/L), WBC (10³/mm³), HCT (percentage), BUN (mg/dl), Cr (mg/dL), Na

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(meq/l),K(meq/l), bilirubin(μ mol/L) and albumin(g/dl) The blood test and ABG (Arterial Blood Gas) test of every patient were recorded and kept on the first day of admission in ICU. With the continuous follow up, the status of patients was recorded while the new cases were continually added. In the case that patients were transferred to another ward or discharged or the patients died, these situations were added to the directory of information. if patients were discharged from the hospital, after 1 month, they were called with the number they had written on their sheets. If they didn't answer the phone, they were called 3 times with the interval of 1 day to know about their situation after discharge. The information was entered into the SPSS version 11 file, then classified, completed, and analyzed. The data were presented as frequency, mean and descriptive results. At the end, data were analyzed using T-Test, analysis of Variance and Chi-square.(the level of significance is lower than 0.05)

This study was approved by the ethic committee of Shiraz University of medical Sciences with approval number of IR.SUMS.REC.1390.2681.2681. The ethic committee of Shiraz University of medical Sciences waived informed consent, as the patients were already consented for research purposes at the time of their admission in hospital. Our patients' records/information was concealed prior to analysis.

RESULTS

From February of 2012 to April of 2013, totally 610 patients were admitted in the ICU of Namazi and shahid faghihi teaching hospitals. During the period of the study, 24 patients who had undergone organ transplantation were admitted in medical ICU. Most of post-transplanted patients were admitted in medical ICU of Namazi Hospital as the main and only center of transplantation in southern Iran.

In the post-transplanted patients, 6(25%) were female and 18(75%) were male, but in the other group (non-transplanted patients) 275(47%) were female and 311 were male (53%). (P value = .000) Although in the non-transplanted group 36 patients (6.1%) had undergone cardiopulmonary resuscitation (CPR) before entering ICU; Table 1 shows none of the transplanted patients experienced CPR (100%). (P value = .008)

Evidence of difference in the age of these groups is shown in Table 1. The mean age in Transplanted was 47.29 which was near the non-transplanted (45.76). (P value = 0 .001)

There is no significant relationship between the length of hospital and ICU stay of patients who did and did not do the transplantation operation. (Respectively, there p values were 0.330 and 0.305). More information is stated in Table 1.

Our study showed that the mean of pH and Std. deviation in group two was 7.36 and 0.15. Also, in group 1 approximately like group two there were equal to 7.35 and 0.15 (P value = .754). There was no relationship that can show that difference in our two groups for WBC, HCT and Pco2 was significant. The exact information about the above subjects is illustrated in Table 2. (P value of 0.360, 0.183 and 0.647, respectively)

It is shown in Table 2 that there was a meaningful difference between these groups in patients' BUN. It was indicated in table 2 that in group two it was 30.1 and in group one it was 70.9. (P value = 0.000).

The findings illustrated that Na, K and albumin's amounts in these groups were not significant (P value = 0.433, 0.545 and 0.262). Regarding our data, it was a noticeable fact that after 30 days following the patients, 127 patients (21.7%) were not responsible for the study in group two and 1 patient in group one (4.2%).

Table 1: The mean of age, length of hospital and ICU stay, and history of previous cardio-pulmonary resuscitation in transplanted versus non-transplanted patients in ICUs, Shiraz, Iran, 2012-13

Variables	Transplanted (Group one)	Non-transplanted (Group two)	P value
	(n=24)	(n=586)	
Age* (year)	47.3 \pm 13	45.76 \pm 21	0.001
Length of hospital stay* (day)	20.8 \pm 15	18.2 \pm 19	0.330
Length of ICU stay*(day)	8.9 \pm 12	10.3 \pm 13	0.305
Gender (men)	18 (75%)	311 (53%)	<0.001
History of CPR**	0 (0%)	36(6.1%)	0.008

*Mean \pm SD, **CPR: Cardio-pulmonary resuscitation

Table 2: Comparison of the mean of hematologic and chemistry tests in transplanted versus non-transplanted patients in the ICUs, Shiraz, Iran, 2012-13

Variables	Transplanted (Group one)	Non-transplanted (Group two)	P value
	(n=24)	(n=586)	
pH	7.35 \pm 0.15	7.36 \pm 0.15	0.754
PCO2 (mmHg)	71.5 \pm 40	40.6 \pm 18	0.647
WBC \times 10 ³ /mm ³	9.5 \pm 5	13.6 \pm 10	0.360
HCT (%)	33.8 \pm 7	36.8 \pm 9	0.183
BUN (mg/dl)	70.9 \pm 50	30.1 \pm 26	0.000
Na (meq/l)	137 \pm 6	140 \pm 6	0.443
K (meq/l)	4.5 \pm 0.7	4.3 \pm 0.8	0.545
Albumin (g/dl)	2.8 \pm 0.6	3.4 \pm 0.6	0.262
HCO3 ⁻ (mEq/L)	20.2 \pm 8	23.5 \pm 9	0.793
Creatinine (mg/dL)	3.54 \pm 2.30	1.83 \pm 1.87	0.026
Bilirubin (μ mol/L)	2.35 \pm 3.67	2.65 \pm 5.60	0.727
pLT \times 10 ⁴ /mm ³	11.90 \pm 8.1	20.06 \pm 12	0.115

DISCUSSION

In the current study, we recorded the information of 610 cases who were admitted in ICUs for 14 months. Overall, most of our patients in both groups were male. Even though we had some patients with CPR report in non-transplanted patients, there was no report for CPR in transplanted patients. PH in both groups was approximately the same. There was also the same situation for WBC and HCT. BUN in transplanted patients was higher.

The mean age in our study for transplanted patients was 47. This fact indicates that to make a decision about the recipients' age is a very important factor. People who are young-old or older have less chance of survival after transplantation. Also as they get older they will effect by the complication of Aging . young and mid-age people are better choice because they can live longer than old cases but some studies showed 51year for kidney transplanted patients(24) also one of the studies in USA for over 60years old livertransplanted patients concluded that most of patients were between 60-69 (92%)²⁵.

In the studies done by Klouche et al , Aloia et al and Aldawood most of the patients were male .Our result was like their studies^{24,25,26}.

The mean of creatinine in transplanted patients was higher than other studies . Other studies indicated a bit different in amount of this para clinical index. 1.6mg/dl²⁵ for liver transplanted and 3.42mg/dl in renal transplanted⁴. cases²⁴ overall, the amount of creatinine is a good indicator for how worse is the condition of the patients. In comparison this amount were higher in transplanted group. It means that the throughout condition of these cases were worse than non- transplanted.

Albumin's mean amount in our study was almost like other studies. An investigation on liver transplanted patients resulted 2.5 mg/dl which is near to our study²⁵. Our result was approximately the same as paper which is published by KadaKlouche *et al*²⁴ also we had the same result in amount of bilirubin with this study. albumin was lower than normal and bilirubin was higher than the normal range in our study. We can conclude that the function of the liver were lower than the normal.It may because of drugs or the transplantation it-self.

In one of the studies done in Shiraz transplant center, the results showed that most of the operation were Liver, kidney and pancreas. The rate of the transplantation and survival increased dramatically from 2002 to 2011²⁷.

Comparison between transplanted versus non-transplanted demonstrated that the mortality rate among transplanted group was higher . This is because of the overall status of transplanted patients. the results were match other studies in the way that the transplanted patients had higher mortality rate . It has stated in literature that the main cause of mortality in this group of patients were infections. Next causes were cancers, cirrhosis and pulmonary emboli. It can be say that all of these circumstances are result from immunosuppressive drugs^{28,29,30}. Frailty is another factor that affect mortality rate, it increases the risk of death in transplantation (31)

CONCLUSION

We can conclude that overall status of the non-transplanted patients were worse than transplanted one and our results were approximately the same as the result of other transplanted patients in other countries. These comparisons like our study is were important to know more about the performance of you ICUs in the compare with other ICUs in the world class.

Study limitations We had to limit our study to just two hospitals. This limitation was because we had just two hospitals which have transplant ward. Additionally, transplantations in private hospitals are a very rare operation, so we gathered our data just from governmental hospitals. As we had a low number of kidney and liver transplanted patients, we had to investigate these groups together. Further cohort studies with more samples are required complete our knowledge about these patients.

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