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Death on the General Wards after Discharge from ICU

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Background: Intensive care units (ICUs) provide a service for patients with potentially recoverable disease who might potentially benefit from closer observation and treatment. However, a number of patients who are successfully discharged from ICU subsequently die during their hospital admission. The aim of this study was to identify the incidence and characteristics of these deaths in general wards after discharge from ICUs.

Methods: Patients who were admitted to our ICU were classified in the following manner; Group 1, patients who survived to hospital discharge; Group 2, patients who died in the ICU; Group 3, patients who died in general wards after discharge from the ICU. Data was collected and patients age, sex, main diagnosis, Acute Physiology and Chronic Health Evaluation (APACHE) II scores on the admission, and number of days in the ICU were compared.

Results: 1498 consecutive patients were admitted to the general ICU, and 1339 patients were discharged alive from hospital, 114 patients died in the ICU and 45 patients died during their post ICU hospital stay. 28% of the deaths after intensive care occurred in general wards before discharge from hospital. Among those patients who died in general wards, 7 (15.5%) were expected to survive. 29 (64%) had been withdrawn from sustained therapy before discharge from the ICU.

Conclusions: Although some deaths following ICU discharge were inevitable, others were unexpected, and may have been preventable. **(Korean J Anesthesiol 2005; 48: S 30～3)**

Key Words: discharge, intensive care unit, mortality.

INTRODUCTION

A number of patients who were successfully discharged from intensive care unit (ICU) will subsequently die during their hospital admission. If the patients died on ward after discharge from ICU, this means there is either a substantial waste of resources in the ICU or a missed opportunity to prevent a death.

It has been shown that hospital mortality of ICU patients averaged 27%. However, since an actual 17.9% of patients died in ICU, the remaining 9.8% died in the general wards after their discharge from ICU. Death in general hospital wards after ICU discharge contributes significantly to overall hospital mortality.[1)] Though some deaths were expected and probably inevitable, most occurred in patients who remained at risk on discharge or those who were expected to survive. Some of these deaths may be preventable by improvement of care in ICU or general ward.[2)] In Korea, there is little information available concerning the patients who died after discharge from the ICU and before discharge from the hospital. Our aim for this study was to identify the incidence and characteristics of the deaths occurring in the general wards after discharge from ICU.

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MATERIALS AND METHODS

The study was conducted in a twenty five bed general ICU that took most types of patients, except for the neurosurgical cases. This study included patients admitted to the ICU from July 2000 to June 2001. Patients who were admitted to the ICU were classified in following manner; Group 1, patients who survived to after the time of hospital discharge; Group 2, patients who died in the ICU; Group 3, patients who died in

the general wards after their discharge from the ICU. The following data were collected; age, sex, main diagnosis, and the admission Acute Physiology and Chronic Health Evaluation (APACHE) II score, and all these variables were evaluated. The duration of stay in the ICU and on the wards was calculated from the number of nights of overnight stays.

Each ward death was assessed with regard to the likely hospital outcome that would have been expected at the time of discharge from the ICU. Two clinicians classified the patients from the information on age, admission diagnosis, the text of the discharge summary, cause of death and presence of a "do not resuscitation" (DNR) note.

All patients who were discharged from the ICU were followed up until discharge or death. This assessment was retrospectively performed with knowledge of the adverse outcome, but it was based on prospectively gathered data and a summary written at the time of discharge.

The categories used were as follows.

Expected to die or Death appeared at discharge. For example, this was a patient with severe hypoxic brain damage following cardiac arrest who was sent to the ward with a chest infection.

Considered at risk of death. The patients that remain at risk and require close observation. For example, this was an elderly surgical patient who has recovered from respiratory failure, but who has renal impairment with a poor chronic health status.

Expected to survive. Death seems unlikely and it was surprising outcome. For example, this was a patient discharged from ICU after an uncomplicated stay following major elective surgery.

All the values were expressed as frequency or mean ± SD, and the data were analyzed using SPSS® 10.0 (Statistics Package for Social Sciences, Chicago, IL, USA) statistical software. Differences between groups were determined using one way ANOVA. A P value of < 0.05 was considered to be statistically significant.

RESULTS

During the 12-month study period, 1498 patients were admitted to ICU. 1339 patients (Group 1) were discharged alive from the hospital, 114 patients (Group 2) died in ICU, and 45 patients (Group 3) died during their post-ICU hospital stay.

The mean age of the patients was 60 years and 40% of them were women. There were no significant differences in sex and age distribution among the three groups. The mean APACHE II score of the total patients was 11. Group 1 patients had less severe disease on their admission to ICU when compared to Groups 2 and 3. However, there was no significant difference between Groups 2 and 3 for their severity score (Table 1).

The main diagnostic categories for ICU admission included the cardiovascular system (44%), malignancies (15.7%), the gas-

Table 1. Comparison of Patients Characteristics

	Survivors (n = 1339)	ICU deaths (n = 114)	Ward deaths (n = 45)	All patients (n = 1498)
Age (yr)	59.7 ± 17.1	61.4 ± 19.6	66.6 ± 16.1	60.1 ± 17.3
Female (%)	40.4%	36.8%	38.5%	39.9%
APACHE II score	10.1 ± 6.1*	21.7 ± 9.3	20.6 ± 8.6	11.3 ± 7.4
Range				
0-4	12.1%	1.1%	0%	10.8%
5-9	44.0%	6.5%	11.4%	40.0%
10-14	24.7%	20.7%	20.5%	24.2%
15-19	11.4%	14.1%	20.5%	12.0%
20-24	5.2%	20.7%	15.9%	6.8%
25-29	2.1%	15.2%	18.2%	3.7%
30-34	0.4%	8.7%	6.8%	1.2%
35-39	0%	9.8%	6.8%	1.0%
>40	0.1%	3.3%	0%	0.3%

Values of age and APACHE II score are means ± SD. APACHE: Acute Physiology and Chronic Health Evaluation, *: P < 0.05 vs ICU deaths & Ward deaths.

trointestinal system (10%) and the respiratory system (Table 2).

ICU days were significantly shorter for group 1 as compared to group 2 and 3 (Table 3).

For the patients who died in the general ward, 7 patients (15.5%) were expected to have survived. 29 (64%) had been decided on to be withdrawn from sustained therapy before discharge from ICU (Fig. 1).

DISCUSSION

The present study was designed to especially look at those patients who died on the general wards following ICU discharge prior to hospital discharge. These patients may have died because of potentially treatable complications that might have been prevented by continued ICU care or a higher level of care on the general wards. If so, these deaths represent a missed opportunity to save lives and a waste of resources during ICU stay. Conversely some of these deaths may have been inevitable and perhaps these patients should have been discharged earlier or they should have never been admitted to ICU in the first place. Deaths in the hospital following discharge from ICU are a significant problem. Few studies have examined the problem of death after discharge from ICU. However, several studies have reported similar figures with post ICU mortalities of 35.4% in UK,[3] 23.4% in Portugal,[4] and 31% in Scotland.[2] This study confirms a high post-ICU mortality with 28% of the total hospital deaths occurring following ICU discharge.

Post-ICU mortality was sometimes caused by factors occurring before ICU discharge.[5] Many investigators have studied the effects of age on the outcome from a critical illness with variable results. Only the severity of illness has been shown to play a significant and consistent role in determining the outcome.[6] Le Gall et al[6] identified age, previous health status and severity of illness as predictors of post-ICU survival. However Cullen et al[7] did not find any association between age, severity or length of stay and late mortality. It was expected that the age of the patients who expired in the general ward would be higher than those who expired in the ICU because family members expect that patients may not recover and survive when they are old. In our study, contrary to the expectation, there was no difference in the age distribution between the two groups.

Table 2. Major Reasons for ICU Admission and Mortality Rates for each Group in the ICU and General Wards

Reasons for ICU admission	No. of patients (n = 1498)	Mortality in ICU (n = 114)	Mortality in ward (n = 45)
Cardiovascular	663	38 (5.7%)	17 (2.6%)
Cancer	237	22 (9.3%)	16 (6.8%)
Gastrointestinal	152	11 (7.2%)	7 (4.6%)
Respiratory	125	11 (8.8%)	3 (2.4%)
Trauma	121	9 (7.4%)	1 (0.8%)
Endocrinology	41	0 (0%)	1 (2.4%)
Infection	40	10 (25%)	4 (10%)
Neurology	29	1 (3.4%)	1 (3.4%)
Others	114	12 (10.5%)	4 (3.5%)

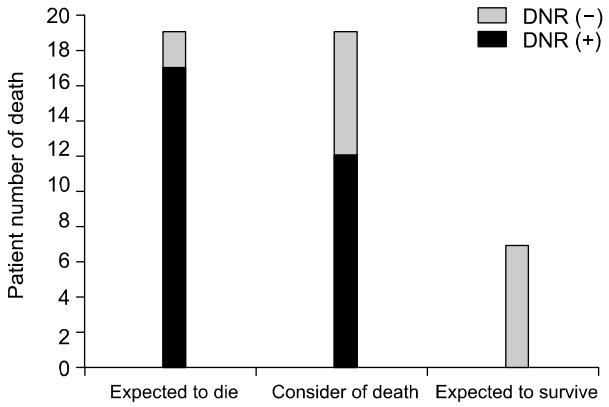

Fig. 1. The patients who died on general ward are classified by the expected prognosis and presence of a DNR after ICU discharge. DNR: do not resuscitation.

Table 3. Duration of ICU and Ward Stay

	Survivors (n = 1339)	ICU deaths (n = 114)	Ward deaths (n = 45)	All patients (n = 1498)
ICU stay (days)	3.4 ± 5.5*	11.5 ± 20.9	11.9 ± 17.6	4.3 ± 8.8
Ward stay (days)	14.7 ± 24.2†	0	34.8 ± 56.9	14.3 ± 25.7

Values are means ± SD. *: $P < 0.05$ vs ICU deaths & Ward deaths, †: $P < 0.05$ vs Ward deaths.

Although some of the deaths following ICU discharge were inevitable, a number of deaths were unexpected and should, therefore, have been preventable. It has been reported that the patients who died in the hospital after discharge from ICU had a significantly higher severity of illness score on the day of ICU discharge than those who survived.[8] This suggests that patients who were at risk for post-ICU mortality may have been discharged from the ICU with an incomplete resolution of their acute medical condition.

Sometimes, patients are discharged early, and perhaps inappropriately, to make room for more severely ill patients. The prevention of post-ICU mortality is likely to be linked to the delivery and provision of the post-ICU care that is available. There is currently much debate, but little objective evidence, about the provision of intermediate care.[9,10] One function of these units would be to act as a step down from the ICU for patients who require higher levels of care than are available on the general wards. In Korea, intermediated ICU facilities remain very limited.

Although this post-ICU mortality may indicate that premature discharge from full ICU or the less than optimal management of the ICU or the general wards, are other factors in the decision to limit treatment of hopelessly ill patients.[11]

Identifying patients at risk for premature ICU discharge may help physicians to resolve the clinical dilemma who are they to discharge to make a room for patients requiring urgent admission to the unit? Further studies are needed to assess the risk factors for post-ICU mortality according to whether end of life decisions are implemented in the ward. Both admission and discharge criteria in the ICU are critical issues in the allocation of limited health care resources. However, much less emphasis has been placed on discharge criteria.

Since 1974, the American Heart Association has proposed DNR orders as formal documentation, and DNR orders have now become firmly established in professional guidelines and policy.[12] However, less is known about DNR decisions in ICU than in the general wards. It has been reported that DNR orders preceded 39% of all ICU deaths.[13] Our findings showed that 29 patients of group 3, who were discharged alive from ICU after implementation of a decision to withhold or withdraw life sustaining treatment, died before hospital discharge. For these patients, ICU discharge was an appropriate response to awareness that further intensive care would be futile.

We lost 7 patients who were expected to survive at the time of ICU discharge. A further study to evaluate the individual characteristics and the reasons why we loose the patients who are expected to survive seems to be necessary. Modern intensive care faces not only medical challenges, but also ethical challenges, which together create the need to evaluate the quality of the care delivered.

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