

PREVALENCE OF ADVERSE EVENTS DURING TRANSPORT OF CRITICALLY ILL PATIENTS FROM THE EMERGENCY DEPARTMENT TO THE INTENSIVE CARE UNIT

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ABSTRACT

Background: The process of Intra Hospital Transports (IHTs) of critically ill patients is at high risk of changing patient conditions. Emergency transportation causes complications and may affect patient safety. This study aims to describe the prevalence of adverse events during the transport of critically ill patients from the Emergency Department (ED) to the Intensive Care Unit. **Method:** This study applied an analytic observational design with a prospective cohort approach. The study examined 151 emergency patients. The inclusion criteria are patients aged >16 years and the issued decision to transfer the patients to the Intensive Care Unit at levels 2 and 3. **Results:** From 151 observed-transfer processes, 119 (78.8%) respondents experienced adverse events. Among them 54 (45.5%) were non-physiological cases, 33 (27.7%) physiological, and 32 (26.8%) combination of physiological and non-physiological adverse events. Most of the physiological adverse events were nausea (12 or 13.3%), while most non-physiological adverse events were temporary cessation of therapy in the course of 65 (57%). There is a significant relationship among age ($p=0.012$, $r=0.351$), sex ($p=0.019$, $r=0.249$), suitability of transfer companion ($p=0.005$, $r=0.281$) with the adverse events during the transport of critically ill patients from the Emergency Department to the Intensive Care Unit. **Conclusion:** Furthermore, risk management is required to reduce the complication at the time of transfer. During the transfer procedure continuous intravenous access must be ensured to minimize risk.

Keywords: Adverse Events, Intra-Hospital Transport, Critically Ill Patients

INTRODUCTION

The transport of patients is an inseparable part of service in the ED (Salt *et al.*, 2018). Transport of patients between wards in the hospital aim to sustain patient care may result in high risk of adverse events (AEs) (Bergman *et al.*, 2017). The actions taken in the ED may affect the safety of critical patients before being transferred to the Intensive Care Unit (Jiang *et al.*, 2016).

The situations in the emergency rooms that are vulnerable, overcrowded along with limited resources make the transfer of patients from the emergency room more complex, varied, and hazardous (Choi *et al.*, 2012; Farnoosh *et al.*, 2018). Overcrowding of patient entailed by complex severity and its characteristics to work in the environment that races against time, causes of AEs in

the Emergency Department (Stang *et al.*, 2013). The transport of patients in unstable conditions may raise complications and risk patient safety (Decrucq *et al.*, 2013; Harish *et al.*, 2016).

Adverse events during the transfer of critically ill patients in the hospital are related to patient physiological changes (44.1%), transfer of equipment was 23.5% and the staff was 19.7% (Gimenez *et al.*, 2017). Most of the adverse events related to the patient's clinical condition are the circulatory system (40%), the respiratory system (30%) and nervous system (25%) (Tolentino *et al.*, 2018). Meanwhile, minor incidents related to patients anxiety (15%), agitation (11.1%), and pain or discomfort (1% - 6.1%) (Jia *et al.*, 2016; Jones *et al.*, 2016).

A nurse is one of the professional medical workers

that accompanies in transporting the patients (Kue *et al.*, 2011). Research shows that IHTs of patients is a burden for nurses and will disrupt the workflow if it is not prepared properly (Jennings *et al.*, 2013). Nurses consider patient transport as an unsafe and stressful task (Ringdal *et al.*, 2016).

This study aims to determine the adverse events during the transfer of critically ill patients from the emergency room to the Intensive Care Unit in a hospital in Central Java.

METHODOLOGY

This quantitative study applied an analytic observational design with a prospective cohort approach. Researchers followed the process of transferring patients from the ED to the Intensive Care Unit. The population of this study consisted of all patients in ED with 2 or 3 transfer levels. The sample in this study consisted of 151 transport process of ED patients to the Intensive Care Unit in one of the general hospitals in Central Java. The study was conducted on January 5-31, 2020. The researcher was assisted by 2 enumerators who had carried out the interrater reliability test with a result of kappa=1. The sampling technique was the consecutive sampling technique. The inclusion criteria are emergency patients aged >16-years-old and eligible for transfer to Intensive Care Units level 2 and 3. The exclusion criteria are patients who died or were referred before transfer. Adverse events during the transport of patients were categorized into 4 groups namely physiological AEs, non-physiological AEs, combined AEs (physiological and non-physiological), and no AEs. The parameters of unexpected events during the transfers were based on the model developed by Jones *et al.*, (2016). The instrument in this study used an observation sheet that had been tested by expert judgment. The data were processed using SPSS version 16. The descriptive data are presented in the form of frequencies and percentages. The bivariate test takes Cramer's V.

This study has received ethical clearance from the Health Research Ethics Omission at one of Regional Public Hospitals in Central Java, Number. 1.418/XII/HREC/2019. The approval was given from the study site. Every respondent was informed about the objectives, benefits, and research procedure. The information was given to the patient and family. The willingness of the respondents in this study had no

compulsion.

RESULTS

The prevalence of AEs during the transport of critically ill patients from the ED to the Intensive Care Unit can be seen in Table 1.

Table 1: Distribution of AEs Frequencies during Transfer of Patients from the ED to the Intensive Care Unit (n = 151)

Variables	F	%
AEs during transport		
No AEs	32	21.2
AEs	119	78.8
AEs Type		
Non-physiological	54	45.5
Physiological	33	27.7
Combined AEs	32	26.8

The table shows most of the respondents who were transported experienced AEs during the transfer. The non-physiological AE was the most frequent case found.

Table 2: The Frequency Distribution of Physiological AEs Parameters during Critical Patient Transfer from the ED to the Intensive Care Unit

Condition	N	%
Systolic reduction > 20% early	8	8.9
Systolic increase > 20% early	6	6.7
Systolic < 90 mmHg	6	6.7
O ₂ saturation <90%	4	4.4
RR < 8 or > 30 x/Minute	9	10.0
HR < 40 or > 130 x/minute	9	10.0
New onset of arrhythmia	6	6.7
Agitation	11	12.2
Convulsions	1	1.1
Bleeding	2	2.2
Decreased awareness (GCS)	7	8.9
Nausea	12	13.3
Increased pain score	7	7.7
Cardiopulmonary arrest	1	1.1
Patient died	1	1.1
Total	90	100

Table 2 shows the occurrence of physiological AEs. Most physiological AEs were nausea and agitation and one respondent experienced cardiopulmonary arrest and resulting in death.

Table 3: Frequency Distribution of Non-Physiological Incident Parameters during Critical Patient Transfer from the ED to the Intensive Care Unit

Condition	N	%
Oxygen supply ran out	2	1.7
Lost vein access device, clogged or not smooth	18	15.8
Change in the drain position	2	1.7
Change in NGT/OGT position	1	0.9
Delayed > 5 minutes at the destination	6	5.3
Required a restrain	6	5.3
Temporary cessation therapy (infusion)	65	57.0
Error documenting drugs	2	1.7
The document left or not complete	6	5.3
Other (water humidifier entered the patient's nasal cannula)	6	5.3
Total	114	100

Table 3 shows that most non-physiological AEs were temporary terminations of therapy during transport followed by the discontinuity of venous access devices.

Table 4: Correlation among Age, Gender, Primary Case, Transfer Level, Conformity of Personnel to AEs during Transfers from the ED to Intensive Care Unit (n = 151)

Characteristics	F	%	r	p
Age			0.351	0.012*
>65 years	45	29.8		
46-65 years	74	49.0		
26-45 years	26	17.2		
17-25 years	6	4.0		
Gender			0.249	0.019*
Male	90	59.6		
Female	61	40.4		
Primary Case			0.338	0.078
Surgery	17	11.3		
Internal Disease	37	24.5		
Cardiovascular	66	43.7		
Neurology	23	15.2		
Lungs	8	5.3		
Level Transfer			0.224	0.056
3 rd Level	31	20.5		
2 nd Level	120	79.5		
Conformity of Transport Personnel			0.281	0.005*
Conformity	106	70.2		
Non-Conformity	45	29.8		
Nursing Education			0.149	0.329
Diploma (D3)	142	94.0		
Nurse Profession	9	6.0		
Nursing Certificate			0.112	0.595
Basic	118	78.1		
Advance	33	21.9		

* $P < \alpha (0.05) = \text{significant}$

DISCUSSION

Intra-hospital patient transport is defined as a temporary or permanent transport inside of the hospital environment for diagnostic, therapeutic, and treatment purposes in special units (Shields, Overstreet & Krau, 2015). Adverse events during the transport of critically ill patients are defined as any expected or unexpected event that affects patient stability during the transport consisting of team failures, equipment failures, delays, and physiological changes (Gimenez *et al.*, 2017). According to the Conceptual Framework from World Health Organization (2009), the characteristics of patients influence incidence of adverse events. The factors affecting these situations are the patients' demographic data, the main reason being the patients' needs of treatment, and the primary diagnosis.

In this study, the most physiological AE was nausea. Based on observations in this study, most of the respondents had primary cases of a cardiovascular emergency. Nausea occurred in patient were mostly with thrombolytic administration. Besides, the travel route from the ED to the Intensive Care Cardiovascular Unit (ICVCU) must pass the elevator two times and the inter-building movement is slightly uphill. This leads to inconvenience for respondents. It is in line with Aslanabadi *et al.*, (2018) who observed that 217 patients were administered with streptokinase therapy. The study found that the side effects of streptokinase were chest pain, hypotension, cough, and limb pain, nausea, spit-up, bronchospasm, arrhythmia, fever, hemorrhage, headache, agitation, hematuria, diarrhea, and hypoxia.

Most of the non-physiological events that occurred during transfer were temporary cessation of therapy. It indicates that the transfer assistance officer pays little attention to the importance of maintaining continuity of therapy during the transfer process. During Transfer the movement may cause Intra Venous (IV) line to be blocked, or can be lose, or is non-smooth. During the transport, patients must be carried carefully to avoid any hindrances. The mild hindrance may cause displacement of intravenous access that can potential turns into serious problems for the patients (Knight *et al.*, 2015).

The ages group in this study are divided into 16-25 years, 26-45 years, 46-65 years, and > 65 years. This study is in line with the results of previous studies stating that age affects undesirable events during the transfer of critically ill patients in the ICU (Harish *et al.*,

2016). The functional consequence theory states that as a consequence of increasing age causes decrease in biological functions (Miller, 2012). This will go hand in hand with increasing age (aging process) (Standhope & Lancaster, 2016).

Male was significantly related to the adverse events during the transfer of critical patients from the emergency department to the intensive care unit. This study is not in line with the study by Farnoosh *et al.*, (2018) and Kue *et al.*, (2011) showing that gender is not related to adverse events during the transport of critically ill patients in the hospital. According to the researchers' analysis, there was a correlation between gender and the adverse events during the transfer of patients indicating that the 90 (59.5%) respondents were male.

The suitability of the transport officer in this study can be seen from the number and composition of the transfer assistance team. Observation results show that all 151 (100%) respondents about 106 (70.2%) respondents were transferred by inappropriate teams. The results of this study are in line with Yang *et al.*, (2017) which indicated that there is a significant relationship between the transfer accompanied by a doctor or not accompanied by a doctor. The transfer team is recommended to consist of doctors with airway management experience, trained critical nurses, and technicians trained in mechanical ventilation equipment (Decrucq *et al.*, 2013; Quenot *et al.*, 2012). The multidisciplinary transfer team is effectively able to overcome potential problems that occur during the transfer of critically ill patients (Kue *et al.*, 2011; Kulshrestha and Singh, 2016). There is also a need for additional workers to assist the nurse during transport

(Blay *et al.*, 2017).

There is no relationship between the education and training of transfer companion nurses and the occur of adverse events. Most of the respondents were accompanied by nurses with a Diploma in nursing with basic practical training. Transfer assistance staff should be trained, competent, experienced in transferring critically ill patients, and certified transfer training along with Advance Cardiac Life Support (ACLS), airway management, and critical care training (Fanara *et al.*, 2010; Kulshrestha and Singh, 2016). Based on the observation it can be said that the nurses in charge of transfer along with their assistants in each shift are the same people which may lead to making repeated mistakes.

CONCLUSION

The AEs during the transport of critically ill patients from the ED to the Intensive Care Unit are still quite high. The most frequent AE is non-physiological AE, i.e. the cessation of therapy temporarily. There is a relationship among age, sex, and the suitability of transfer assistants with AEs during the transfer of patients in the hospital. The transport companion officer should ensure that the venous access device and device attached to the patient are functioning properly during the transfer within the hospital.

Conflict of Interests

The authors declare that they have no conflict of interest.

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