

GERIATRIC PATIENTS IN EMERGENCY DEPARTMENT HOSPITAL USM; PRESENTATION AND OUTCOME

Affiah Sjamun Sjahid¹, Nik Hisamuddin Nik Ab Rahman¹, Siti Azrin Ab. Hamid¹

¹School of Medical Sciences, Universiti Sains Malaysia, Hospital Universiti Sains Malaysia

ABSTRACT

Background and Objectives:

Few studies have been done by other countries regarding geriatric patients attending Emergency Department (ED) and their outcome. This study aimed to determine the proportion of geriatric patients attending ED in Hospital Universiti Sains Malaysia (USM), the mean duration of hospital stay, outcome of the illness and factors associated with mortality in geriatric patients admitted to Hospital USM.

Methodology:

A retrospective cohort study was done from January 2015 till March 2015 at ED Hospital USM. All patients aged 60 years and above were included. Systematic random sampling was used.

Results:

Total patients included in this study were 209 patients. The mean age was 68.4 years old. Fifty-eight percent were male and 95.7% were Malay. Seventy-eight percent were triaged as an emergency. Three most common presenting symptoms were respiratory (24.9%), cardiovascular (19.65%) and gastrointestinal symptoms (12.9%). 95 patients (45.5%) were admitted and mean duration of hospital stay was 8 days. Out of 95 patients admitted, only 15 patients (15.8%) died in the ward. Factors associated with mortality were gender, patient's method of arrival, conscious level on arrival, patient's condition when transferring to the ward; either ventilated and on inotropic agent or not, patient's first pulse rate taken at triage and first blood investigations taken in ED; white blood cell, hemoglobin, serum lactate and serum urea.

Conclusions:

Majority of the geriatric patients triaged as emergency cases and cardiorespiratory cases were the most common presenting symptoms. Associated factors of mortality had been identified and these factors will alert medical personnel in the ED to treat this group of patients more thoroughly and judiciously.

Keywords: *Geriatrics, emergency department (ED)*

Corresponding Author:

Dr Afifah binti Sjamun Sjahid,
Emergency Physician, Department of Emergency Medicine,
School of Medical Sciences, Universiti Sains Malaysia,
16150 Kubang Kerian, Kelantan, MALAYSIA
Email: afifahkk@usm.my; afifahsjamun@gmail.com
Tel: +6017-9805054; Fax: +609-7673219

INTRODUCTION

Ageing can be defined as a biological, sociological, economic and chronological phenomenon. Most developed countries have accepted the chronological age of 65 years as a definition of 'elderly' or older person, but this does not adapt well to the situation in developing countries. At the moment, United Nations and Ministry of Health's Malaysia recommends people aged 60 years and above to refer as the elderly or ageing population¹.

In 2015, world population reached 7.3 billion, with 12.3% of it consist of elderly more than 60 years of age. Globally, the number of elderly person more than 60 years old is expected to increase more than double by year 2050 and more than triple by year 2100². Department of Statistics Malaysia mentioned that in 2016, the total population of Malaysia was estimated at 31.7 million people, and 6 percent of it consist of the elderly population, with an increment of 0.2 percent each year³. Ageing is a triumph of development. People are living longer because of better nutrition, sanitation, health care, education and economic well-being.

Changing global demography is resulting in older people presenting to ED in greater numbers than ever before⁴. They usually present with acute and ill condition and are more likely to be admitted to hospital. Atypical clinical presentation of illness, a high prevalence of cognitive disorders, and the presence of multiple comorbidities complicate their evaluation and managements^{5,6}.

As Malaysia ages, its health and social care systems will have to adapt to a changing pattern of disease and illness. The health care system in this country is primarily geared towards short term care hospitalization, otherwise the elderly patients usually have multiple chronic diseases that require long term care management and

hospitalization⁷. A comprehensive restructuring of the health care system is required for Malaysia to handle the rising tides of illness and disability associated with ageing populations⁸. Malaysia will need to develop sufficient expertise in acute Geriatric Medicine^{9,10}, a specialty that focuses on health care of elderly people, which aims to promote health by preventing and treating diseases and disabilities in older adults.

Few studies had been done by other countries regarding geriatric patients attending ED in their hospitals. A study by Liu et al from China found out that three most common causes of geriatric emergencies were respiratory disease, cardiovascular disease and neurological disease¹¹. However, in a rural hospital in Nigeria, acute malaria, hypertensive crises syndrome, and acute hypertensive heart failure were the three most common causes of geriatric emergencies¹². The difference in the common causes of geriatric emergencies between these two countries can be explained by differences in geographical and developmental status of the country¹¹.

There are also few studies regarding factors affecting mortality in elderly patients admitted to hospital. A study by Ponzetto et al in 2003 found out risk factors associated with in-hospital mortality included functional impairment (activities of daily living), medical conditions such as cerebrovascular disease and cancer, and electrolytes abnormalities such as albumin and creatinine¹³. Another study by Ayaz et al concluded that advanced age, poor general status, multiple comorbidities and electrolyte abnormalities were the predictors of mortality. They noted the most common comorbidities are cardiovascular disease, diabetes mellitus and hypertension. Electrolyte abnormalities such as hypoglycemia, hypoalbuminemia, hyponatremia, hypernatremia and

hyperkalemia are associated with increased mortality in the hospitalised elderly patients¹⁴.

Recently, a study by Mokhtar et al in 2015 was about utilisation of the ED by older residents in Kuala Lumpur, Malaysia, compared with younger patients. They made a conclusion that older patients were more likely to attend the ED and require investigations, procedures and hospital admission¹⁵. Until present, there is no proper study done in Malaysia about demographic data and factors associated with mortality in admitted geriatric patients, so by doing this study, we can predict the outcome of geriatric patients once they stepped into our ED. This prediction is important so we can treat them thoroughly and systematically.

This study aims to determine the proportion, mean length of stay in hospital and outcome of the illness in geriatric patients admitted to Hospital USM through ED, and also to identify factors associated with mortality during admission.

METHODS

This study was a retrospective cohort study from January 2015 till March 2015. All patients aged 60 years and above and attended ED Hospital USM were included in this study. Patients transferred to other hospital, took At Own Risk (AOR) discharge in the ward, died in ED or died in the ward after 30 days of admission to Hospital USM were excluded in this study. By using PS sample size calculation software, the sample size for this study was 199 patients. Systematic random sampling was used as more than 2000 geriatric patients came to ED during the study period. Every ten geriatric patients visiting ED, one patient will be chosen for the study. A total of 209 patients had been included in this study.

Demographic and clinical data such as age, gender and race were obtained. The patient was triaged either emergency (red and yellow zone) or non-emergency (green zone) case. Details such as patient's presenting symptom, disposition (either admitted or discharged), duration of hospital stay and outcome of the illness (either discharged alive or death in the ward) were recorded. Patient's method of arrival, conscious level on arrival, past medical history (underlying comorbidities), vital signs on arrival, blood investigations on arrival and patient's condition during admission (ventilated or not, on inotropes or not) were also recorded, to look for factors affecting mortality in hospitalised geriatric patients.

The study was approved by the Human Research Ethics Committee USM (USM/JEPeM/15090298). The permission from Director of Hospital USM was obtained to review the medical records. All data were managed and analyzed by IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Descriptive statistics were expressed as frequency and percentage for categorical variables and mean and standard deviation for numerical variables. Independent categorical variables were compared using Chi-Square test. Paired group comparisons were performed using an Independent t-test or Mann-Whitney test for numerical variables. A *p* value of <0.05 was considered as statistically significant for all statistical analyses in this study and will be applied to determine the associated factors of mortality in hospitalised geriatric patients.

RESULTS

Total patients included in this study were 209 patients. The mean age was 68.4 years old, with age range from 60 till 106 years old. Fifty eight point nine percent were male and 95.7% were Malay. Only 5 patients

(2.4%) were Chinese and the other were Siamese. A total of 70.8% were triaged as an emergency; with 19.6% were red zone cases, while 51.2% were yellow zone cases. Three most common presenting symptoms were respiratory (24.9%), cardiovascular (19.65%) and gastrointestinal symptoms (12.9%). Out of 209 patients studied, 95 patients (45.5%) were admitted. Mean duration of hospital stay was 8 days (mean 7.57, SD 12.97). From 95 patients admitted, 80 patients (84.2%) were discharged from ward alive. Only 15 patients (15.8%) died in the ward. Cause of death include septicemic shock (7 patients, 46.7%), cardiogenic shock (3 patients,

20.0%), advanced malignancy (3 patients, 20.0%) and spontaneous ICB (2 patients, 13.3%). Factors associated with mortality in hospitalized geriatric patients were gender ($p = 0.009$), patient's method of arrival ($p = 0.001$), conscious level on arrival ($p < 0.001$), patient's condition when transferring to the ward; either ventilated ($p = 0.014$) and on inotropic agent ($p < 0.001$) or not, patient's first pulse rate taken at triage ($p < 0.001$) and first blood investigations taken in ED; white blood cell (WBC) ($p = 0.007$), haemoglobin ($p = 0.019$), serum lactate ($p < 0.001$) and serum urea ($p = 0.036$)

Table I : General characteristics of the patients. (n=209)

Characteristics	n (%)
Age, years (mean,SD)	68.4 ± 6.95
Gender	
Male	123 (58.9)
Female	86 (41.1)
Race	
Malay	200 (95.7)
Chinese	5 (2.4)
Siamese	4 (1.9)
Triage	
Emergency	148 (70.8)
Non-emergency	61 (29.2)
Presenting symptom	
Respiratory symptom	52 (24.9)
Cardiovascular symptom	41 (19.6)
Gastrointestinal symptom	27 (12.9)
Neurological symptom	15 (7.2)
Infection	21 (10.0)
Trauma/orthopaedics cases	21 (10.0)
Renal symptom	11 (5.3)
Others	21 (10.0)
Comorbidity	
Hypertension (HPT)	122 (58.4)
Diabetes Mellitus (DM)	84 (40.2)

Hyperlipidemia (HPL)	19 (9.1)
Ischemic Heart Disease (IHD)	29 (13.9)
Chronic Kidney Disease (CKD)	18 (8.6)
Chronic Obstructive Airway Disease (COAD)	35 (16.7)
Disposition	
Discharge	114 (54.5)
Admitted	95 (45.5)
Duration of hospital stay, days (mean,SD)	7.57 ± 12.97
Outcome	
Discharge alive	80 (84.2)
Died in ward	15 (15.8)
Cause of death	
Septicemic shock	7 (46.7)
Cardiogenic shock	3 (20.0)
Advanced malignancy	3 (20.0)
Spontaneous ICB	2 (13.3)

Values are presented as mean ± standard deviation or number (%), where appropriate.

Table II : General characteristics of the alive and the dead groups (n=209)

Characteristics	Alive group n (%)	Dead group n (%)	P
Age, years	71.13 ± 8.37*	68.73 ± 7.44*	>0.95
Gender			0.009
Male	119(96.7)	4(3.3)	
Female	75(87.2)	11(12.8)	
Method of arrival			0.001
Walk-in	160(95.8)	7(4.2)	
Referred case	30(78.9)	8(21.1)	
Ambulance call	4(100.0)	0(0.0)	
Conscious level on arrival			<0.001
Alert (GCS 15/15)	185(95.9)	8(4.1)	
Drowsy (GCS 9-14/15)	8(80.0)	2(20.0)	

Comatose (GCS \leq 8/15)	0(0.0)	5(100.0)	
Intubated already	1(100.0)	0(0.0)	
Comorbidities			
HPT	111(91.0)	11(9.0)	0.22
DM	75(89.3)	9(10.7)	0.104
HPL	18(94.7)	1(5.3)	>0.95
IHD	27(93.1)	2(6.9)	>0.95
CKD	18(100.0)	0(0.0)	0.373
COAD	33(94.3)	2(5.7)	>0.95
Condition when transferring			
Ventilated	1(33.3)	2(66.7)	0.014
Inotropes	1(16.7)	5(83.3)	<0.01
Duration of hospital stay, days	7.19 \pm 8.65*	4.27 \pm 3.17*	0.63

* Mean (SD)

Table III : Vital signs and blood parameters of the alive and the dead groups

Characteristics	Alive group	Dead group	<i>P</i>
Blood pressure	143 ± 36.15	137.27 ± 49.84	0.856
Pulse rate	93.88 ± 28.14	106.09 ± 21.71	<0.001
WBC	10.14 ± 4.69	22.43 ± 16.99	0.007
Hb	11.35 ± 2.55	10.78 ± 2.51	0.019
Platelet	227.40 ± 87.14	322.83 ± 201.95	0.383
Lactate	1.77 ± 1.25	3.42 ± 1.53	<0.001
Urea	11.47 ± 10.16	11.61 ± 8.34	0.036
Creatinine	275.69 ± 323.68	131.45 ± 56.73	0.654
Calcium	2.10 ± 0.18	2.08 ± 0.32	0.739
Albumin	37.37 ± 5.34	32.3 ± 8.58	0.160
CBS	9.92 ± 5.61	9.50 ± 4.64	0.121

DISCUSSION

The mean age of elderly patients attending ED was 68.4 years old, with age range between 60 years old up to 106 years old. Other studies at other countries in Asia had a higher mean of age, 82 years old for study in China¹¹ and 72.8 years old for study in Singapore¹⁶. Most of the geriatric patients attending ED in the current study were due to

emergency causes, corresponds with the previous study from Singapore¹⁶, indicates that elderly patients that came to emergency department need to be treated and investigated early and thoroughly.

The three most common presenting symptoms were respiratory symptoms, cardiovascular symptoms and gastrointestinal symptoms. Previous

international studies have also reported that cardiorespiratory symptoms were the most common cause of hospital visit and admission in elderly patients^{11,17,14}. Cardiovascular symptoms usually related with underlying cardiovascular diseases such as hypertension, hyperlipidemia and ischemic heart disease, where else respiratory symptoms related with underlying chronic lung diseases such as bronchial asthma and chronic obstructive airway disease.

As the current study revealed that most of the geriatric patients came to ED with emergency condition related to the cardiorespiratory problem, thorough investigations and proper integrated management need to be done in ED level. By doing this, we are hoping the outcome of the hospitalised geriatric patients due to cardiorespiratory problem will be better and lower the risk of mortality. In the future, we are expecting more emergency physicians interested in the study of cardiorespiratory emergencies in order to give the best treatment to our special group of patients.

Almost forty-six percent of elderly patients that came to ED end up with hospitalisation with the mean duration of hospital stay were 7.57 days. The previous study from Singapore reported a higher percentage of 63.7% elderly patients hospitalised after attending emergency department¹⁶. Mean duration of hospital stay of the geriatric patients were almost similar with the study by Ayaz et al in 2014 with 7.7 days¹⁴, while other studies reported the mean duration of 19.4 days¹⁷ and 16.2 days¹⁸. These differences may be due to severity of the patients' condition during admission and complications of the illness causing prolonged hospitalisation. A study by Bertozzi et al reported delays in recognizing the specific clinical problems, delays in carrying out diagnostic examinations and difficulties in reaching maximum health and

function levels were the factors that prolonged hospitalization in geriatric patients¹⁹. A study by Maguire et al in 1986 concluded that advanced age, stroke, confusion and falls as reasons for admission to hospital, incontinence and loss of independence for daily activities as the major factors associated with the prolonged stay in hospital²⁰.

The rate of in-hospital mortality was found to be 15.8% in the hospitalized patients. The rate was almost similar with previous studies by Ponzetto et al with 14.9% mortality¹³ and Silva et al with 16.4% mortality¹⁸. In contrast, a study by Ayaz et al in 2014 reported lower rate with 8.4% mortality¹⁴. The difference was due to the exclusion criteria from the study; whereby malignancy, surgery and trauma patients were excluded in the study. Septicemic and cardiogenic shock were the main cause of death in hospitalized geriatric patient in the current study, followed by malignancy and spontaneous intracranial bleed secondary to hypertensive emergency. However, a study by Ponzetto et al reported that malignancy as the most common cause of death, followed by cerebrovascular accident, dementia and cardiovascular disease¹³. Another study by Sanya et al in 2011 found out the three most common diagnoses at death were stroke, sepsis and lower respiratory tract disease or pneumonia²¹.

There were multiple risk factors reported from the previous studies regarding the risk factors for mortality in hospitalised geriatric patients^{13,14,17,18,22}. In the current study, comparison of the characteristics of the alive group and dead group demonstrated that gender, patient's method of arrival, conscious level on arrivals, ventilated patients and patients on inotropes were factors that significantly affect mortality in hospitalised geriatric patients. In this study, 12.8% female patients died in the ward, while

male patients only 3.3%. Even though by attendance, male patients were more likely to seek treatment compared to female, female patients had a higher risk of death. In contrast, a study by Rozzini et al reported that one of the factors related to mortality was male gender²². The difference in gender as a risk factor for mortality cannot be explained further as there was no other study comparing gender as the risk factor for mortality in admitted geriatric patients.

Patient's methods of arrival to ED can be either by walking in, referred case by health clinics or district hospitals or brought in by ambulance. In this study, 21.1% of referred case patients died in ward compared to walk-in patients (4.2%). The conscious level on arrival means patient's condition during arrival to emergency department, either alert (GCS 15/15 if in trauma patient), drowsy (GCS 9-14 if in trauma patient), comatose (GCS \leq 8 if in trauma case) or already intubated (usually case referred from other district hospitals). From this study, patients that came to ED in comatose state or drowsy had more risk to die in the ward. Ventilated patients and patients on ionotropic agents were also had a risk of mortality. It can be concluded that elderly patients that were referred from other clinics or hospitals, drowsy or comatose during arrival, ventilated and on ionotropic agents had higher risk of mortality. No previous study has reported regarding these parameters, so these results can be used to predict patients' outcome once they step into ED.

Regarding initial vital signs and blood parameters taken in ED, it can be concluded that pulse rate, total white blood cell, hemoglobin, serum lactate and serum urea level were the significant associated factors for mortality in hospitalised geriatric patients. Mean pulse rate in the dead group

was 106.09 ± 21.71 beats per minute (bpm), which means tachycardia of more than 100 bpm represents a higher risk of mortality. Regarding blood parameters, patient came with sepsis with high WBC had a high risk of mortality. Mean haemoglobin level in the dead group was 10.78 ± 2.51 , correlates with the study by Ponzetto et al, reported that haemoglobin level < 11 g/dl associated with mortality¹³. Serum lactate also had a significant finding, serum lactate more than 2 had a higher risk of mortality. Other studies mentioned hypoalbuminemia and high serum creatinine level as the associated factors of mortality^{13,14,17,18,22}. Unfortunately, the results were not significant in this study. It may be due to the limited number of total patients studied, especially from the dead group, causing the difference in findings. More studies are needed in this perspective in order to make further comparisons.

In the current study, it was concluded that advanced age, duration of hospital stay and comorbidities were not the associated factors of mortality in admitted geriatric patients. The mean duration of hospital stay in the dead group was shorter than the alive group. A study by Ayaz et al in 2014 reported that duration of hospital stay also did not affect mortality. They also reported that presence of at least one comorbidity is associated with mortality, but specific comorbidities did not affect mortality except for diabetes mellitus, malignant diseases and liver cirrhosis¹⁴. In the current study, comorbidity did not affect mortality. It may be because of the illness itself causing mortality, not the underlying medical problem. For example, from 15 dead patients, three of them had no comorbidity, yet they died due to UGIB (upper gastrointestinal bleed), intracranial bleed and malignancy (breast cancer).

CONCLUSION

Majority of the geriatric patients attending ED Hospital USM were triaged as emergency cases and cardiorespiratory cases were the most common presenting symptoms. Gender, patient's method of arrival, conscious level on arrival, ventilated, on inotropic agent, tachycardia, high white blood cell, low haemoglobin and high lactate

level are the factors associated with mortality in hospitalised geriatric patients. It is important to look for these associated factors to give the best treatment for this special group. A multi-centre, larger sample size study should be conducted to improve the accuracy regarding the associated factors of mortality in hospitalised geriatric patients.

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