FACTORS ASSOCIATED WITH MORTALITY OUTCOME OF INTUBATED ELDERLY IN HOSPITAL USM

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LIST OF ABBREVIATION

UN	United Nation
ICU	Intensive Care Unit
APACHE II	Acute Physiology and Chronic Health Evaluation II
SAPS II	Simplified Acute Physiology Score II
SOFA	Sequential Organ Failure Assesment
Na+	Sodium
K+	Potassium
PaO2	Partial Oxygen
MV	Mechanical Ventilation
MICU	Medical Intensive Care Unit
USM	Universiti Sains Malaysia
MMC	Malaysian Medical Council
T2DM	Type 2 Diabetes Mellitus
HPL	Hyperlipidaemia
CAD	Coronary Artery Disease
COPD	Chronic Obstructive Pulmonary Disease
CKD	Chronic Kidney Disease

GCS	Glasgow Coma Scale
HDW	High Dependency Ward
PS	Power and Size
EGFR	Estimated Glomerular Filtration Rate
INR	International Normalized Ratio
TB	Total Bilirubin
SPSS	Statistical Package for the Social Sciences
SD	Standard Deviation
DKA	Diabetic Ketoacidosis
HHS	Hyperosmolar Hyperglycaemic State
RBS	Random blood sugar
OR	Odds Ratio
CI	Confidence Interval
MJMS	Malaysian Journal of Medical Sciences

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LIST OF SYMBOLS

➢	More Than
≥	Greater Than or Equal To
<	Less Than
≤	Less Than or Equal To
=	Equal To
%	percentage
iu	International Unit
kg	Kilogram
kg/m^2	Kilogram Per Meter Square
mmHg	Milimeter Mercury
mmol/l	Milimol Per Liter
n	Number of Participants
χ^2	Chi square
g/L	Gram per liter
g/dl	Gram per desiliter

ABSTRAK

Latar belakang :Sejak beberapa tahun yang lalu hingga sekarang, kita menghadapi peningkatan populasi warga emas kerana penurunan kadar kematian dan peningkatan kadar kelahiran. Secara tidak langsung, warga emas turut memerlukan kemudahan kesihatan termasuk unit rawatan rapi di hospital. Kajian in bertujuan untuk mengenalpasti faktor-faktor yang mempengaruhi kadar kematian warga emas yang memerlukan bantuan mesin ventilasi di hospital.

Kaedah : Merupakan kajian retrospektif terhadap warga tua yang bernafas melalui mesin ventilasi yang berumur 60 tahun dan ke atas yang dimasukkan ke Unit Rawatan Rapi (ICU) / Wad Penjagaan Rapi (HDW) Hospital USM selama 6 bulan bermula dari 1 November 2019 sehingga 30 Mei 2020 Kesemua data diperolehi daripada sumber data komputer hospital dan rekod perawatan.. Kesemua faktor-faktor klinikal berkaitan termasuk demografik data, sejarah penyakit terdahulu, penyebab utama pesakit bergantung kepada bantuan mesin ventilasi, diagnosis penyakit semasa kemasukan ke wad, fungsi organ, rawatan atau intervensi yang diterima, jumlah hari pesakit memerlukan bantuan mesin ventilasi di hospital akan diambilkira sama ada faktor-faktor ini mempengaruhi kematian pesakit dalam masa 30 hari.

Keputusan : Daripada 155 orang pesakit warga emas berumur 60 tahun ke atas hanya 115 pesakit sahaja diambil untuk kajian ini setelah mengambil kira beberapa kriteria dengan min umur (SD) 68.84 ±7.310. Daripada kajian ini, faktor-faktor yang bertanggungjawab ke atas kematian pesakit dalam 30 hari melalui ujian *chi square* adalah simptom sesak nafas ($\chi^2(1)= 3.869$, p 0.049), diagnosis penyakit strok ($\chi^2(1)=6.003$, p 0.014). Kerosakan fungsi organ pula adalah pesakit yang mempunyai

skor SAPS II sederhana dan rendah ($\chi^2(1)=5.365$, p 0.021; $\chi^2(1)=12.114$, p 0.001), kekurangan enzim pembekuan darah ($\chi^2(1)=5.546$, p 0.019), kekurangan garam sodium dalam darah ($\chi^2(1)=6.385$, p 0.012), kekurangan protein albumin dalam darah ($\chi^2(1)=5.052$, p 0.025), enzim aminotransferase yang tinggi ($\chi^2(1)=7.591$, p 0.006), penggunaan ubat-ubat inotropik ($\chi^2(1)=18.321$, p <0.001), bernafas dengan mesin ventilator kurang dari 48 jam ($\chi^2(1)=9.529$, p 0.002) dan pesakit yang menjalani trakeostomi ($\chi^2(1)=10.092$, p 0.001). Dalam ujian 'multiple logistic regression' didapati pesakit berisiko kecil mendapat kematian adalah pesakit yang mempunyai skor SAPS II yang rendah (odd ratio [OR] 0.149 confidence interval [CI] 0.047, 0.476) dan pesakit yang menjalani trakeostomi (OR 0.053 CI 0.010,0.284) manakala pesakit berisiko besar enzim adalah aminotransferase yang tinggi (OR 3.373 CI 1.133,10.040), penggunaan ubat-ubatan inotropik (OR 21.183 CI 3.867,116.045), bernafas dengan mesin ventilator kurang dari 48 jam (OR 5.610 CI 1.351,23.303) .

Kesimpulan: Kematian dalam masa 30 hari dalam kalangan pesakit warga emas yang memerlukan bantuan mesin pernafasan tidak bergantung pada sejarah penyakit terdahulu atau usia tetapi berdasarkan ciri-ciri klinikal dan keabnormalan keputusan darah biokimia yang menandakan pesakit berada pada tahap kritikal serta rawatan yang diterima semada berada di unit rawatan rapi.

Kata kunci : *warga emas yang memerlukan bantuan mesin ventilasi, kematian dalam masa 30 hari, sesak nafas*

ABSTRACT

Background: Since for the past few years till now, we are facing the increasing size of elderly group because of reduced mortality rate but with high birth rate. This ageing population may result in increasing requirement for health care facilities including critical care unit for the elderly. This study was aimed at identifies the factors which associated with mortality outcome of intubated elderly patients' in hospital.

Method: Retrospective cross sectional study of intubated elderly aged 60 years old and above which admitted to ICU/ High dependency ward (HDW) Hospital USM from 1st November 2019 till 30th May 2020 for 6 months. Data were collected using hospital computer base data and medical record. Factors were identified including demographic profile, comorbids, indication of intubation, diagnosis upon admission, organ dysfunction, intervention received, ventilation duration and complication with length of hospital stay to compare with 30 days mortality outcome.

Result: Of the 155 intubated elderly patient, only 115 patients were eligible for this study after excluding few criteria with mean (SD) age 68.84 ±7.310(60-93). From this study, the factors independently associated with 30 days mortality in chi square test were respiratory distress as the indication of intubation ($\chi^2(1)= 3.869$, p 0.049) , patient was diagnosed with acute stroke upon intubation ($\chi^2(1)=6.003$, p 0.014), had organ dysfunction intermediate and low severity SAPS II score ($\chi^2(1)=5.365$, p 0.021; $\chi^2(1)=12.114$, p 0.001), coagulopathy ($\chi^2(1)=5.546$, p 0.019), hyponatremia ($\chi^2(1)=6.385$, p 0.012), hypoalbuminemia ($\chi^2(1)=5.052$, p 0.025), elevated transaminases ($\chi^2(1)=7.591$, p 0.006), patient on vasopressor usage ($\chi^2(1)=18.321$, p <0.001), ventilated less than 48 hours ($\chi^2(1)=9.529$, p 0.002) and underwent

tracheostomy ($\chi^2(1)=10.092$, p 0.001), In multiple logistic regression, factors independently associated with low risk of mortality were low severity SAPS II score (odd ratio [OR] 0.149 confidence interval [CI] 0.047, 0.476) and underwent tracheostomy (OR 0.053 CI 0.010,0.284) while factors associated with high risk of mortality were patient with elevated transaminases (OR 3.373 CI 1.133,10.040, vasopressor usage (OR 21.183 CI 3.867,116.045), and ventilation duration less than 48 hours (OR 5.610 CI 1.351,23.303) .

Conclusion: 30 days mortality outcome among intubated elderly patient depends not on the premorbid or age but based on the clinical presentation and biochemical abnormalities which indicated the severity of the illness and management in the intensive care unit

Keyword: *intubated elderly, 30 days mortality, respiratory distress*

CHAPTER 1: INTRODUCTION

Based on United Nations (UN) projections, Malaysia is expected to become an ageing country in 2030 when Malaysian population aged 60 years and above reaches 15 per cent of the nation's total population (United Nation, 2013). In Malaysia, elderly citizens are defined by those aged 60 years and over (World Assembly on Aging, 1982, World Health Organization, 1989 & Ministry of Health, 1999)[18] . According to a statement by Malaysia's Chief Statistician on July 2019, the 15 percent threshold would be crossed in 2030.

With declining fertility and longer life expectancy, Malaysia's population is ageing. By 2020, it is estimated that the number of older persons will be 5.5 million and by 2030, Malaysia will be in the category of ageing nations with older persons constituting more than 15% of the population. In Malaysia, average life expectancy is 72.3 years for male and 77.2 for female.(Malaysia Country Report, Asean, 2013)

Advanced age is considered as an independent risk for mortality in the patients admitted to ICU. It is believed by many clinicians that unplanned admission of sick geriatric patients in ICU may not beneficial in term of survival. In the developing countries where the resources are limited, the geriatric ailments are viewed with a palliative intent due to financial constraints and availability of beds in the ICU. Thereby, mechanical ventilation is discouraged in geriatric population especially in the developing countries (Siddiqui S et al., 2018)

Given the increased demand by the aging population in presence of resource limitations, it is important to know the outcomes of elderly patients admitted to the ICU and factors contributing to these outcomes. Knowledge of long-term outcomes of elderly ICU patients is also limited as most studies have data for only 1-2 years following discharges from the hospital. With increased life expectancy, such longer-term data become highly relevant. (Mukhopadhyay et al., 2014).

There are few severity scoring system commonly used in critical care setting such as Acute Physiology and Chronic Health Evaluation (APACHE) score, Simplified Acute Physiology Score (SAPS) and Mortality Probabilty Model (MPM). Although these scoring systems use different variables and weights for classification of disease severity, they commonly monitor parameters such as heart rate, blood pressure, neurological state, and clinical data as these factors are significantly deviated from physiological normality in progression of critical disease. Old age and chronic disease are also captured by the scoring systems. Sequential Organ Failure Assessment (SOFA) score, which is based on organ failure over time to evaluate morbidity and multiple organ dysfunction are also used (Mohini Singh et al., 2019; A. Saleh et al., 2016; Gong Y et al., 2019)

APACHE II score is currently the most widely used method of severity scoring in the critically ill and an important parameter used to evaluate the prognosis of patients in the ICU. The APACHE II, which was published by Knaus *et al*. in 1985 as the updated version of APACHE I, excluded the patients aged 16 years or less, those with burn injuries and coronary artery disease and those with an ICU stay of less than 8 hours. It quantifies illness severity based on 12 basic physiologic parameters, including body

temperature, central arterial pressure, heart rate, respiratory rate, PaO2, arterial pH, serum Na+, serum K+, creatinine, hematocrit, white blood cell count, and Glasgow Coma Scale (GCS). These physiologic variables indicate the worst values recorded during the initial 24 hours of ICU admission and are combined with the degree of risk factors associated with increased age and chronic health evaluation outcomes (recent surgery, history of severe organ failure, and weakened immune system) to produce the severity score.

SAPS II, since developed in 1993, has been used as one of ICU scoring systems quantifying disease severity and predicting mortality and verified among surgical and internal medicine patients in large scale studies. Like APACHE II, it excludes the patients aged 16 years or less, those with burn injuries and those with a past history of cardiac surgery. This scoring system consists of 17 variables including 12 physiological variables, age, admission type (elective surgery, emergency surgery, and internal medicine) and three underlying diseases (acquired immunodeficiency, metastasis, and blood cancer). All measurements are completed within 24 hours after ICU admission and the resultant score can range from 0 to 163.

The MPM , developed in 1993, excludes children, burn injuries, coronary artery, and patients who had cardiac surgery as APACHE II does. It is used to predict hospital mortality based on partial physiological disorders, requiring fewer variables. MPM places more weight on chronic illness, concurrent illness, and age and less weight on acute physiological disorders, when compared with the APACHE.

SOFA is Sequential Organ Failure Assessment. It predicts mortality risk for patients in the intensive care unit based on lab results and clinical data. It is based on the degree of dysfunction of 6 organ systems. The score is calculated at admission and every 24 hours until discharge, using the worst parameters measured during the prior 24 hours.

30 days-mortality is one of the measurement for hospital quality rate used by The Centers for Medicare & Medicaid Services (CMS) under the US Department of Health and Human Services (HHS) . It is defined of deaths in the 30 days after either entering the hospital for a specific condition ie pneumonia, heart failure, myocardial infarct or chronic obstructive airway diasese (COPD) stroke; or post coronary artery bypass graft (CABG) surgery. It is because deaths after a longer time period may have less to do with the care the hospital provided and more to do with other complicating illnesses, patients' own behavior, or other care services patients received after they leave the hospital. For our study, we will use 30 days mortality specifically post intubation as our outcome for this study

CHAPTER 2: OBJECTIVE OF STUDY

2.1 General Objective

To study the characteristic of intubated elderly patients admitted to Hospital USM

2.2 Specific Objectives

1) To determine the proportion of mortality among intubated elderly patients.
2. To identify the characteristic of intubated elderly such as demographic profiles, functional status, comorbidities, indication of intubation, diagnosis upon admission, organ dysfunction and types of intervention and treatment received
3. To study the factors associated with mortality among intubated elderly patients.

CHAPTER 3: MANUSCRIPT

Title: FACTORS ASSOCIATED WITH MORTALITY OF INTUBATED ELDERLY IN HOSPITAL USM

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3.2 INTRODUCTION

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3.3 METHODOLOGY

3.3.1 Study centre and selection of patients

Hospital USM is a tertiary medical centre as well as teaching hospital containing 1 general ICU which consists of 10 beds, 1 high dependency ward (HDW) which consists of 16 beds, 1 TICU (trauma ICU) which consists of 12 beds, 1 SICU (Surgical Intensive care unit) and 1 Neurosurgical ICU which consists of 10 beds. All intubated cases related to non-surgical case will be admitted to ICU and HDW plus admission medical patient to TICU and SICU if intubated patients are more than bed quota. So for this study, it was conducted specifically in ICU, HDW with other medical patients in TICU and SICU.

Registration data of intubated elderly patients which admitted there from the emergency medicine department, general wards and other hospital from 1st November 2019 till 30th May 2020 were collected from ICU/HDW /TICU/SICU registration book. Then medical report summary of each patient were analysed from Hospital USM computer database and Medical Record of HUSM to ensure confidentiality. An additional follow up period of one month in June 2020 for intubated elderly which was discharged home from ward. Therefore, the total duration of this retrospective observation window will be 7 months**.**

Based on that, all intubated elderly patient at least 60 years olds which fulfil the criteria were selected for this study. The inclusion criteria were the elderly intubated patient aged 60 years old and above. The exclusion criteria were the non-intubated patient, was diagnosed as malignancy treated or not, post traumatic brain injury due to trauma

or moto vehicle accident (MVA) and patient who was admitted to ICU post elective procedure. Because this was a retrospective cross sectional study, therefore, no informed consent was required but need to obtained approval from The Human Research Ethics Committee of USM (JEPeM) .

3.3.2 Data collection

For data collection, proforma checklist had been created and used to extract only relevant data for this study. For the patients who were discharge home from hospital, we have checked online clinic registration date follow up whether patient turned up or not. If not, we contacted the survivors or relatives by phone and there were only 2 of them. The relatives were cooperative and appreciated us for the call.

This was the first study done in Malaysia specifically for geriatric patient. So there were multiple information and factors were collected, such as demographic profiles: age, gender, race and functional status of activity daily living (ADL), comorbidities. Other parameters such as diagnosis upon admission ie sepsis secondary to pneumonia, sepsis other than pneumonia, acute coronary syndrome, metabolic (HHS, DKA, Uremia) and upper gastrointestinal bleed. Sepsis definition was based on 2017 Surviving Sepsis Campaign (SSC) guidelines. For pneumonia, it included community acquired, hospital acquired and aspiration pneumonia. Sepsis other than pneumonia was sepsis due to intra-abdominal sepsis or musculoskeletal infection or urosepsis or central nervous system infection. For the causes of intubation, 4 common causes being chosen were respiratory distress, cardiac arrest, poor GCS and metabolic (HHS/DKA/Uremia).

For organ dysfunction, we used SAPS II score and SOFA score on admission to predict risk of hospital mortality. For easily calculation of SAPS II score, we had devided into 3 categories of severity which were high risk more than 80 points, intermediate risk 54 till 79 points and low risk 53 points and below based on Thermo Fisher Scientific 2020. Others were parameters of blood investigation such as full blood count which consisted of leukocytosis or leukopenia, anemia, thrombocytopenia or thrombocytosis and coagulopathy based on definition by World Health Organization (WHO). For biochemical parameters, we used hyponatremia, hypoalbuminemia which was defined as less than 35 g/L , random blood sugar on admission, in which hyperglycaemia was defined as blood glucose more than 7.8 mmol/l and blood glucose level for hypoglycaemia was less than 4 mmol/l based on Practical Guide to Inpatient Glycaemic Care 2019, Ministry of Health . For intervention or treatment patient received, we had chosen 5 interventions which were blood transfusion, vasopressor usage, tracheostomy, dialysis and cardioversion whether electrical or pharmacological or both. For intubation or ventilation duration we have divided into 2 variables, patient requiring ventilation machine less than 48 hours or more than 48 hours. It is because if patient had only intubated for less than 48 hours, it indicated that severity of the condition upon presentation [26]. Reintubation, weaning failure, length of intubation and length of hospital stay also being included.

3.4 RESULT

During 6 months period, there were total 155 intubated elderly patients aged 60 years old and above were admitted to ICU, HDW and few of them from TICU and SICU. From 155 people, only 115 patients were eligible for this study after excluding few criterias listed before. Other than that, 12 of them were intubated for elective procedure and surgical operation, 3 of them already diagnosed having malignancy with metastasis, 25 of them lack of variables more than 50% which some of them no documentation over hospital database, only simple summary and unable to trace old notes (hardcopy) from medical record as misplaced or missing.

From this study, there were 76 (66.1%) patients which belong to 30 days mortality and 39 (33.9%) patients who were survived. The highest number of patients who were both died and survived from age group of 60 to 69 years old, 43 (56.58%) and 24 (61.54%). The lowest count of patient who had 30 days mortality were age of 90 – 99 years old, only 1 patient.

From this study, mean age was 68.84 ± 7.310. No differences in gender (males n= 56, 48.7%, females n =59, 51.3%), with more Malays (n=112, 97.4%) compared to non-Malays (n =3, 2.6%). For functional status of activity daily living, most of the intubated elderly were dependent (n=66, 57.4%) while others were independent (n=49,42.6%). Most of the intubated elderly had at least 1 comorbid (n=108,93.9%) and few of them (n=7,6.1%), did not have any comorbid at all. Few common comorbidities were identified each of them, most of them had Type 2 Diabetes mellitus (n=78,67.8%)

followed by hypertension (n=91, 93.9%), coronary artery disease (n=37, 32.2%), chronic obstructive pulmonary disease (n=15,13%), chronic kidney disease (n=43, 37.4%), stroke (n=13,11.3) and others (n=40, 43.8%). From 4 major indication of intubation, most of the common cause was respiratory distress (n=59,51.3%) followed by poor GCS (n=36, 31.3%), cardiac arrest (n=15,13%) and metabolic (n=5,4.3%). For diagnosis upon admission, the most common was sepsis secondary to pneumonia (n=60, 52.2%) followed by sepsis other than pneumonia (n=31, 27%), acute coronary syndrome (n=22,19.1%), metabolic i.e. DKA, HHS or uremia (n=19,16.5%), acute stroke (n=3,.6%) and upper gastrointestinal bleed (n=8,7%).

For organ dysfunction, there are few of parameters used. Mean SAPS II score upon admission 59.4±14.006 equal to 50% mortality with most of the intubated elderly had intermediate severity (n=70, 60.9.1%) followed by low severity (n=35,30.4%). Mean SOFA score on admission 10.32±3.386, anaemia 10.2±2.98, serum albumin 31.23±6.9 and random blood sugar on admission 10.8±8.0. Comparing total white cell count, most of the patient had leucocytosis (n=82, 71.3%) than leukopenia (n=4, 3.5%). Other parameters were thrombocytopenia (n=37,32.2%), coagulopathy (n=73, 63.5%), hyponatremia (n=45, 39.1%), hypoglycaemia (n=6,5.2%), hyperglycaemia on admission (n=63,54.8%) and arrhythmia (n=39,33.9%). Regarding intervention and treatment, most of the patient received vasopressor usage (n=97,84.3%) followed by dialysis (n=58, 50.4%), blood transfusion (n=49, 42.6%) and tracheostomy (n=12, 10.4%). There were patients received cardioversion (n=27,23.5%) with electrical cardioversion (n=14,12.2%) and pharmacological cardioversion (n-20,17.4%).

For duration of ventilation or intubation, more of them were ventilated for more than 48 hours (n=72, 62.6%) with mean day 7.47±9.8 compared to patient intubated for less than 48 hours (n=43,37.4%). Weaning failure (n=28, 24.3%) and minimal of them requiring reintubation (n=14,12.2%). Mean length of hospital stay was 13.03±13.74.

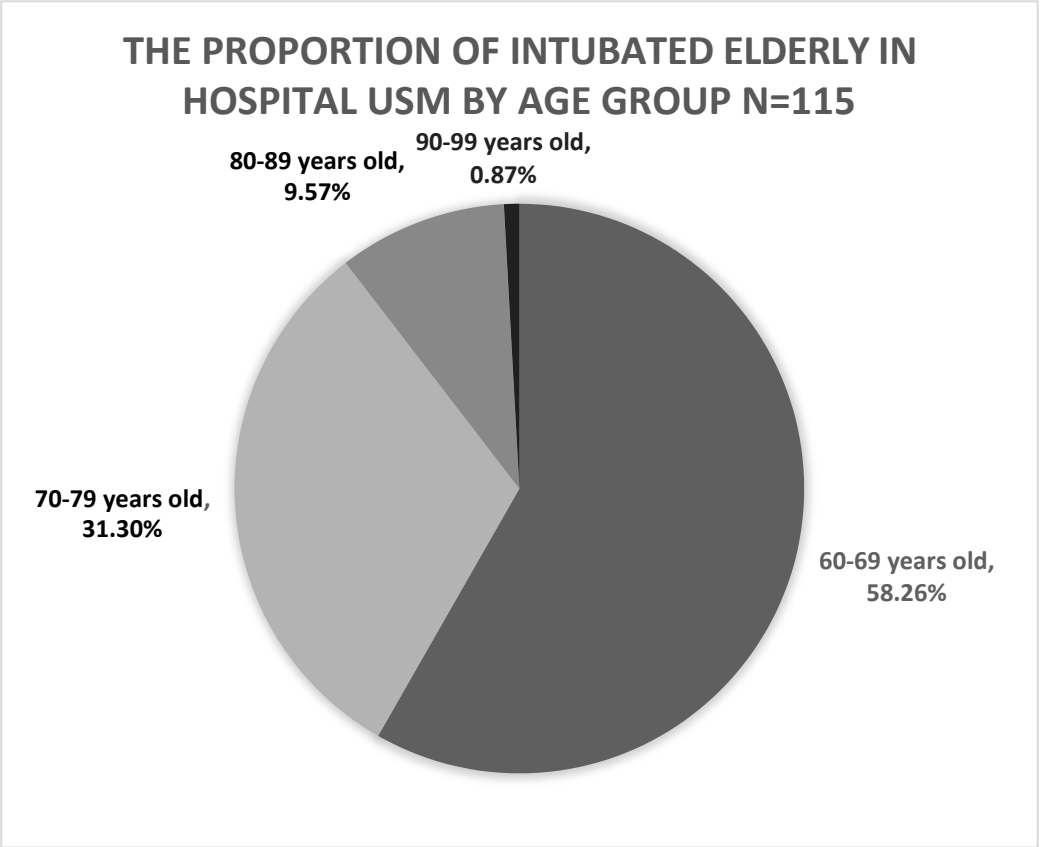

Figure 1 : The proportion of intubated elderly in Hospital USM by age group (n=115)

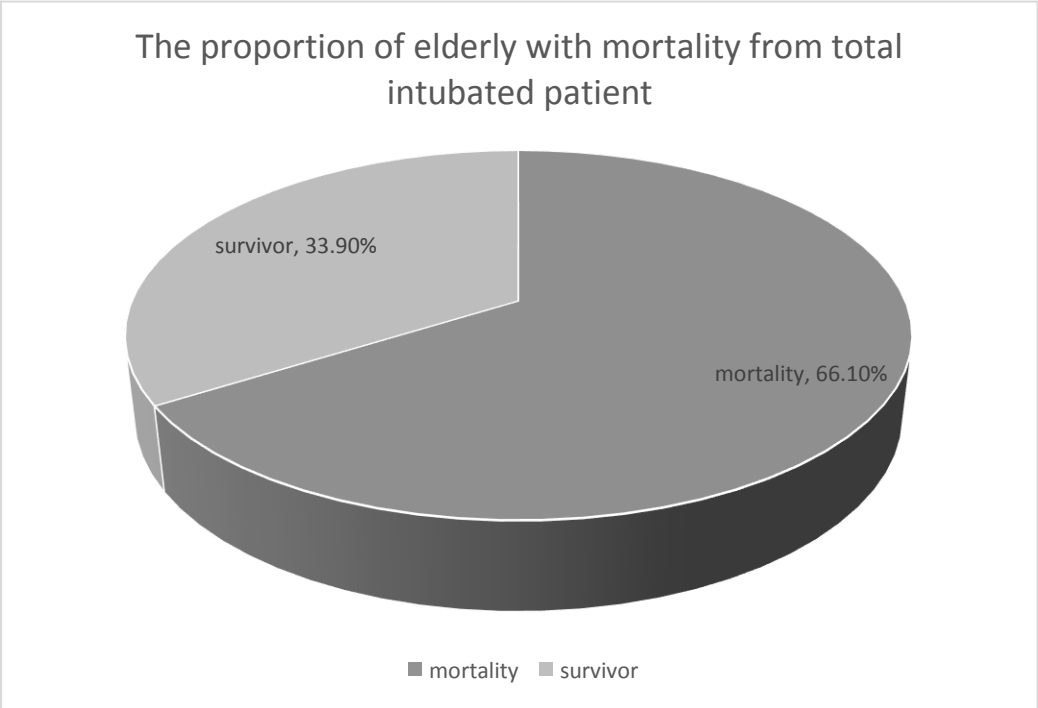

Figure 2 : The proportion of elderly with mortality from total intubated patient (n=115, mortality 76 patients, survivor 39 patients)

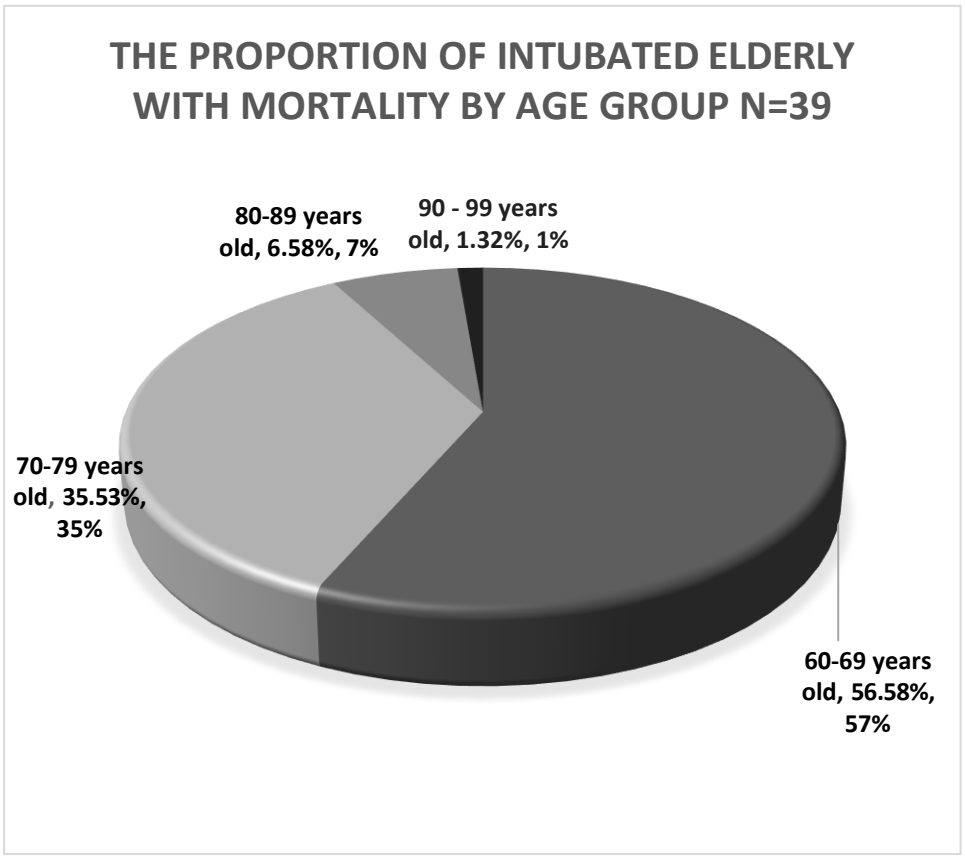

Figure 3 : The proportion of intubated elderly with mortality by age group (n=115)

3.4.1 Study outcomes

Chi square test and logistic regression were conducted to determine the association of factors with outcome of 30 days mortality among elderly intubated in Hospital USM.

3.4.1(a) Chi square test (Univariable analysis)

Chi square test was done to identify the indidual factors which affect the 30 days' mortality outcome of intubated elderly. There were 10 factors of variables which statistically significant.

Respiratory distress as indication for intubation was statistically significant associated with mortality outcome (n=34, 57.6%, p value 0.049) compared to other indication of intubation. Intubated patient due to acute stroke is associated with low risk of 30 days mortality and statistically significant (p value 0.014).

Regarding organ dysfunction, patient with intermediate severity SAPS II score (n=52, 74.3%), coagulopathv (n=54, 74%), hyponatremia (n=36, 80%), hypoalbuminemia (n=55,73.3%) and elevated transaminases (n=44,78.6%) were associated with 30 days mortality outcome compared to other factors while low severity SAPS II score (n=15,42.9%) not was associated with 30 days mortality outcome in which patient had good prognosis and statistically significant (p value 0.001).

Regarding intervention and treatment, patient with vasopressor usage have more risk of 30 days mortality (n=73,74.2%) compared to non-vasopressor usage

(n=25,25.8&). While patient with tracheostomy had good prognosis and not associated with mortality (n=9,75%) with p value of 0.001.

3.4.2(b) Logistic regression analysis

For logistic regression, few variables or factors with p value less than 0.25 from simple logistic regression and clinically important variables were selected for multiple logistic regression.

. There were 5 variables which statistically significant on multiple logistic regression with *p*-value of less than 0.05. Low severity score of SAPS II score and tracheostomy associated with survival while the other 3, elevated transaminases, vasopressor usage and ventilation less than 48 hours were highly associated with 30 days mortality. Details of result were presented below.

Preliminary main effect model was obtained after comparing model using forward LR and backward LR. Preliminary main effect model consisted of 5 variables. From the correlation matrix, it showed that the correlation between these variables were good thus indicated that there were no problems with multicollinearity. All possible two-way interactions were also checked and no significant interaction was found in the model.

Fitness of the model was tested and the results were as below:

i. Hosmer and Lemershow goodness of fit test was not significant with

p-value of 0.392, showing that the model was fit.

ii. Classification table showed that 85.2% were correctly classified.

iii. The Receiver Operating Characteristics (ROC) curve was 0.884, which was above the acceptable level.

Overall, the classification table and ROC showed satisfactory model fitness

Below are the details of interpretation for the association between the factors and 30 days mortality outcome:

1. Intubated elderly with SAPS II score 53 and below has low risk to get 30 days mortality outcome with 0.149 odds (Adj. OR 0.149; 95% CI 0.047,0.476; p <0.05), when other variables were adjusted.
2. Intubated elderly with elevated transaminases associated with high risk to get 30 days mortality with 3.373 odds (Adj. OR 3.373; 95% CI 1.133,9.10.040; p <0.05), when other variables were adjusted
3. Intubated elderly who underwent tracheostomy associated with low risk 30 days mortality of 94% (0.053odds) (Adj. OR 0.053; 95% CI 0.010,0.284; p <0.05), when other variables were adjusted
4. Intubated elderly with vasopressor usage associated with high risk 30 days mortality of 21.183 odds (Adj. OR 21.183; 95% CI 3.867,116.045; p <0.05), when other variables were adjusted
5. Intubated elderly with duration of ventilation less than 48 hours associated with high risk 30 days mortality of 5.610 odds (Adj. OR 5.610; 95% CI 1.351,23.303; p <0.05), when other variables were adjusted

3.5 DISCUSSION

In our study, mean age of elderly intubated were 68.84 ± 7.310 (60-93) with similar to other study in Europe (S. Vosylius et al., 2005) and Korea (Lee et al., 2016) compared to other study in China (Liang et al., 2017),Thailand (Suraseranivong et al., 2018) and Germany (Becker et al., 2015) with mean age more than 75 years old. It means most of the countries all over the world agree that elderly age was not a cut point to defer the management.

We have compared our study with study done in 2016 (Lai et al., 2016) in which that elderly patient have higher mortality rate if they have one out of 5 factors : age more than 80 years old, at least one comorbid, APACHE II scores upon admission > 15, serum albumin < 20g/l and requiring haemodialysis. In our study, only hypoalbuminemia ($\chi^2(1)=5.052$, p 0.025) was significant associated with 30 days mortality. We did not use APACHE II scores but using SAPS II score as based on our Malaysian registry of intensive care 2017.

In our study, patient with acute stroke have good prognosis ($\chi^2(1)= 6.003$, p 0.014). This also same with study done by Hung *et al*, in which patients were found to be associated with better outcomes if they were diagnosed with degenerative neurologic diseases or stroke.