Comparison of Mortality in Patients with Multiple Morbidities and with Single Morbidity Admitted at Acute Medical Unit, Pak Emirates Military Hospital, Rawalpindi, Pakistan

Nazia Sharif, Imran Fazal, Noor Ul Ain

Department of Medicine, Pak Emirates Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

ABSTRACT

Objective: to discover the impact of single and multimorbidity on the specific outcomes in patients admitted to a critical care setup, Acute Medical Unit, at Pak Emirates Military Hospital, Rawalpindi Pakistan.

Study Design: Cross sectional comparative study.

Place and Duration of Study: Acute Medical Unit, Pakistan Emirates Military Hospital, Rawalpindi Pakistan, from Aug 2018 to Jan 2019.

Methodology: All patients admitted to AMU were included in the study. Age was kept as the primary inclusion criteria for this study. Non-probability convenient sampling technique was used. After exclusion, the final sample size was 354. Data was analysed using SPSS version 22.0.

Results: Out of 354 patients that were included in the study, 215(60.7%) were males while 139(39.3%) were females. The patients were divided in 4 age groups i.e., 15-35 years, 36-55 years, 56-75 years and 76-90 years. Based on the history taken from the patient and the lab tests ordered, 216(61%) had more than one disease while 138(39%) had only a single disease. Most common comorbid diseases, found in our study were diabetes mellitus, hypertension, ischemic heart disease (IHD) and cerebrovascular accident, Mortality rates of patients with multiple morbidities were higher than those with single morbidity.

Conclusion: Multimorbidity is a great challenge faced by physicians of today. Our study found greater mortality rates in patients with multiple morbidities and greater age than those with single morbidities and lesser age.

Keywords: Co-morbidity, Multimorbidity, Mortality.

INTRODUCTION

Critical care in this era includes a subtle constellation of intensive monitoring as well as quick pharmacological and interventional measures in order to provide the best possible care to the patients, which in turn not only decreases the overall duration of hospital stay but also improves the outcomes in patients who get admitted to either an intensive care unit (ICU) or high dependency unit (HDU.) Outcomes of patients admitted directly to an ICU from the emergency department (ED) have come out to be better than outcomes of patients reaching these setups indirectly, that is from a general medical ward, thus reinforcing the benefits gained from critical care.[1]

Acute Medical Unit, AMU at Pak Emirates Military Hospital (PEMH), Rawalpindi, Pakistan is a critical care set up where patients are admitted either directly from the emergency department or shifted from the general medical ward, where they are provided not only with the required active treatment but also undergo diagnostic tests and imaging that is required to explore the disease with which they reported to in the ED, in the first place. A multidisciplinary approach is employed to provide the best possible care to patients involving doctors from various disciplines to reach the diagnosis, after which patients are either shifted to a general medical ward or discharged in some cases and they are further guided for continuation of treatment on outpatient basis.

Multimorbidity is a great challenge faced by the clinicians as well as the government.[2] According to WHO, having two or more chronic conditions at one time is multimorbidity and this results in greater debility and functional deterioration and greater chances of mortality.[3,4] One of the most common multimorbidity pattern observed is the occurrence of cardiovascular and metabolic diseases together.[5] As described in the Lancet article Diabetes and Hypertension: the bad companions,' elevated blood pressure is recorded in over two third of patients with diabetes mellitus type-2.[6] Similarly, the co-occurrence of various chronic diseases has marked impact on the severity of the predominant illness that brings a patient to hospital and warrants an ICU admission in most, especially elderly >65 years of age. Length of

Correspondence: Dr Nazia Sharif, Department of Medicine, Pak Emirates Military Hospital, Rawalpindi Pakistan

hospital stay is determined by various factors including multimorbidity, severity of acute illness and socioeconomic and demographic factors.[7] But overall mortality is greatly affected by the co-occurrence of various morbidities where the long term discharge and health care plan aims to create a physiological balance with the help of lifestyle and pharmacological therapies in the presence of various interacting pathologies.[8]

This study was designed to discover the impact of single and multimorbidity on the specific outcomes in patients admitted to a critical care setup, that is, Acute Medical Unit, AMU at Pak Emirates Military Hospital (PEMH), Rawalpindi Pakistan Very little data is available comparing the impact of single and multiple co morbidities on the outcomes of patients admitted to this facility so this study specifically looks to explore how multiple co morbidities influence mortality and severity of illness in patients admitted to AMU.

METHODOLOGY

The cross sectional comparative study was conducted at Acute Medical Unit, Pakistan Emirates Military Hospital, Rawalpindi Pakistan, from August 2018 to January 2019 after taking due consent and permission from the Ethical Review Committee of the Institute.

Inclusion Criteria: All patients admitted to Acute Medical Unit at Pak Emirates Military Hospital Rawalpindi were included in the study

Exclusion Criteria: Patients less than 15 years of age or greater than 90 years of age were not included.

A well-structured, pre-tested questionnaire was administered to all the patients admitted in AMU and was duly filled by the doctors, conducting the study. The questionnaire contained questions to recognise the primary disease of the patients with which they were admitted, the presence or absence of any co-morbidity in the study population and the final outcomes of the patients, with positive outcome being either discharged or considered stable enough to be shifted to medical ward and negative being, death of the patient. Patients were selected through non-probability convenient sampling technique. All questionnaires were filled with informed consent of the patients. A sample size of 377 was calculated using WHO sample size calculator with margin of error 5% and confidence interval 95%. Keeping this in view, 24 questionnaires were discarded either due to age limitation or due to incomplete information and thus the final sample size came out to be 354.

Data was analysed using SPSS-22 and Microsoft Xcel. Mean and Standard Deviation was calculated for the continuous variables. A comparison of mortality in patients with multiple morbidities and with single morbidity admitted at AMU, was drawn.

The main limitation of our study was that the long term outcome of the patients, with either single morbidity or multiple morbidities, shifted to medical ward couldn't be assessed. Thus, outcomes of patients for their duration of stay in AMU was assessed only.

RESULTS

Out of 354 patients that were included in the study, 215(60.7%) were males while 139(39.3%) were females. The patients were divided in 4 age groups i.e. 15-35 years, 36-55 years, 56-75 years and 76-90 years. 74(20.9%) patients belonged to age group of 15-35 years, 100(28.2%) patients belonged to the age group 36-55 years, maximum number of patients fell in the age group of 56-76 years .i.e., 137(38.7%) and 43(12.1%) of patients belonged to the age bracket of >76 years, up to 90 years of age. First part of the questionnaire focused on identifying the primary disease with which the patients were admitted in AMU. Respiratory illnesses with which patients presented included acute exacerbation of COAD, respiratory failure and post TB bronchiectasis, cardiovascular conditions included myocardial infraction, heart failure and thromboembolism, gastrointestinal and hepatobiliary conditions included acute gastroenteritis, hepatitis B or C associated chronic liver disease, mostly with decompensation .i.e. variceal bleed or hepatic encephalopathy. Some had presented with either acute, chronic or acute or chronic renal failure. Some with cerebrovascular accidents or seizures secondary to meningitis, encephalitis, while others with endocrinological emergencies most common being diabetic ketoacidosis, DKA. Infectious diseases with which patients presented included malaria and dengue with acute presentation being high grade fever while presented with deterioration due to an underlying neoplastic disorder and some had presented with various other illnesses like snake bite, flare of systemic lupus erythematosus etc. Figure-1 shows the percentages of presentation of these diseases.

Patients were inquired about the presence of various comorbid diseases and some lab tests were ordered in order to check the chronicity of the disease. Based on the history taken from the patient and the lab tests ordered, 216(61%) had more than one disease, while 138(39%) had only a single disease. Out of

216(61%) patients who had multiple morbidities, 129(36.4%) had just one comorbidity in addition to the primary disease that they presented with, 54(15.3%) had 2 comorbid conditions, 32(9%) had 3 while 5(1.4%) had 4 comorbid conditions. Most common comorbid diseases, found in our study were diabetes mellitus, hypertension, ischemic heart disease (IHD), cerebrovascular accident .i.e. having a previous history of stroke, chronic obstructive airway disease, chronic liver and kidney disease and tuberculosis. Figure-2 shows a comparison of the frequencies of the common comorbid illnesses.
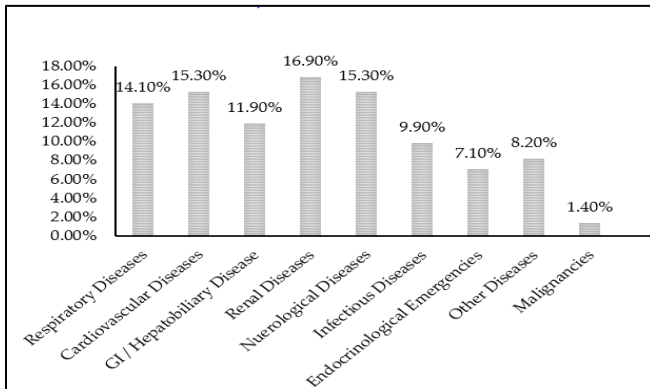

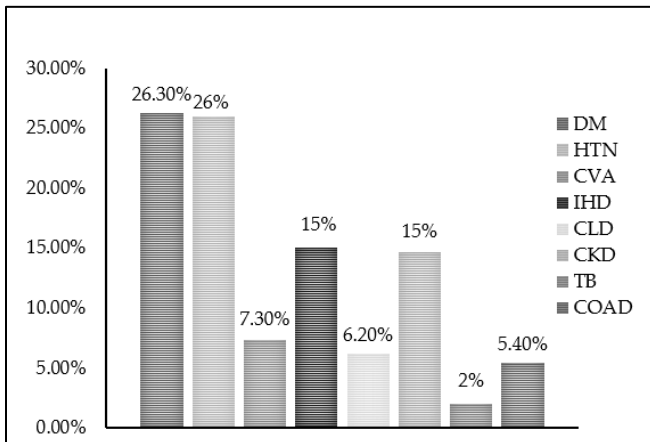**Figure-1:Frequencies of various diseases at presentation at AMU(n=354)**

Figure-2: Frequencies of various Common Comorbid Illnesses (n=354)

Outcomes of the patients were categorized as positive if they were either stable enough to be shifted to general medical ward or fit enough to be discharged and continue treatment and follow up on outpatient basis and negative if the disease lead to the death of the patient. A total number of 116(32.8%) patients which were included in our study died while 203(57.3%) were shifted to general medical ward and 35(9.9%) were discharged thus had positive outcomes. Our study found out that no comorbidity lead to greater frequency of positive outcomes as compared to multimorbidity, as shown in the Table-I.

Table-I: Comparison between presence of multiple morbidity and specific outcomes of the patients (n=354)

Multiple Comorbid Conditions	Death	Shifted to Ward	Dis charged	Total
Yes	88 (40.7%)	111 (51.3%)	17 (7.87%)	216
No	28 (20.2%)	92 (66.6%)	18 (13.0%)	138
Total	116 (32.7%)	203 (57.3%)	35 (9.8%)	354

A comparison of the age which was divided in 4 primary groups and mortality was drawn in our study population. Among all the patients aged 15-35 years (74,20.9%,) 67(90.54%) had a positive outcome while 7(9.4%) had a negative outcome. Out of 100(28.25) patients aged 36-55 years, 74(74%) had a positive outcome while 26(26%) died. Out of 137(38.7%) patients aged 56-75 years of age, 77(56.2%) lived while 60(43.7%) died. Lastly, patients greater than 76 years were 43(12.1%) and among them 19(44.1%) had a positive outcome while 24(55.8%) had a negative outcome. So, in conclusion, maximum number of patients aged 15-35 years had positive outcomes while maximum number of patients aged >76 years had negative outcomes meaning thereby that age was inversely proportional to the specific outcomes of the patients but significant association between the two couldn't be established. (*p*-value >0.05, Chi Square Test).

DISCUSSION

In this study, we found that the presence of multiple co-morbidities results in negative outcomes in patients despite of being admitted in a critical care setup. While those with a single morbidity had better outcomes i.e., either they were stable enough to be shifted to a general medical ward or they were considered fit for discharge and thus discharged. The common co-morbid conditions as found by our study were Diabetes Mellitus, Hypertension, Ischemic Heart Disease, Cerebrovascular Accidents, Tuberculosis, Chronic Kidney Disease, Chronic Liver disease and Chronic Obstructive Airway disease. Our study focused on the more common co-morbid conditions and the outcomes of patients with single or multiple illnesses. People with multiple morbidities had more risk and rates of mortality as found by our study and

study carried out on US Veterans, where the researchers studied mortality rates in 11 chronic conditions.[9]

Multimorbidity in octogenarians is usually determined better by profiles of clusters of conditions rather than the presence or absence of any single condition.[10] As described in the Lancet, elevated blood pressure is recorded in over two third of patients with diabetes mellitus type-2.[6] Medical therapy and lifestyle modifications are usually considered the preferred therapeutic strategies for elderly as the rate of complications and risk of mortality is found to be higher in patients undergoing surgical interventions like that for lower limb claudication.[11]

Multimorbidity, as found by our study and many other studies worldwide is an emerging health problem and extensive research is being carried to study the patterns of multi-morbidity. Our study found the co-occurrence of diseases like diabetes mellitus and hypertension, hypertension and cerebrovascular accidents, hypertension and chronic kidney disease, based on the pathological changes that one disease brings in the body aggravating the effect of or causing the other disease. Yorkshire Health Study, which aims to study the patterns of multi-morbidity reports age, BMI and deprivation as the main factors associated with multi-morbidity.[12] The famous Alameda Count Study, defining co-morbidity as the occurrence of two or more diseases together, reinforces a significant association of multimorbidity and 17 year mortality rate as well.[13]

The economic burden and cost of multimorbidity is on the rise irrespective of the outcomes of patients.[14] Our study focused mainly on the outcomes of patients but many researches have revealed this important aspect that the health care cost of patients with multimorbdity is higher than those with single morbidity.[15] The burden of multimorbidity mainly rests with the third world countries, with low incomes and hard pressed health care services due to population explosion.[16] One study found out that among uninsured patients, those with a history of cancer had greater mortality risk by CCI (Charlson Comorbidty Index) than those without. Chronic conditions such as diabetes mellitus, cerebrovascular disease, and chronic pulmonary diseases existed in patients with cancer histories, affecting their mortality risk.[17,18] Likewise, patients with chronic illnesses are a source of greater economic burden on facility that offer free medical services as reported by many studies.[15]

CONCLUSION

Multimorbidity is a great challenge faced by physicians of today. Our study found greater mortality rates in patients with multiple Morbidities and greater age than those with single morbidities and lesser age. The common co-morbid conditions as found by our study were Diabetes Mellitus, Hypertension, Ischemic Heart Disease, Cerebrovascular Accidents, Tuberculosis, Chronic Kidney Disease, Chronic Liver disease and Chronic Obstructive Airway disease.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

NS & IF & NUA: Conception, study design, data acquisition, data analysis, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Molina JAD, Seow E, Heng BH, Chong WF, Ho B. Outcomes of direct and indirect medical intensive care unit admissions from the emergency department of an acute care hospital: a retrospective cohort study. BMJ Open 2014; 4(11): e005553. https://doi: 10.1136/bmjopen-2014-005553.
2. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B, et al. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. The Lancet 2012; 380(9836): 37-43. https://doi: 10.1016/S0140-6736(12)60240-2.
3. Zimmerman JE, Kramer AA, Knaus WA. Changes in hospital mortality for United States intensive care unit admissions from 1988 to 2012. Crit Care 2013; 17(2): R81-R. https://doi: 10.1186/cc12695.
4. Johnston MC, Crilly M, Black C, Prescott GJ, Mercer SW. Defining and measuring multimorbidity: a systematic review of systematic reviews. Eur J Public Health 2018; 29(1): 182-189. https://doi: 10.1093/eurpub/cky098.
5. Schafer I, von Leitner EC, Schon G, Koller D, Hansen H, Kolonko T, et al. Multimorbidity patterns in the elderly: a new approach of disease clustering identifies complex interrelations between chronic conditions. PloS one 2010; 5(12): e15941. https://doi: 10.1371/journal.pone.0015941.
6. Ferrannini E, Cushman WC. Diabetes and hypertension: the bad companions. The Lancet 2012; 380(9841): 601-610. https://doi: 10.1016/S0140-6736(12)60987-8.
7. Hedinger D, Braun J, Kaplan V, Bopp M. Determinants of aggregate length of hospital stay in the last year of life in Switzerland. BMC health services research 2016; 16(1): 463. https://doi: 10.1186/s12913-016-1725-7.
8. Wallace E, Salisbury C, Guthrie B, Lewis C, Fahey T, Smith SM. Managing patients with multimorbidity in primary care. BMJ: Br. Med. J 2015; 350: h176. https://doi: 10.1136/bmj.h176.
9. Lee TA, Shields AE, Vogeli C, Gibson TB, Woong-Sohn M, Marder WD, et al. Mortality rate in veterans with multiple chronic conditions. Journal of general internal medicine 2007; 22(1): 403-407. https://doi: 10.1007/s11606-007-0277-2.

10. Teh RO, Menzies OH, Connolly MJ, Doughty RN, Wilkinson TJ, Pillai A, et al. Patterns of multi-morbidity and prediction of hospitalisation and all-cause mortality in advanced age. Age and ageing 2018; 47(2): 261-268. https://doi: 10.1093/ageing/afx184.

11. Erben Y, Mena-Hurtado CI, Miller SM, Jean RA, Sumpio BJ, Velasquez CA, et al. Increased mortality in octogenarians treated for lifestyle limiting claudication. Catheterization and cardiovascular interventions: official journal of the Society for Cardiac Angiography & Interventions 2018; 91(7): 1331-1338. https://doi: 10.1002/ccd.27523.

12. Li J, Green M, Kearns B, Holding E, Smith C, Haywood A, et al. Patterns of multimorbidity and their association with health outcomes within Yorkshire, England: baseline results from the Yorkshire Health Study. BMC public health 2016; 16(2): 649. https://doi: 10.1186/s12889-016-3335-z.

13. Seeman TE, Guralnik JM, Kaplan GA, Knudson L, Cohen R. The health consequences of multiple morbidity in the elderly. The Alameda County study. Journal of aging and health 1989; 1(1): 50-66. https://doi: 10.1177/089826438900100104.

14. Ording AG, Sorensen HT. Concepts of comorbidities, multiple morbidities, complications, and their clinical epidemiologic analogs. Clinical epidemiology 2013; 5(1): 199-203. https://doi: 10.2147/CLEP.S45305.

15. Rahman S, Mirza AS, Wathington D, Green S, Mayers Y, Iranmanesh E, et al. Chronic disease and socioeconomic factors among uninsured patients: A retrospective study. Chronic illness 2019:1742395319828430.

16. Navickas R, Petric VK, Feigl AB, Seychell M. Multimorbidity: What do we know? What should we do? Journal of comorbidity 2016; 6(1): 4-11. https://doi: 10.15256/joc.2016.6.72.

17. Mirza AS, Pabbathi S, Lu Y, Ayoubi N, Ewing A, Jaglal M, et al. Comorbidities, risk, and socioeconomic factors of uninsured cancer survivors. Medicine 2018; 97(47): e13121. https://doi: 10.1097/MD.0000000000013121.

18. Brusselaers N, Lagergren J. The Charlson Comorbidity Index in Registry-based Research. Methods of information in medicine 2017; 56(5): 401-406. https:// doi: 10.3414/ME17-01-0051.

....