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ECONOMIC BURDEN OF UNSTABLE ANGINA/NON-STEMI USING DIFFERENT HEALTH CARE PARAMETERS IN KARACHI

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ABSTRACT

Unstable angina (UA) and non ST segment elevation myocardial infarction (NSTEMI) is one of common ischemic sign of acute coronary syndrome (ACS), a serious emergency medical condition and majority of patients admitted with chest pain, affecting citizens at younger ages leading to more death and disability in low- and middle-income countries thereby having a greater economic impact. The study aim was to determine the economic burden of unstable angina in hospitalized patients by analyzing the cost of different health care parameters in public and private hospitals of Karachi. A prospective study was conducted among hospitalized UA/NSTEMI patients from September 2013 to February 2014. Data was analysed and results were obtained with the help of statistical software SPSS version 20.Overall 227 patients of UA/NSTEMI admitted in private and public hospitals. Majority of them were males 66.5% while 33.5% were females presented with chief complaint of chest pain 41.4%. UA found to have 58.1% and NSTEMI 41.9%. Total hospitalization cost has been estimated approximately $ 34485. Factors like accommodation cost, laboratory charges, medicines cost and angiography contributed differently to increase the economic burden as $ 9675 and $ 6002 whereas significant financial load found to be from medicines and angiography $ 6550 and $12247respectively. Despite advances in treatment, unstable angina/ non ST elevation myocardial infarction UA/NSTEMI presents an enormous medical, social, and economic burden on individuals of Karachi.

Key words: Economic burden, unstable angina/non-ST elevation MI

INTRODUCTION

Acute coronary syndrome (ACS) is a large source of hospitalization worldwide comprised of unstable angina (UA) and closely related non-ST segment elevation myocardial infarction (NSTEMI) and ST segmented elevation myocardial infarction (STEMI). Such broad spectrum of disease involves an imbalance of oxygen demand that greatly reduce the blood flow to the myocardium due to thrombus formation and nearby obstructs coronary vessels, causing disability and has profound risk towards myocardial infarction (MI) leading to sudden stroke or cardiac death [1,2].This life threatening disorder mainly described by clinical manifestation of atherosclerosis and its severity depends on the area of

coronary blockage prone towards significant mortality and morbidity [14]. With the trend towards globalization, socioeconomic, cultural and demographic transitions are taking place in many less developed countries, UA/NSTEMI has become an important contributor to the total burden of disease and death in many countries of the developing world. Economic considerations for such patients are an important element of health care assessment and the approval of medicines for UK National Health Service (NHS). Systematic reviews and meta-analysis support economic evaluations [3].

Incidence of Unstable Angina: Acute coronary syndrome (ACS) is the major sign of ischemic heart disease (IHD) which in turn is a key part of

cardiovascular diseases; however in Pakistan IHD is the 2nd leading source of death contributing to 11% of all deaths **[4].** The National Centre for Health Statistics reported 1 433 000 hospitalizations for UA or NSTEMI in U.S **[5].** Moreover occurrence of unstable angina was approximately 6 out of every 10,000 people in U.S **[6].** About 15% of UA/NSTEMI patients die or experience reinfarction within 30 days **[7].** Among 9508 patients with angina in Scotland, the incidence was found to be higher in males (1.8/1000) comparative to females (1.4/1000) which is common with increased age and socioeconomic deficit **[8].** In South Korea the prevalence of unstable angina was 97,522 in 2004 and number of patients increased up to 160,395 in 2009 with approximately 64.1% of patients of 60 years old **[9].**

MATERIALS AND METHODS

Study design: This is a prospective study done in Karachi, Pakistan

Study population: Economic burden of UA/NSTEMI was determined in two hospitals located in Karachi. This study was carried out mainly at largest government cardiovascular hospital. Data was also collected from other private tertiary care hospital. Total 227 patients with unstable angina (UA) and non ST-elevated myocardial infarction (NSTEMI) were admitted in both hospitals within the duration of six months (September 2013 to February 2014). Although the management and treatment of UA/NSTEMI clearly depend on the severity of the symptoms being experienced, the presence of symptoms should be treated as a medical emergency so all patients undergo a 12-lead electrocardiogram (ECG) to determine the type and severity of the ACS event. The inclusion criterion for the research was a patient admitted overnight with a suspected or definite unstable angina/NSTEMI after confirmation of investigational tests. Consecutive data collection practice was maintained to assure the uniformity and accuracy during the course with the ability of unfunded clinicians and nurses.

Study tool: The data was collected through the questionnaire designs to have relevant questions regarding cost assessment associated with UA/NSTEMI. Study carried out after taking written consent from patients/relatives. The questionnaire assessed the initial brief details of participants comprises of patient demographics (name of patient, age, gender and symptoms). On the other hand, direct health care cost utilized by the UA/ Non-STEMI patients were assessed in admitted patients of both

hospitals including emergency fee, room/ward charges and ICU/CCU cost, diagnostic examinations charges of lipid profile and cardiac biomarkers (Troponin I). Moreover non- invasive cardiac investigational checks belongs to electrocardiogram (ECG), echocardiography (Echo), and exercise tolerance test (ETT) and diagnostic cardiac catheterization procedures like angiography. Therapeutic drug cost involves low molecular weight heparin LMWH enoxaparin sodium and fondaparinux during hospitalization. For such purpose, medical information of same individual was collected from the patient's medical profile on request from hospital admission.

Study Period: About 227UA/NSTEMI patients completely filled the questionnaire, their medical record were entirely analysed from September 2013 to February 2014 in order to assess the economic burden.

Ethical approval: Permission was obtained before conducting the studyfrom the ethics committee of the hospitals as well as administration department of Karachi University.

Data analysis: Data was analyzed statistically using software SPSS version 20. Frequency tables and descriptive statistics were applied to identify the significant association among variables.

RESULTS

Cost Evaluation: The direct health care system costs related to UA/NSTEMI mostly composed of inpatient and pharmaceutical costs, since in-hospital procedures and drug therapy are the most important and vital part of treatment. Type of hospitalization cost refers to out-of-pocket expenses incurred by the patient or the patient's family during hospitalization since such charges falls as burden for disease on an individual when concerned wellbeing. The costs of emergency room (ER), ICU/CCU, general and medical wards were obtained from the both hospitals ranging from lowest possible rate to expensive rate. Cost estimation for the accommodation and diagnostic procedure based on the charges obtained from the study settings which depended on the type of room the patients stayed in. Possibility of discrepancy and corresponding increase in costing of health care services varied due to difference of charges among community and private sectors.

Total 227 patients of UA/NSTEMI admitted in private and public hospitals. Majority of them were

males 151(66.5%) while 76(33.5%) females presented with chief complaint of chest pain 94(41.4%), vomiting with chest discomfort 54(23.8%), shortness of breath 48(21.1%) and loss of consciousness 31(13.7%). UA found to have 132 (58.1%) and NSTEMI 95(41.9%) shown in figure1. Increased number of 91(40%) UA/NSTEMI events were found in both genders within age group of (55-64 years) indicated by table 1. About 58 (25.6%) patients were belonging from lower family status presented by figure 2. Treatment, diagnostic and investigational tests utilized by patients given in table 2. Direct cost analysis of different parameters associated with UA/NSTEMI was imputed in table 3. A number of patients visited emergency (ER) with the onset of chest pain and all patients received primary care with low molecular weight heparin (LMWH) enoxaparin or fondaparinux. Around 151(66.5%) patients were directly shifted into general/medical wards from ER including 102(67.55%) were males and 49(32.4%) were females while remaining 76(33.5%) includes 49(64.4%) males and 27 (35.5%) females patients accounted an additional hospital cost in ICU/CCU rather than paid in wards during hospitalization due to allied co-morbidities. Total hospitalization cost has been estimated approximately $ 34485 with a significant portion of drug cost $ 6550 whereas angiography contribute high amount $ 12247 of total budget. The expected charge to treat a single episode of UA/NSTEMI found to have $151.92

DISCUSSION

Increase health care costs have developed a crucial burden globally. Health care is a right of citizenship which should not depend on individual income and wealth. Now- a- days expenditures are already on peak due to high living standard with advanced technologies. In third world country the cost of healthcare is usually borne through out-of-pocket payments. Healthcare delivery through the public sector comes in the form of public hospitals and facilities which are beset with funding problems. In any healthcare system, resources are finite and choices must be made about how best to spend limited budgets. The estimated five years cost for unstable angina in U.S was $40,581 expense belong to diagnostic and clinical facilities [10]. In Sweden, estimated direct treatment budget for a single unstable angina patient was 40,052 (Swedish krona)

on annual basis [11]. According to the Australian Institute of Health and Welfare (AIHW) data of 2009, 32,452 hospitalizations was due to unstable angina and direct health care cost afforded by a single patient was $577 including cost of inpatients, consultant fee, lab charges, pharmaceuticals products, other professional services [13]. Canada and Canadian Institute for health information data (2008-2009) indicate 25,040 hospitalization of UA in different Canadian province. The average hospital treatment cost intended for UA was $ 6,445 in Ontario province. Direct cost associated was $457, 097 including hospitalization cost, Physician costs and Pharmaceutical costs [15]. 52,296 hospitalizations due to unstable angina were reported in the UK during the year 2009 with the hospitalization costs of 25,298 (PoundsSterling). All expenses include stay in hospital, lab charges, physician fee and therapy cost [16]. The diagnosis of unstable angina new cases has found to be 500,000 patients in America on annual basis and cost related to admit patient was $9536 [12]. The expected cost of unstable angina has been estimated at $2.4 bn in 2009 [13]. However, management of unstable angina considered as expensive contributing financial load on an individual. Economic analysis facilitate monitoring of different parameters like decreased load of disease on patients, increase survival rates along with the satisfaction of care and cost.

CONCLUSION

Cardiovascular diseases have a profound adverse economic impact on individuals, societies and health care system. Economic burden found to be high in hospitalized patients of unstable angina or non-ST elevation myocardial infarction using different health care parameters in hospitals of Karachi. High costs of medical care with available limited resources have conducted a number of pharmacoeconomic analyses in many countries for further facilitations in developing the strategies to reduce burden of disease.
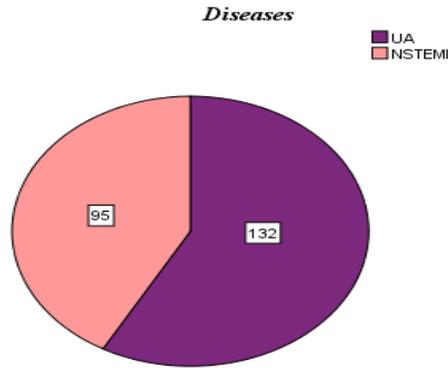
ACKNOWLEDGEMENTS

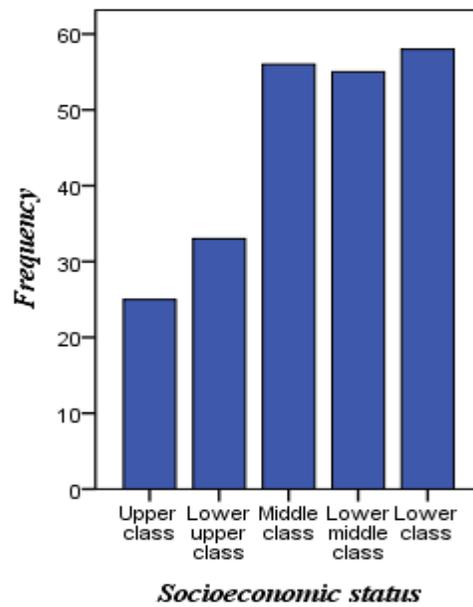**Figure 1: Number of diagnosed disease of unstable angina/non STEMI**

Figure.2- Socioeconomic Status of UA/NSTEMI patients

Table 1-Estimated number of hospitalized patients by age and gender

Age group	Males	Females	Total
35-44	11	9	20
45-54	41	11	52
55-64	55	36	91
65-74	38	17	55
75 +	6	3	9
Total	**151**	**76**	**227**

Table 2- Health care resources utilized during hospitalization (N=227)

Health care resources	Frequency (%)
N	**Patients (%)**
Drug therapy	
Enoxaparin sodium	166 (73.1)
Fondaparinux	61 (26.9)
Diagnostic tests in hospital	
Lipid profile	129 (56.8)
Cardiac biomarker (Troponin)	167 (73.6)
Investigations in hospital	
Chest X-ray	166 (73.2)
Electrocardiogram (ECG)	136 (59.8)
Echocardiogram (Echo)	80 (35.3)
Exercise treadmill test (ETT)	96 (42.3)
Accommodation	
Emergency visit	227 (100)
ICU/CCU visit	76 (33.5)
General/Medical Wards	227 (100)
Coronary angiography	
Angiography	81 (33.7)

N= number of patients, Patients with unstable angina (UA), Non- ST Elevated myocardial infarction (NSTEMI)

Table 3- Estimated cost analysis of direct health care indicators for UA/Non-STEMI (N=227)

Variables	Mean (PKR)	Cost (PKR)	Cost ($)
Total hospitalization cost	15009.1	3407068	34485.39
Total accommodation cost	4211.01	955900	9675.35
Laboratory charges	2612.37	593008	6002
Medicines cost	2850.93	647160	6550
Angiography	5330.41	1210002	12247.30

Patients with unstable angina (UA), Non- ST Elevated myocardial infarction (NSTEMI) (1 PKR=0.010 USD) 2014

REFERENCES
1. Grech ED, Ramsdale. BMJ, 2003; 326: 1259-61.
2. Thygesen KA, Alpert JS. Current Cardiology Reports, 2001; 3(4): 268-72
3. Dyfrig A. Br J Clin Pharmacol. 2012; 73(6): 968–72.
4. Butt Z, Shahbaz U, Hashmi A, Naseem T, Khan MZ, Bukhari MH. Annals, 2010 ; (1): 55-8
5. Braunwald E, Elliott MA, John WB, Robert M. Circulation, 2000; 102: 1193-
6. Sarkees M, Bavry A. Am Fam Physician, 2009; 80 (4): 383-84.
7. Turpie AG. Am J Manag Care, 2006; 16: 430-4
8. Murphy NF. Heart, 2006; 92:1047-54
9. Kim J, Lee E. BMC, 2013; 13: 55.
10. Ellison H, Joel W, Antonio M. Am J Cardiol, 1990; 65(7): 432-40.
11. Andersson F, Kartman B. Pharmacoeconomics, 1995; 8(3): 233-44.
12. Buysman E, Brixner D. Am Health Drug Benefits, 2011; 4(6): 353-61
13. The economic costs of heart attacks and chest pain (Acute Coronary Syndrome) Access Economics, 2009
14. Baroletti S, Cina J, Tsilimingras K, Fanikos J. Aventis Pharmaceuticals support group, 2005.
15. Zeneca A, Roby K, Wilsdon T, Cannolly S, Sauri L. Charles River Associates, 2010
16. Roby K, Wilsdon T, Connolly S, Sauri L. Charles River Associates, 2010