

Morbidity pattern and outcome of patients admitted in a coronary care unit: a report from a secondary hospital in southern region, Saudi Arabia

Mushabab A. Al-Ghamdi

Internal Medicine Department, University of Bisha, Bisha, Kingdom of Saudi Arabia

ABSTRACT

Background: There is limited information about the clinical profile and outcome on patients admitted to a coronary care unit (CCU) in Saudi Arabia is available.

Objective: The aim of this study was to evaluate reasons for admission, clinical characteristics, outcome and predictors of outcome in CCU patients.

Materials and methods: The data of 392 patients admitted to the CCU of a secondary care centre in southern region of Saudi Arabia from 1 January 2017 to 31 December 2017 were collected. Data that were extracted from the patients included demographics, admission diagnosis and outcome.

Results: A total of 392 patients, comprising 305 (77.81%) males and 87 (22.19%) females, were admitted to the CCU. Their mean age was 64.62 ± 15.7 . The most common cause of admission was acute coronary syndrome (63.3%), the majority (97.2%) of whom were above 50 years of age (Table 2). Thirty-one patients died. This figure accounted for 7.7% of all the patients admitted to the CCU and 23.4% of the patients that were fully managed in the CCU. The majority of the patients that died were those with cardiac arrest (12 out of 16). Acute coronary syndrome ($p = 0.029$), cardiac arrest ($p = 0.000$) and age greater than 50 years ($p = 0.000$) were associated with death in the study patients. However, cardiac arrest ($p = 0.002$) and age greater than 50 years ($p = 0.017$) were independent predictors of death in the study patients.

Conclusion: The reasons for admission to the CCU were acute coronary syndrome, heart failure and cardiac arrest. Mortality among CCU patient was comparable to reports elsewhere. Cardiac arrest and age greater than 50 years were independent predictors of death.

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KEYWORDS

CCU; admission; outcome

1. Introduction

Cardiovascular disease (CVD) is now recognized as the leading cause of death and disability worldwide [1], and as such, a number of the patients with cardiovascular conditions will require acute coronary care. Coronary care is increasingly becoming a very vital part of management of critically ill patients even in areas where facilities for its operation were, hitherto, not available. The care of critically ill patients is undoubtedly one of the most burdensome and onerous aspects of intensive care medicine. Because intensive care and coronary care attract a huge cost on the part of the health facilities and patients care givers, it is usually only offered to patients whose condition is potentially reversible and who have a good chance of surviving with the intensive care support [2] Like in other parts of the world [3], the demographics of Saudi Arabia population is progressively changing; so does the mortality recorded from heart-related disorders, resulting in increased admission of middle-aged individuals and elderly with complicated cardiac diseases. The rapid socioeconomic growth in the Gulf countries, which engendered a tremendous shift in lifestyle such as an

increased consumption of low quality cholesterol-laden foods and adoption of a sedentary lifestyle [4], has resulted in increase rates of CVD and associated risk factors among the Gulf population [4]. Consequently, the region witnessed a significant change in the cardiology workload for most of the secondary and tertiary health facilities necessitating incorporation of coronary care unit (CCU) into intensive care medicine over the years. King Abdullah Hospital CCU was established in 2000, it is an eight-bed unit with continuous monitoring facilities, cardiac specialist and multi-disciplinary cardiac team that have access to key cardiac investigations and interventions, at all times, but the percutaneous cardiac intervention (PCI) is not available. Because of regional variations that exist in the pattern of admissions to CCU, availability of data on morbidity pattern and outcome will assist the health care planners and providers in establishing an efficient health care policies and delivery. Besides, presence of such data will also help improve the approach to rational management of acute cardiac disorders. However, there is paucity of data as it relates to pattern and outcome of the patients managed in the CCU in the region, hence, the current study.

CONTACT Mushabab A. Al-Ghamdi  mualghamdi@ub.edu.sa  Internal medicine department, University of Bisha, Bisha 67713-3728, Kingdom of Saudi Arabia

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2. Methods

This retrospective study reviewed the admissions into the CCU of a secondary care centre in southern region of Saudi Arabia from 1 January 2017 to 31 December 2017. The hospital is an accredited centre and operates a well-equipped 8-bed CCU which admits patients with acute cardiac conditions, from accident and emergency unit, medical and surgical subspecialties.

CCU electronic records of all admissions, transfers out, discharges, leave against medical advice (LAMA) and deaths were utilized for the purpose of this study. Data extracted from the records included age, sex, race (Saudi or non-Saudis), diagnosis, duration of stay in the unit and outcome. Outcome was classified as transfers, discharges, LAMA and death. However, for the purpose of multivariate analysis, the outcome was dichotomized into alive and dead. Ethical approval was waived by the Ethics Committee of the hospital. As this is a retrospective observational study, confidentiality and anonymity was maintained.

3. Data analysis

Analysis of data was carried out using the 'Statistical Package for Social Sciences' (SPSS) program for Windows version 16.0 (SPSS Inc., Chicago, IL). Univariate analysis was carried out using Pearson Chi-square or Fisher exact test for categorical variables. Student *t*-test was used for comparison of mean in the case of normally distributed data. The variables that were significant on univariate analysis were subjected to multiple logistic regression model and the covariates were adjusted for each independent (regression) variable to find independent predictors of in-hospital mortality. $P < 0.05$ was adopted as statistically significant level.

4. Results

During the period of the study, a total of 392 patients, comprising 305 (77.81%) males and 87 (22.19%) females, were admitted into the CCU. Their mean age was 64.62 ± 15.7 , the mean age of the men was 63.62 ± 15.9 while that of their women counterpart was 69.38 ± 14.1 ($p = 0.001$). Three hundred and forty patients (86.7%) were of Saudi nationalities while 52 (13.3%) patients were foreigners. The distribution of diagnosis of cardiac conditions necessitating admission into CCU by their gender of the patients is as shown in Table 1. Out of the patients admitted, significantly more females had cardiac arrest and valve heart disease ($p = 0.001$ and $p = 0.000$ respectively). The most common cause of admission was acute coronary syndrome (63.3%), majority (97.2%) of whom were above 50 years of age (Table 2). However, more males ($p = 0.001$) had acute coronary syndrome.

Thirty-one patients died accounting for 7.7% of all the patients admitted into the CCU and 23.4% of the patients that were fully managed in the CCU (i.e., neither referred nor LAMA). Majority of the patients that died were those with cardiac arrest (12 out of 16 patients with cardiac arrest). Table 3 showed the distribution of the overall outcome of the patients by their diagnosis. Acute coronary syndrome ($p = 0.029$), cardiac arrest ($p = 0.000$) and age greater

Table 1. Distribution of aetiology of cardiac disorder by gender.

Etiology	N	Gender		P. value
		Male	Female	
Acute coronary syndrome	248	206	42	0.001*
Heart failure	83	66	17	0.627
Cardiac arrest	16	7	9	0.001*
Hypertensive emergencies	7	7	0	0.154
Arrhythmias	30	19	11	0.065
Valve heart disease	8	0	8	0.000*
Total	392	305	87	

*Statistically significant

Table 2. Distribution of diagnoses of the patients by their age group.

Age	Gender						Total
	ACS	HF	Cardiac arrest	Hypertensive emergency	Arrhythmia	Valve Disease	
< 50 yrs	7	23	0	7	16	0	53
> 50 yrs	241	60	16	0	14	8	339
Total	248	83	16	7	30	8	392

*Statistically significant

Table 3. Distribution of the overall outcome of the patients by their diagnosis.

Diagnosis	Outcome				Total
	Alive/discharged	Referred	LAMA	Died	
Acute coronary syndrome	40	173	28	7	248
Heart failure	31	19	21	12	83
Cardiac arrest	4	0	0	12	16
Hypertensive emergencies	7	0	0	0	7
Arrhythmias	16	14	0	0	30
Valve heart disease	0	8	0	0	8
Total	98	214	49	31	392

*Statistically significant

LAMA : Leaving Against Medical Advice

Table 4. Factors associated with death.

Parameters	Total	Outcome		P. value
		Dead	Alive	
Acute coronary syndrome	47	7	40	0.029*
Heart failure	42	12	31	0.919
Cardiac arrest	16	12	4	0.000*-
Hypertensive emergencies	7	0	7	–
Arrhythmias	16	0	16	–
Age > 50	86	28	58	0.000*
Presence of comorbidities	112	23	89	0.053
Gender (male)	73	15	58	0.374
Saudi nationality	116	29	87	0.420
Duration	30	11.27 ± 7.2	5.28 ± 6.2	0.438

*Statistically significant
SD: Standard Deviation

than 50 years ($p = 0.000$) were associated with death in the study patients. Heart failure, presence of comorbidity, hypertensive emergencies, presence of arrhythmia on admission and duration of the illness were not significantly associated with death (Table 4). However, after adjusting for confounder like acute coronary syndrome, cardiac arrest ($p = 0.002$) and age greater than 50 years ($p = 0.017$) were independent predictors of death in the study patients.

5. Discussion

To the best of our knowledge, the current study is the first of its kind from southern region of Saudi Arabia to evaluate the mortality profile and the outcome of the CCU admissions. Our data showed that patients cared for in CCU were quite heterogenous, the cases ranged from ACS or AHF to cases with non-ACS, non-AHF diseases. This observation emphasizes the importance of clinical and organizational challenges [5]. In our study, acute coronary syndrome was the most common cause of admission into CCU. This finding was consistent with BLITZ-3 registry study which was a multicentre, prospective, observational, nationwide study that enrolled 6986 consecutive in Italy [5]. Doğan et al., in a separate study conducted in Turkey, showed that the acute coronary syndrome accounted for 65% of all CCU admissions [6]. Nonetheless, some studies have shown that the epidemiology of CCU is with rising number of non-ACS subjects and with increasing numbers of elderly who were non-ACS subjects with multiple non-cardiac comorbidities admitted [7,8].

Acute heart failure (AHF) was the 2nd rated admission diagnosis after ACS in the current study. This finding is agreement with other studies [9], the BLITZ-3 Registry demonstrated that AHF is the most common admission diagnosis after ACS, and among elderly patients AHF prevalence rises significantly [9]. In Saudi Arabia, AHF is common and its prevalence is expected to rise in the near future due to aging and chronicity of ACS. Management of heart failure with a multi-professional approach improves outcomes for

patients; therefore, adoption of such approach will go a long way to reduce complications and, hence, stop the rising rate of admission into CCU and reduce mortality from heart failure. To this end, the role of cardiologist and specialist heart failure nurses in chronic disease management cannot be overemphasized [10].

Overall mortality of CCU admissions was 7.7% in this study. This figure is comparable to what obtains elsewhere. In the early 1990s, Tesky et al. reported a 13% mortality for patients admitted to the CCU in Ottawa, Canada [11]. Rotstein et al., on the other hand, reported a crude 30-day mortality rate of 5.4% for a hospital in Israel in the mid-1990s [12], a figure, which was slightly lower than the 7–8% CCU mortality rate in the USA from 1989 to 2006 reported by Katz et al. [13]. It is, however, worthy of note that the overall in-hospital mortality in the current study was relatively high (23.4%), a figure comparable to the crude mortality reported by Rotstein et al. in their study [12]. and reports of Chua et al. in which the overall in-hospital mortality was 20.6% [14].

Acute coronary syndrome, Cardiac arrest and age greater than 50 years were found to be associated with death in our study. Nevertheless, cardiac arrest and age greater than 50 years independently predicts death in the study patients. This finding is in keeping with the REPORT of Chua and his colleagues in their study in which age was the most important clinical variable predicting outcome [14].

Overall, the current study emphasizes the importance of a well-designed and equipped CCU in a society with rapidly changing cardiovascular demography like Saudi Arabia. The size of such unit will not only depend on the catchment area of the hospital in question but also on the availability of other high-dependency units within the hospital. Appropriate facilities for invasive and non-invasive monitoring are also mandatory. In addition, day-round availability of diagnostic tests will also have to be ensured for an effective operation of the CCU.

The current study is not without limitations, among other things; our study represents the evaluation of a single CCU and as such may not be generalized to other hospitals in the country. Nevertheless,

establishing databases and studying outcome trends adds to key knowledge about performance and health resource allocation. Moreover, important information about the mortality, as recorded in the current study, of CCU patients can also provide a guide in decisions making regarding the burden of treatment and success rates of heart-related disorders.

6. Conclusion

The primary reasons for admission into the CCU, in the current study, were acute coronary syndrome, heart failure and cardiac arrest. Mortality among CCU patient was comparable to reports elsewhere. Cardiac arrest and age greater than 50 years independently predict death in the patients.

Disclosure statement

No potential conflict of interest was reported by the author.

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