A cohort-study of patients suspected for MERS-CoV in a referral hospital in Saudi Arabia

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Ko and colleagues recently published predictive factors for pneumonia in patients infected with Middle East respiratory syndrome-coronavirus (MERS-CoV) [1]. The differentiation between MERS-CoV and non-MERS-CoV was evaluated in few studies with no significant findings [2–4]. In this study, we review a large cohort of patients who were admitted to one (Prince Mohammed bin Abdulaziz Hospital) of the 4 MERS-CoV reference centers under the umbrella of the Ministry of Health (MoH) to rule out MERS-CoV with the aim to compare MERS-CoV positive patients to non-MERS-COV patients. Prince Mohammed bin Abdulaziz Hospital (PMAH) is referral center for all MERS-CoV patients diagnosed in the central region based in Riyadh, Saudi Arabia. The study included all patients from April 1st 2014 to December 2016. MERS-CoV testing was done using nasopharyngeal swabs and tested using real time reverse transcriptase PCR as described previously [5]. In this cohort, we compared MERS-CoV patients to non-MERS-CoV patients. The comparison used percentage for categorical data and mean $\pm$ standard deviation (SD) for continuous data. A p value of < 0.05 was considered significant.

During the study period, there were a total of 2151 patients who were admitted for evaluation for MERS-CoV. Of those patients, 1856 (86.3%) were non-MERS-CoV, and 295 (13.7%) were MERS-CoV patients. Male gender was 61% among MERS-CoV patients and 53.7% among non-MERS-CoV patients (P = 0.019). There was no difference in the mean age of MERS-CoV patients (47.3 $\pm$ 17.8 years) compared with 554.6 $\pm$ 22.1 years in the non-MERS-CoV patients. Overall, the age group 21-40 and 41-60 years were more common among MERS-CoV patients (36.9% vs. 24.4% and 32.9% vs. 22.5%, respectively). Cough and shortness of breath were less common in the MERS-CoV than non-MERS-CoV patients (41.4% vs. 50.3% and 54.2% vs. 66%). Healthcare workers represented 14.9% and 2.6% (P = 0.0001) in the MERS-CoV than non-MERS-CoV patients, respectively. The mean WBC count was not significantly lower in

MERS-CoV vs. non-MERS-CoV patients (mean 7.47 vs 11.5, P =1). The case fatality rate was significantly lower in the non-MERS-CoV (9.2%) compared with MERS-CoV (20%) (P = 0.0001).

This is the largest cohort study of MERS-CoV and non-MERS-CoV patients. Previously, there were three case-control studies of MERS-CoV vs. non-MERS-CoV patients. The first study included 17 MERS-CoV patients and 82 non-MERS-CoV patients with a high mortality rate of 76% and 15% among MERS-CoV and non-MERS-CoV patients respectively. The second study included 80 MERS-CoV patients and was matched to 159 non-MERS-CoV patients with a recorded mortality rate of 10%vs. 4.4%. A third study from Saudi Arabia included 48 patients with MERS-CoV infection and 111 MERS-CoV negative patients. The study included patients from October 2012 to April 2014 and the case fatality rates were 35% and 22% respectively. The current study included a larger number of patients spanning a longer duration and the case fatality rate was only 20%. This case fatality rate was different in varioust hospitals and ranged from 28.6% to 63.6% [6]. The current study had a case fatality rate that is close to the South Korea rate and lower than the overall all rate (38.7%) and the Kingdom-wide rate of 36.5% [7]. The variability of the case-fatality rates may be related to host factors, co-morbidities, care provided and yet unidentified factors [6].

Most of the cases of MERS occurred in the healthcare settings [2,8]. The proportion of healthcare workers (HCWs) in these outbreaks is variable. In a study of 70 cases, at least 50% of the cases were acquired in the hospital setting [9]. In the 2014 Jeddah outbreak, there were 128 laboratory-confirmed cases in 14 hospitals between February 17 and April 26, 2014 [10]. Of these cases, 33% were primary cases and >60% (including 39 HCWs) were acquired within healthcare facilities. In the current study, HCWs represented 14.9% and 2.6% (P = 0.0001) in

the MERS-CoV and non-MERS-CoV patients, respectively. However, the hospital is a referral hospital for all MERS cases in the Riyadh region and thus the finding does not represent the transmission within the same hospital. In conclusion, the case fatality rate was higher in the MERS than non-MERS and healthcare workers were more common among MERS patients.

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Table 1: Comparison of characteristics of non-MERS-CoV and MERS-CoV patients

	Non MERS-CoV (Number)	Non-MERS-CoV (%)	MERS-CoV (Number)	MERS-CoV (%)	P value
Number	1856		295		
Male	997	53.7	180	61.0	0.0199
0-20	116	6.3	8	2.7	0.014
21-40	453	24.4	109	36.9	0.0001
41-60	417	22.5	97	32.9	0.0002
61-80	683	36.8	75	25.4	0.0001
81-100	187	10.1	6	2.0	0.0001
Abnormal CXR	1170	63.0	182	61.7	0.6505
Fever	1718	92.6	282	95.6	0.065
Symptoms	1814	97.7	252	85.4	0.0001
GI symptoms	228	12.3	32	10.8	0.5638
SOB	934	50.3	122	41.4	0.0047
Cough	1225	66.0	160	54.2	0.0001
Healthcare workers	48	2.6	44	14.9	0.0001
Mechanical ventilation	168	9.1	69	23.4	0.0001
Death	171	9.2	59	20.0	0.0001

Table 2: Comparison of the means between non-MERS-CoV and MERS-CoV patients

	Non-MERS-CoV	SD	MERS-CoV	SD	P value
Mean age	54.6	22.1	47.3	17.8	1.0
WBC	11.5	6.53	7.47	4.31	1.0
Hgb	125.8	27.1	129.1	25.1	0.037
Platelet	280	131.4	227	107.7	< 0.0001
PMN Absolute	14.72	128.0	9.46	65.0	0.29