Predictors of Mortality Among Confirmed, Symptomatic MERS Cases in KSA, 2012-2015

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Background

- ❑ Human coronaviruses (HCoVs) first described in 1960s and associated with the common cold.
- ❑ In 2003, Severe Acute Respiratory Syndrome (SARS) was identified, and in 2012, Middle East Respiratory Syndrome (MERS-CoV).
- ❑ SARS and MERS both have a relationship with the Acute Respiratory Distress Syndrome (ARDS), and both have high case fatality rates.
- ❑ 1,698 confirmed MERS cases reported globally from 26 different countries. Out of these, 609 patients have died (mortality rate ≈ 36%) (as of April 11, 2016).
- ❑ In Saudi Arabia alone, total of 1,371 confirmed MERS cases reported, of which 587 died (mortality rate ≈ 43%) (as of April 11, 2016).
- ❑ MERS cases have occurred in sporadic and clustering patterns.

Objectives

- ❑ Describe the survival experience of <u>confirmed symptomatic MERS patients</u> in the Kingdom of Saudi Arabia from September 2012 to December 2015.
- ❑ Look for factors significantly related to their survival experience.

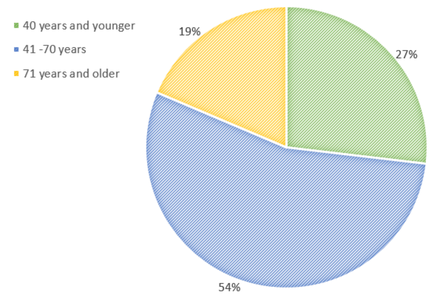
Methods

- ❑ Dataset received from Saudi's Ministry of Health (SMoH) for period of 2012 through 2015.
- ❑ Descriptive analysis and Cox Proportional Hazards Model were applied to address relationship between the survival of patients and variables of interest.

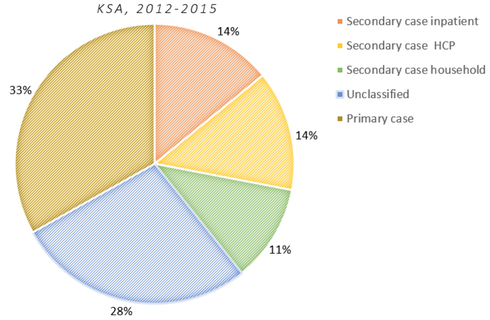
Results

- ❑ Total of 1,128 confirmed symptomatic MERS cases reported to SMoH from September 2012 through December 2015 (mortality rate = 48.67%).
- ❑ By age group, cases aged 71 and older had an 80% mortality rate, dropping to 50% in the 41-70 year old age group, and to 25% in the 40 and under group.
- ❑ Among those who died, 37.52% were primary cases, 31.69% were unclassified, 20.77% were secondary cases acquired from hospitals, 7.29% were secondary case household, and 2.73% were secondary case HCP.
- ❑ No significant association was observed between camel contact and mortality due to MERS.*

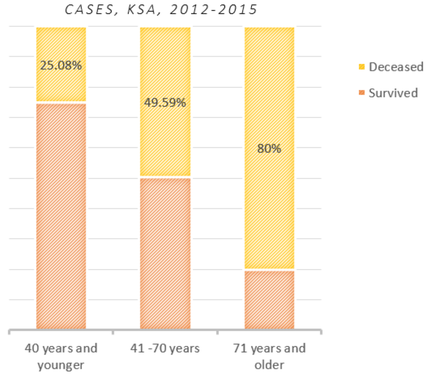
AGE DISTRIBUTION FOR CONFIRMED SYMPTOMATIC MERS CASES, KSA, 2012-2015



PROBABLE SOURCE OF INFECTION FOR CONFIRMED SYMPTOMATIC MERS CASES, KSA, 2012-2015



MORTALITY RATE BY AGE DISTRIBUTION FOR CONFIRMED SYMPTOMATIC MERS CASES, KSA, 2012-2015



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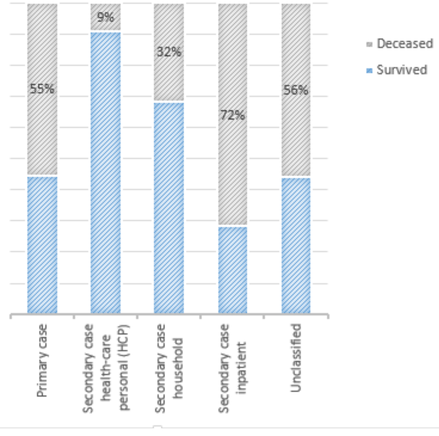

Results (cont.)

- ❑ Hazard of death among inpatients was 40.9% more than the hazard of death among primary cases.*
- ❑ Hazard of death among secondary case HCP was 18.5% of the hazard of death among primary cases.*
- ❑ Among individuals 71 years old or older, the hazard of death was 236% more than the hazard of death among individuals aged 40 and under.*

* Controlling for other demographic characteristics among patients diagnosed in the same year.

Hazard ratios of MERS mortality factors among confirmed symptomatic MERS cases, KSA, 2012-2015

			Unadjusted				Adjusted			
Variable	Level	Reference Group	HR	95% Lower CI	95% Upper CI	p-value	HR	95% Lower CI	95% Upper CI	p-value
Saudi / Non-Saudi		Non-Saudi	2.001	1.601	2.502	<.0001	1.300+	1.028	1.644	0.0285
Gender		Female	1.180	0.981	1.420	0.0786	0.881	0.727	1.067	0.1936
History of camel contact		Cases with no history of camel contact	1.204	0.869	1.668	0.2643	1.103	0.785	1.550	0.5716
Probable source of infection	2ndry case inpatient	Primary	1.481	1.177	1.862	0.0008*	1.409	1.105	1.798	0.0057*
	2ndry case HCP**		0.157	0.093	0.265	<.0001*	0.185	0.105	0.327	<.0001*
	2ndry case household		0.603	0.430	0.846	0.0034*	0.631	0.445	0.895	0.0099*
	Unclassified		1.073	0.876	1.314	0.4965	1.110	0.900	1.370	0.3281
Region	Eastern	Central	1.366	1.061	1.759	0.0156*	1.480	1.130	1.940	0.0045*
	Northern		1.592	0.973	2.602	0.0640	1.896	1.149	3.129	0.0123*
	Southern		1.022	0.648	1.612	0.9243	1.072	0.675	1.703	0.7690
	Western		1.232	1.016	1.493	0.0339*	1.346	1.087	1.667	0.0065*
Age (year)	41-70	40 and less	2.015	1.567	2.592	<.0001*	1.525	1.175	1.980	0.0015*
	71 and more		3.717	2.834	4.876	<.0001*	2.520	1.890	3.361	<.0001*
Year***	2012+2013	2015	1.234	0.953	1.596	0.1102	-	-	-	-
	2014		1.299	1.079	1.563	0.0057*	-	-	-	-

* Statistical significance ** HCP: Health Care Personal *** Year was stratified in the adjusted model + The adjusted model does not include age, due to the strong association between age and nationality. In particular, 24% of Saudi are 71 and older, compared to 6% of non-Saudi are 71 and older

Discussion

- ❑ Older age is associated with MERS mortality.
- ❑ Probable source of infection can play a protective role or increase MERS mortality.
- ❑ MERS mortality rate is also linked to different geographical distribution.
- ❑ Underreporting may be an explanation for the lack of association between camel contact and MERS mortality.

Recommendations

- ❑ Nearly 30% of confirmed symptomatic MERS cases in Saudi Arabia acquired infection within health care facilities.
- ❑ Infection control compliance must be improved.
- ❑ Protocol should be enforced in all health care facilities.