



Brief Report

Middle East respiratory syndrome in South Korea during 2015: Risk-related perceptions and quarantine attitudes



E.Y. Kim PhD^a, Q. Liao PhD^b, E.S. Yu PhD^a, J.H. Kim MD, PhD^a, S.W. Yoon PhD^b, W.W.T. Lam PhD^b, R. Fielding PhD^{b,*}

^a Mental Health Clinic, National Cancer Centre, Goyang, Republic of Korea

^b Division of Behavioural Sciences, School of Public Health, The University of Hong Kong, Hong Kong SAR, China

Key Words:

Trust
Outbreak control

A telephone survey involving 200 household members in and around Seoul, South Korea, was completed during the maturity stage of the outbreak of Middle East respiratory syndrome (MERS) in Korea during June 2015. The study found that respondents perceived low risk from contracting MERS, had low trust in government in controlling MERS, and generally held unfavorable attitudes toward quarantine.

© 2016 Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. All rights reserved.

The first major Middle East respiratory syndrome (MERS) outbreak outside of the Arabian Peninsula began in South Korea in mid-May 2015. Following the index case, a 68-year-old man, who was diagnosed on May 20, 2015, 186 confirmed cases were reported by July 5, 2015 (Fig 1). In total 14,702 persons were quarantined at some point between May 20 and July 3, 2015. These were voluntary quarantine recommendations, which advise that persons who have had contact with a confirmed case of MERS since onset of illness should quarantine themselves at home or in a health care facility for 14 days.¹ All contacts have their health status monitored daily¹ but are provided with basic necessities and financial compensation for the loss of income during the period of quarantine. Contacts who develop symptoms during the quarantine period will be isolated to receive early treatment, whereas those reporting no illness after the 14-day quarantine will be released from further monitoring.¹ However, these voluntary recommendations were often ignored, leading to public outcries in Korea as well as China and Hong Kong,^{2,3} and calls for punitive legislation for travelers who make false health declarations.² We conducted a population survey during the outbreak of MERS in Korea to investigate public risk perceptions of MERS and attitudes towards quarantine in controlling MERS among households in the Republic of Korea.

METHODS

Following approval from the Korean National Cancer Centre institutional review boards, an experienced Korean polling company was commissioned to implement random-dialed calls made to Seoul and Gyeonggi state numbers. Eligible households were identified by computers, whereas ineligible telephone numbers such as fax numbers and commercial telephone numbers were automatically screened out. Inclusion criteria were being able to communicate in Korean and capable of answering a telephone interview. Within each eligible household, 1 adult aged 18 years or older whose birthday was closest to the survey date was invited to participate in the study. Unanswered household telephone numbers were called at different times and days for up to 4 times before replacement with new numbers. More than 70% of the calls were made after 6:00 p.m. to avoid oversampling of the nonworking population. Respondents agreeing to participate completed a telephone interview based on a standardized questionnaire.

Core questions included in the questionnaire were developed based on measures used to survey attitudes toward severe acute respiratory syndrome and novel influenzas in Hong Kong,^{4,5} Health Belief Model and Theory of Planned Behavior. These core measures included perceived susceptibility to (eg, How likely do you think it is that you will contract MERS over the next 1 month?), perceived severity of (eg, How likely do you think you would be seriously ill if you were infected with MERS?), and worry about MERS (eg, agreement on the statement, "I feel worried that I may be infected with MERS"), perceived self-efficacy in preventing MERS (eg, agreement on the statement, "I am confident that I could protect myself from contracting MERS"), trust in government action to control MERS (eg, agreement with the statement, "I trust the government to do what is needed to protect us from contracting MERS"),

* Address correspondence to Richard Fielding, PhD, School of Public Health, The University of Hong Kong, 21 Sassoon Rd, Pokfulam, Hong Kong SAR, China.

E-mail address: fielding@hku.hk (R. Fielding).

Conflicts of interest: None to report.

EYK, QL, and RF conceptualized this study. SYU translated the original questionnaire from English to Korean. EYK, ESU, JHK, SWY, and QL collected, synthesized, and analyzed the data. EYK, QL, and RF wrote the first draft. RF, WWTL, EYK, QL, ESU, JHK, and SWY interpreted the results and revised the article. RF is the study guarantor. All authors read and approved the final manuscript.

perceived social norms toward MERS prevention (what others are doing) (eg, agreement on the statement of “Most of my friends took measures to prevent against MERS”), attitudes toward quarantine (eg, agreement on the statement of “quarantine is not very effective to stop the spread of MERS”), and MERS-related anxiety (a 6-item scale).^{6,7} All the above were responded to on 7-point (susceptibility, severity) or 4-point (MERS-related anxiety) or 5-point categorical response scales. Internal consistency (Cronbach’s α) for the above core measures was generally acceptable ranging from 0.61 (for perceived social norms in MERS prevention) to 0.90 (for perceived susceptibility to MERS and worry about MERS) (Table 1). The items

used to assess each core measure are detailed in Appendix Table S1. Mean scores and/or proportions of risk perception variables and attitudes toward quarantine were calculated and their variability by age, gender, and educational attainment was assessed using multivariate logistic/linear regression models.

RESULTS

A total of 200 respondents completed the interview during June 26-30, 2015. Although small, a sample size of 200 allows an estimate of population prevalence of 50% in risk perceptions or attitudes with a 95% confidence interval and with a margin of error of $\pm 7\%$, considered acceptable in preliminary surveys. Among the respondents, 51% were women, 18% were older than age 60 years, and 57% obtained at least tertiary education (Appendix Table S2).

The mean scores, standard deviation, and values of internal consistency of risk perception constructs and attitudes toward quarantine are shown in Table 1.

Risk perceptions toward MERS were low. Only 9% of respondents perceived their personal probability of being infected with MERS to be greater than the average level for the population, whereas 24% perceived the severity of MERS to be greater than average levels of severity; 32% indicated worry about being infected with MERS. Men expressed less worry than did women (odds ratio [OR], 0.54; 95% confidence interval [CI], 0.29-0.99; $P = .049$). Perceived self-efficacy in preventing MERS and awareness of social normative pressure to prevent against MERS were at moderate levels (Table 1).

Only 33% of the respondents expressed (agree/strongly agree) trust in the adequacy of government control measures. Level of trust in government was marginally lower in higher educated groups (OR, 0.52; 95% CI, 0.27-1.01 for tertiary or above referenced against secondary or below; $P = .053$). Compared with respondents aged 20-39 years, respondents aged 40-59 years (OR, 4.47; 95% CI, 2.05-9.74; $P < .001$) and those aged 60 years or older (OR, 5.99; 95% CI, 2.36-15.18; $P < .001$) indicated more trust in the government.

Respondents on average indicated moderate anxiety about the current MERS outbreak (Table 1). Men reported less anxiety (β , -0.26; $t(199) = -3.70$; $P < .001$).

Mean scores of the 9 items used to measure quarantine attitudes were calculated, with higher scores indicating more positive attitudes toward quarantine. Respondents held generally unfavorable attitudes toward quarantine (Table 1). Of the respondents, only 1 (0.5%) agreed that “a person who is quarantined should stay away from others,” 6% agreed that “people who ignore quarantine orders are very selfish,” 73% agreed that “quarantine is not every effective to stop the spread of MERS,” 79% agreed that “so many people are affected by MERS that quarantine is pointless,” 85% agreed that “MERS is not very infectious so quarantine is pointless,” 86% believed

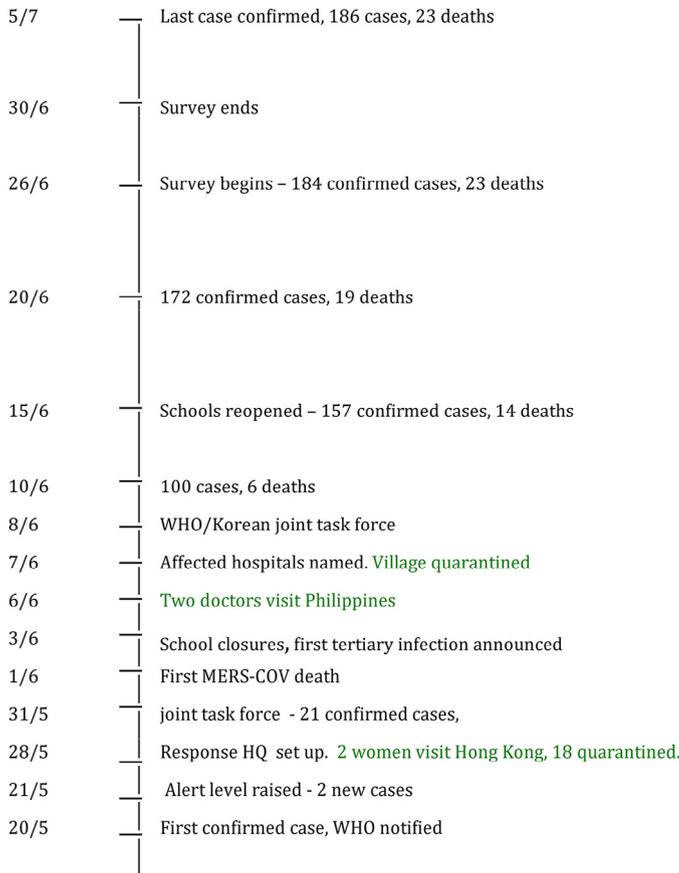


Fig 1. Outbreak timeline. Green text indicates highly publicized quarantine-breaking events. HQ, headquarters; MERS-COV, Middle East respiratory syndrome-coronavirus; WHO, World Health Organization. Source: <http://www.who.int/csr/don/07-july-2015-mers-korea/en/>.

Table 1
Mean, standard deviation, and internal consistency of the study measures

Risk perception and attitudes	Response range	Mean*	Standard deviation	Internal consistency
Perceived susceptibility to MERS (3 items)	1-7 [†]	2.10	1.28	0.90
Perceived severity of MERS (3 items)	1-7 [†]	3.37	1.35	0.77
Worry about contracting MERS (3 items)	1-5 [‡]	2.68	1.18	0.90
Anxiety about MERS outbreak (6 items)	1-4 [§]	2.19	0.67	0.76
Perceived self-efficacy in preventing MERS (2 items)	1-5 [‡]	3.51	1.01	0.72
Perceived social normative in MERS prevention (3 items)	1-5 [‡]	3.50	0.89	0.61
Trust in government in MERS control (3 items)	1-5 [‡]	2.70	1.12	0.89
Attitudes toward quarantine (9 items)	1-5 [¶]	1.86	0.54	0.64

MERS, Middle East respiratory syndrome.

*Item mean score for each construct was used to calculate the mean and standard deviation.

[†]Scales ranged from 1 = never/zero chance to 7 = certain.

[‡]Scales ranged from 1 = strongly disagree to 5 = strongly agree.

[§]Scales ranged from 1 = not at all to 4 = very much so.

[¶]Scales ranged from 1 = strongly agree to 5 = strongly disagree.

"I don't understand why quarantine is needed for MERS," 82% agreed that "implementation of quarantine may increase risk of spreading MERS," 57% agreed that "I can understand why people ignore quarantine instructions," and 56% agreed that "the way in which the government implemented quarantine is not effective to control MERS." Respondents with higher educational attainment held less favorable attitudes toward quarantine (β , -0.29 ; $t(199) = -4.17$; $P < .001$).

DISCUSSION

This survey reveals that the Korean public held largely unfavorable attitudes toward the voluntary quarantine measures. Although repeated voluntary quarantine breaking contributed significantly to the spread of the outbreak, <10% of the respondents held punitive attitudes toward quarantine breaches, whereas more than half indicated that why people ignore quarantine instructions was understandable. Most believed that quarantine was ineffective to control MERS or even increases risk of spreading MERS. The data may reflect significant misunderstandings about the purpose and effects of the implemented voluntary quarantine during the outbreak control. Population, media, and political anxieties raise ethical concerns about restricting personal freedoms voluntarily,⁸ in particular when trust in the implementing organization is low.

Public trust in local government to control the MERS outbreak was much lower than that seen in Hong Kong during the 2009 influenza A/H1N1 pandemic.⁴ As with Severe Acute Respiratory Syndrome in Hong Kong in 2003, MERS was novel for the Korean population in 2015. In such circumstances, trust in the government is likely to plunge as initial confusion about sources of infection and efforts to understand and control outbreaks sees numbers of cases rocket.⁹ Distrust was perhaps amplified by government's initial attempt to withhold the names of hospitals involved in treating the first batch of infected patients, which were the main sources of subsequent infection, particularly among higher-educated and younger people who may easily access information from other sources, such as the Internet.

Perceived susceptibility to and perceived severity of MERS was low among the respondents possibly because the survey was conducted in the mature stage of the outbreak when the growth in number of new cases began to flatten out.⁵ The moderate levels of worry about MERS infection and anxiety related to this MERS outbreak could indicate public worry or anxiety about being quarantined subsequent to MERS infection rather than MERS itself. Most Korean respondents perceived social conformity pressure to adopt protective

behaviors. Norms may be behavior cues to motivate adoption of protective behaviors and commonly widespread social distancing behaviors.^{7,10}

Despite a small sample size constrained by time and no funding, this survey provides useful insights on why frequent quarantine breaking occurred during this active outbreak. The findings also point to an urgent need for both improved public education on voluntary quarantine adherence and greater risk communication transparency by public health agencies, not only in South Korea, but also globally.

APPENDIX: SUPPLEMENTARY MATERIAL

Supplementary data to this article can be found online at doi:10.1016/j.ajic.2016.03.014.

References

1. World Health Organization. Managing contacts in the MERS-CoV outbreak in the Republic of Korea. 1st July 2015. Available from: <http://www.who.int/mediacentre/news/mers/briefing-notes/update-1-july-2015/en/>. Accessed April 18, 2016.
2. Cheung E, Lau C. Hong Kong orders 18 into quarantine after Korean traveller is diagnosed with MERS. South China Morning Post. 29th May 2015. Available from: <http://www.scmp.com/news/hong-kong/health-environment/article/1812136/hong-kong-woman-rushed-hospital-mers-symptoms?page=all>. Accessed April 18, 2016.
3. Li D, Ngo J. Punish travellers who lie about their health, SARS expert urges. South China Morning post, 30th May 2015. Available from: <http://www.scmp.com/news/hong-kong/health-environment/article/1813158/two-south-koreans-who-refused-mers-quarantine?page=all>. Accessed April 18, 2016.
4. Liao Q, Cowling BJ, Lam WW, Ng DMW, Fielding R. Situational awareness and health protective responses to pandemic influenza A(H1N1) in Hong Kong: a cross sectional study. PLoS ONE 2010;5:e13350.
5. Leung GM, Ho LM, Chan SKK, Ho SY, Bacon-Shone JB, Choy RYL, et al. Longitudinal assessment of community psychobehavioral responses during and after the 2003 outbreak of severe acute respiratory syndrome in Hong Kong. Clin Infect Dis 2015;40:1713-20.
6. Marteau T, Becker HL. The development of a six-item short-form of the state scale of the Spielberger State-Trait Anxiety Inventory (STAI). Br J Clin Psychol 1992;31:301-6.
7. Rubin JG, Bakshi S, Amiot R, Fear N, Potts HWW, Michie S. The design of a survey questionnaire to measure perceptions and behaviour during an influenza pandemic: the Flu Telephone Survey Template (FluTEST). Southampton (UK): NIHR Journals Library; 2014. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25642523>. Accessed April 18, 2016.
8. Bensimon CM, Upsure REG. Evidence and effectiveness in decision making for quarantine. Am J Pub Health 2007;97:544-8.
9. Liao Q, Fielding R. Uncertain news: trust and preventive practices in respiratory infectious diseases. Eur Psychol 2014;19:4-12.
10. Syed Q, Sopwith W, Regan M, Bellis MA. Behind the mask. Journey through an epidemic: some observations of contrasting public health responses to SARS. J Epidemiol Community Health 2003;57:855-6.