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Surveillance of introduction of MERS-CoV and other respiratory viruses: appraisement of an alternative procedure in suspected cases

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Background: Middle East respiratory syndrome coronavirus (MERS-CoV) is a major public health concern for the pilgrimage in the Middle East. MERS-CoV is capable of human to human transmission on close contact and causes a high mortality (~50%). All cases observed outside the Middle East are imported cases. Therefore, pilgrims returning from the Hajj, developing respiratory symptoms and presenting with chest X-Ray abnormalities are admitted to referral hospitals in France for rapid investigations. Upper and Lower respiratory tract samples are collected and subsequently tested for MERS-CoV and other respiratory viruses. The National Influenza Centre in the Hospices Civils de Lyon is responsible for the screening of the MERS CoV suspected cases admitted to hospitals in Lyon and the Rhone-Alpes region. A set of duplex PCRs is used to test for other respiratory viruses in MERS-CoV negative samples. Those screenings are time-/labor-extensive and can be considered non-comprehensive since no screening for additional viruses are performed after a positive result due to the time constraints. The main objective of this study was to compare the analytical performances of the current screening procedures with an automated nested multiplex PCR system to test and

propose an alternative screening procedure for the surveillance of introduction of MERS-CoV and other respiratory viruses in France.

Material/methods: We tested lower respiratory samples (n=26) and upper respiratory samples (n=24) from 28 patients with an automated nested multiplex PCR system containing PCR assays for Adenovirus, Coronavirus (229E, HKU1, OC43, NL63), Human Metapneumovirus, Human Rhinovirus/Enterovirus, Influenza A, Influenza A/H1, Influenza A/H1-2009, Influenza A/H3, Influenza B, Parainfluenza 1-4 and RSV. Results were compared between lower and upper samples as well as with results from the duplex PCR assays performed in the routine surveillance.

Results: Viruses were more often detected in lower respiratory samples in comparison to upper respiratory samples (Table). Differences in results between both systems were mostly due to the non-comprehensive nature of routine surveillance. If screenings for a particular virus was performed in the routine surveillance, the overall level of agreement was high (92.8% for Coronaviruses to 100% for Influenza viruses) between both methods.

Routine surveillance	**49 samples***	1 virus	2 viruses	3 viruses	none
	Upper sample (=24)	11	**1**	**0**	12
	Lower sample (n= 25*)	10	**4**	**0**	11
Automated nested multiplex PCR system	**50 sample**				
	Upper sample (=24)	18	**1**	**0**	5
	Lower sample (n= 26)	10	**6**	**4**	6

*results for one lower respiratory sample were not available

Conclusions: The automated nested multiplex PCR system enabled a more comprehensive screening for respiratory viruses. Additionally, lower respiratory samples were observed to give a better representation of virus aetiology and should be favored for the investigation of suspected MERS-CoV infections.