

Table 1 Priority research area and recommended actions to improve global understanding and knowledge on novel coronavirus infection

Priority research area	Recommended actions	Next steps, with support from WHO
Defining the spectrum of disease severity (extent of virus transmission)	<ul style="list-style-type: none"> • Develop a standardized and sensitive approach for seroepidemiological studies to identify severely and mildly ill persons, including those who may have been exposed to the virus but remained well. The studies should focus on: <ul style="list-style-type: none"> • patients with SARI; • close contacts of cases who become symptomatic; • clusters of SARI occurring in occupational groups, particularly health care workers; • Standardize and validate laboratory methods for serological assays (IFA or ELISA) to be used for screening for more specific and conclusive results. 	<ul style="list-style-type: none"> • Create a study group and framework for designing appropriate studies using standardized epidemiological methods. • Identify and prioritize groups for testing. • Develop protocols for standardized serological methods. • Encourage sharing of clinical samples between countries and laboratories. • Initiate serosurveys of contacts and probable cases to elucidate the full clinical spectrum of the disease, mindful of cross reaction. issues in serological studies. • Initiate laboratory training programmes for using standard methods.
Detecting any increase or decrease in incidence of infection	<ul style="list-style-type: none"> • Establish hospital baselines for pneumonia and monitor any unexplained rise in trend. • Enhance surveillance within groups such as case contacts, health care workers and clusters of patients with severe respiratory illness. • Prospectively collect and test sputum specimens from SARI patients and their close contacts. 	<ul style="list-style-type: none"> • Develop standard surveillance tools for monitoring changes in rates of pneumonic illness or detection of illness in selected population groups. • Develop a standard protocol for guidance on types of specimens to collect from selected population groups. • Ensure countries test single cases of unexplained severe respiratory illness and report positives to WHO.
Improving the case definition	<ul style="list-style-type: none"> • Collect more data on the clinical spectrum and natural history of nCoV to inform changes to the case definition (implementing a 2-stage case definition of initial screening followed by closer examination of cases that meet specific criteria can be considered). • Utilize protocols from the SARS epidemic to develop risk factor studies. 	<ul style="list-style-type: none"> • Contact affected countries to request data to better define key clinical features of known cases. • Obtain clinical information on known cases: pool all information from affected countries using a standardized extraction form. • Develop a global case definition for reporting. • Continue to monitor the effectiveness of the case definition and revise when relevant.
Identifying the source of infection	<ul style="list-style-type: none"> • Conduct animal studies to inform sources; (protocols from the studies carried out for the SARS epidemic could be utilized for developing risk factor studies into nCoV infection). 	<ul style="list-style-type: none"> • Include animal studies in the framework.

ELISA – enzyme-linked immunosorbent assay; IFA – immunofluorescence assay; nCoV – novel coronavirus; SARI – severe acute respiratory infection; SARS – severe acute respiratory syndrome; WHO – World Health Organization.