

Abstract

Development of Laboratory Analysis System for unknown infectious diseases

Jang Jun Hyeong, Kim Il-Hwan, Kim Eun-Jin

Division of Emerging Infectious Diseases, Bureau of Infectious Disease Diagnosis Control, KDCA

Kang Byung-Hak

Gyeongnam Regional Center for Disease Control and Prevention, RCDC

Rhie Gi-Eun

Division of High-risk Pathogens, Bureau of Infectious Disease Diagnosis Control, KDCA

It is generally accepted that the rise of infectious diseases, both known and unknown, is linked to climate change and the increase in international air travel. In response to the growing prevalence of unknown infectious disease outbreaks, the Korea Disease Control and Prevention Agency (KDCA) established guideline for Unknown Disease Outbreaks (2019), and operated the Laboratory Analysis Task Force (LATF) of Unknown Disease Outbreak (UDO) for identification and analysis of causative pathogens. The LATF categorized infectious diseases into five syndromes (respiratory, hemorrhagic, diarrheal, neurologic, and rash) and developed laboratory diagnosis algorithms and multi-pathogen panels for differential diagnosis of each syndrome. In addition, laboratory response tabletop exercises (TTX) were conducted to prepare for the occurrence of unknown respiratory disease outbreaks. Through this diagnostic system and TTX, the KDCA was able to aggressively respond to coronavirus-19 (COVID-19) from the initial stage of COVID-19 inflow into South Korea as a form of unknown pneumonia. In conclusion, this study recommended that the KDCA continue preparations for the improvement and supplement of diagnostic assay systems for the occurrence of unknown infectious diseases.

Keywords: Unknown diseases outbreak, Respiratory syndrome, Laboratory diagnosis algorithm, Multi-pathogen panel, Tabletop exercise

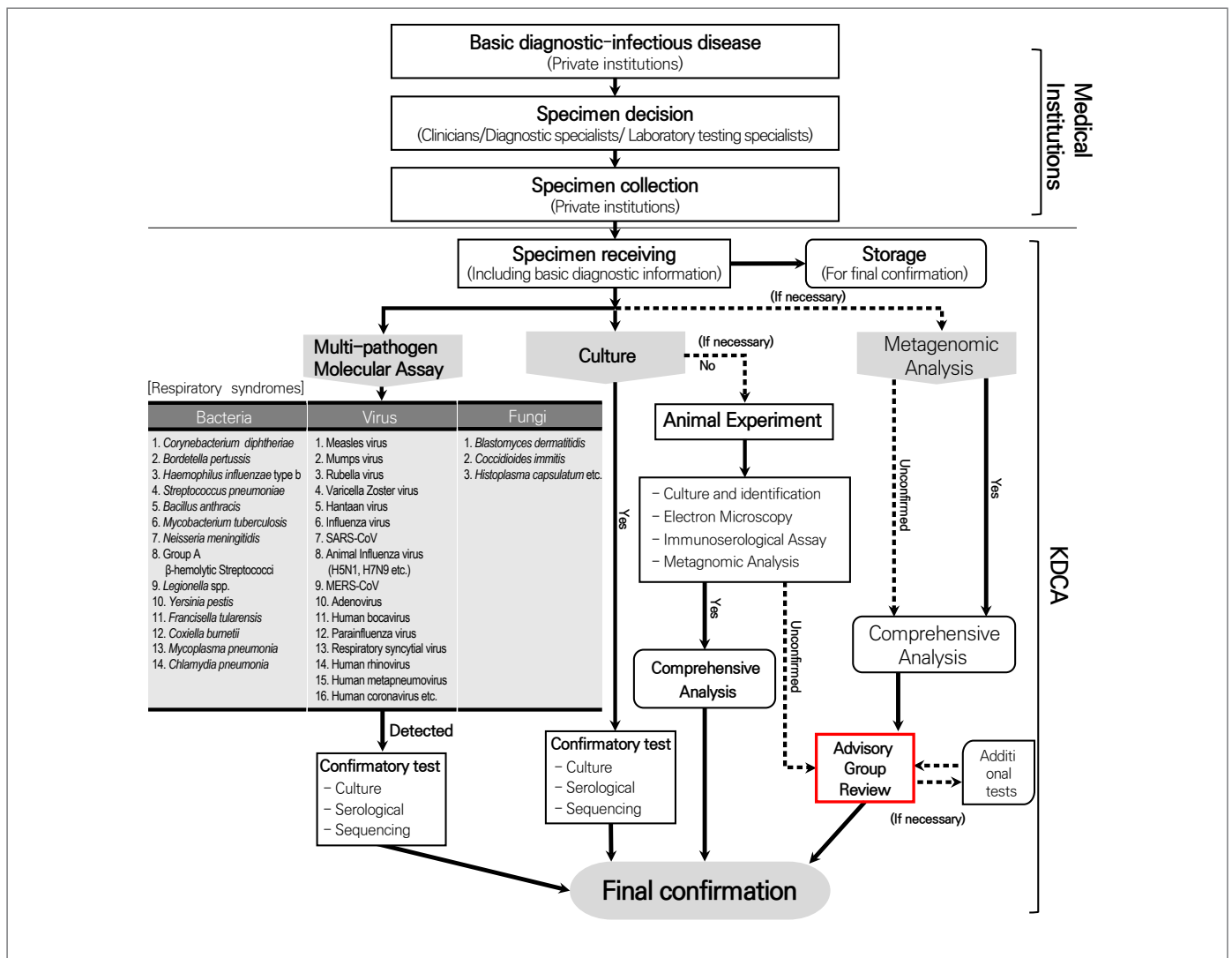


Figure 1. Algorithm for laboratory analysis of respiratory syndrome with unknown infectious diseases

Table 1. Diagnosis of exclusion list for respiratory syndrome

Classification	No.	Pathogens
Bacteria	1	<i>Bacillus anthracis</i>
	2	<i>Bordetella pertussis</i>
	3	<i>Chlamydia pneumoniae</i>
	4	<i>Corynebacterium diphtheriae</i>
	5	<i>Coxiella burnetii</i>
	6	<i>Fransisella tularensis</i>
	7	Group A β -hemolytic <i>Streptococci</i>
	8	<i>Haemophilus influenzae</i> type b
	9	<i>Legionella</i> spp.
	10	<i>Mycobacterium tuberculosis</i>
	11	<i>Mycoplasma pneumoniae</i>
	12	<i>Neisseria meningitidis</i>
	13	<i>Streptococcus pneumoniae</i>
	14	<i>Yersinia pestis</i>
Viruses	1	Measles virus
	2	Mumps virus
	3	Rubella virus
	4	Varicella zoster virus
	5	Animal influenza virus
	6	MERS-CoV
	7	Human boca virus
	8	Human rhino virus
	9	Adenovirus
	10	Human coronaviruses (229E, OC43, HKU1, NL63)
	11	Hantavirus
	12	Human metapneumovirus
	13	Influenza virus A and B
	14	Parainfluenza(types 1, 2 and 3)
	15	Respiratory syncytial virus(RSV)
	16	SARS-CoV
Fungi	1	<i>Blastomyces dermatidis</i>
	2	<i>Coccidioides immitis</i>
	3	<i>Histoplasma calsulatum</i>