Supplementary Material

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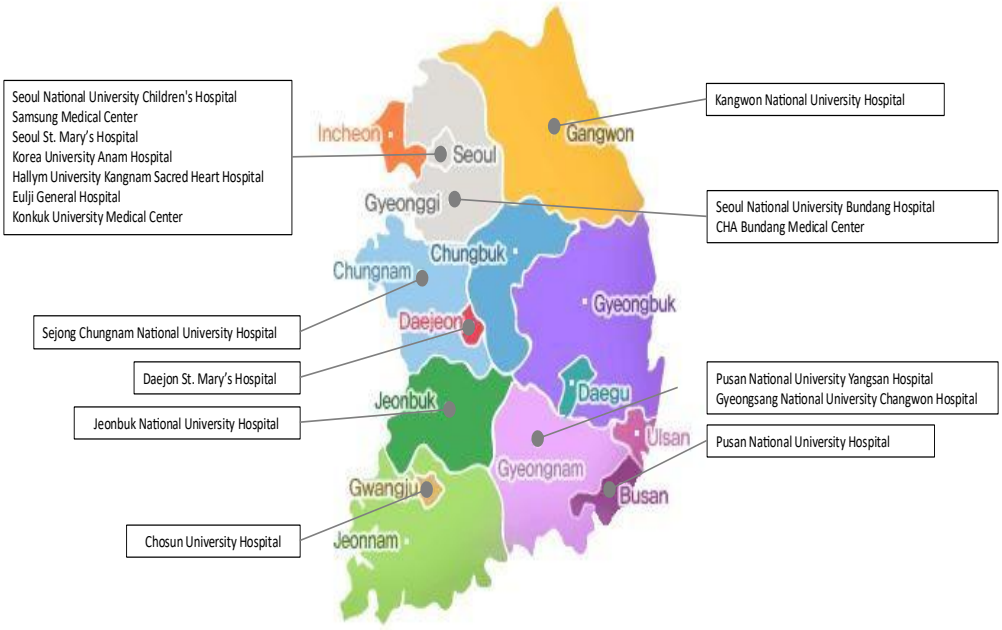

Supplementary Fig. S1. Distribution of 17 participating hospitals throughout South Korea

Supplementary Table S1. Categories and Variables collected using the electronic case report form (eCRF)

Category	Variables collected
Demographics	Age, sex
Hospitalization	Hospital admission status, admission and discharge dates
Clinical presentation	Symptom onset date, fever, cough, sputum, rhinorrhea, sore throat, chest pain, tachypnea, dyspnea, gastrointestinal symptoms, rash, seizure
Vital signs and physical examination	Highest body temperature, highest respiratory rate, lowest oxygen saturation, auscultatory findings, chest retraction
Radiologic findings	Chest radiograph patterns including peribronchial infiltration, consolidation, pleural effusion, cavity or pneumatocele
Underlying medical conditions	Prematurity, congenital heart disease, chronic neurologic, renal, gastrointestinal, endocrine, or pulmonary disease, asthma or allergic disease, genetic disease or congenital anomaly, primary immunodeficiency, hematologic or oncologic disease, and history of transplantation
Microbiologic testing	Respiratory viral molecular testing, bacterial and atypical pathogen PCR assays, Mycoplasma pneumoniae serologic testing, bacterial cultures
Laboratory findings	White blood cell count, C-reactive protein, procalcitonin
Treatment	Antibiotic therapy, antiviral therapy, systemic corticosteroid use for ≥3 days
Respiratory support	the use of respiratory support [either noninvasive (nasal prong, oxygen mask, high-flow nasal cannula, or noninvasive positive pressure ventilation) or invasive respiratory support (invasive mechanical ventilation or extracorporeal membrane oxygenation)].
Clinical outcomes	Intensive care unit admission, complications, mortality, length of hospital stay, outcome at last follow-up

Supplementary Table S2. Diagnostic platforms and *Mycoplasma pneumoniae* serologic assays used across participating hospitals

Location (Province)	Hospital	Respiratory virus PCR	Respiratory virus antigen test	Atypical PCR [a]	*Mycoplasma* serology [b]	Bacterial PCR [c]
Seoul	Seoul National University Children's Hospital	Allplex™ Respiratory Panel 1/2/3 (Seegene, Seoul, Korea)	BD Veritor System Flu A+B (Becton, Dickinson and Company, Franklin Lakes, NJ, USA), Wonmed Covid-19 Ag (Wonmed, Gyeonggi, Korea), BinaxNOW RSV Card (Abbott, Scarborough, ME, USA)	Ecoli Dx (Amplisens, Prague, Czech Republic)	IgM LIAISON (DiaSorin), PA Serodia-Myco II (Fujirebio)	
	Samsung Medical Center	BIOFIRE® Respiratory 2.1 plus Panel (bioMérieux, Marcy-l'Étoile, France)	Not performed	*M. pneumoniae* PCR (SCL, Yongin, Korea); BIOFIRE® Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	PA Serodia-Myco II (Fujirebio)	Not performed
	Seoul St. Mary's Hospital	AdvanSure™ RV-plus Real-Time RT-PCR (LG Chem, Seoul, Korea), BIOFIRE® Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	Wonmed Covid-19 Ag (Wonmed, Gyeonggi, Korea)	BioCore *M. pneumoniae* Real-Time PCR Kit (Invites BioCore, Seoul, Korea)	IgM CHORUS (Diesse), IgG LIAISON (DiaSorin)	
	Korea University Anam Hospital	Allplex™ Respiratory Panel 1/2/3 (Seegene, Seoul,	BD Veritor System Flu A+B (Becton,	*M. pneumoniae* PCR (GCLabs, Yongin,	IgM LIAISON (DiaSorin)	

Location (Province)	Hospital	Respiratory virus PCR	Respiratory virus antigen test	Atypical PCR [a]	*Mycoplasma* serology [b]	Bacterial PCR [c]
		Korea)	Dickinson and Company, Franklin Lakes, NJ, USA)	Korea)		
	Hallym University Kangnam Sacred Heart Hospital	AllplexRespiratory Panel 1/2/3 (Seegene, Seoul, Korea), BIOFIRE® Respiratory 2.1 Plus Panel (bioMérieux, Marcy-l'Étoile, France)	BD Veritor System Flu A+B (Becton, Dickinson and Company, Franklin Lakes, NJ, USA)	Allplex PneumoBacter Assay (Seegene, Seoul, Korea)	IgM LIAISON (DiaSorin)	Allplex™ PneumoBacter Assay (Seegene, Seoul, Korea)
	Eulji General Hospital	AllplexRespiratory Panel 1/2/3 (Seegene, Seoul, Korea)	BD Veritor System Flu A+B (Becton, Dickinson and Company, Franklin Lakes, NJ, USA)	Bacterial Multiplex PCR (GCLabs, Yongin, Korea)	IgM CHORUS (Diesse)	Bacterial Multiplex PCR (GCLabs, Yongin, Korea
	Konkuk University Medical Center	BIOFIRE® Respiratory 2.1 Plus Panel (bioMérieux, Marcy-l'Étoile, France)	Not performed	BIOFIRE Respiratory 2.1 Plus Panel (bioMérieux, Marcy-l'Étoile, France)	IgM CHORUS (Diesse)	Not performed
Gyeonggi-do	CHA Bundang Medical Center	BIOFIRE® Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	BD Veritor System Flu A+B (Becton, Dickinson and Company, Franklin Lakes, NJ, USA), STANDARD Q COVID-19 Ag Test	BIOFIRE® Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	IgM LIAISON (DiaSorin), CHORUS (Diesse)	Not performed

Location (Province)	Hospital	Respiratory virus PCR	Respiratory virus antigen test	Atypical PCR [a]	*Mycoplasma* serology [b]	Bacterial PCR [c]
			(SD Biosensor, Suwon, Korea)			
	Seoul National University Bundang Hospital	Allplex Respiratory Panel 1/2/3 (Seegene, Seoul, Korea)	Standard F Influenza A/B FIA (SD Biosensor, Seoul, Korea), Standard F COVID-19 Ag FIA (SD Biosensor, Seoul, Korea), Standard M10 SARS-CoV-2 (SD Biosensor, Seoul, Korea)	NxTAG RPP (Luminex Corporation, Austin, USA); Allplex™ PneumoBacter Assay (Seegene, Seoul, Korea)	IgM R-FIND (SG Medical)	Not performed
Daejeon	Daejon St. Mary's Hospital	Allplex Respiratory Panel 1/2/3 (Seegene, Seoul, Korea)	Not performed	Allplex PneumoBacter Assay (Seegene, Seoul, Korea)	IgM CHORUS (Diesse)	Allplex PneumoBacter Assay (Seegene, Seoul, Korea)
Sejong	Sejong Chungnam National University Hospital	BIOFIRE Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	Not performed	BIOFIRE Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	IgM LIAISON (DiaSorin)	Allplex PneumoBacter Assay (Seegene, Seoul, Korea)
Jeonbuk	Jeonbuk National University Hospital	BIOFIRE Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	Not performed	BIOFIRE Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	IgM LIAISON (DiaSorin)	Not performed
Gyeongnam	Pusan National University	BIOFIRE Respiratory 2.1	QuantumPACK Easy	Bacterial Multiplex	IgM LIAISON	Bacterial

Location (Province)	Hospital	Respiratory virus PCR	Respiratory virus antigen test	Atypical PCR [a]	*Mycoplasma* serology [b]	Bacterial PCR [c]
	Yangsan Hospital	Panel (bioMérieux, Marcy-l'Étoile, France)	Influenza A+B(BioSquare, Korea), Wonmed Covid-19 Ag (Wonmed, Gyeonggi, Korea)	PCR (SCL, Yongin, Korea); *M. pneumoniae* PCR (Seegene, Seoul, Korea); BIOFIRE® Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France)	(DiaSorin)	Multiplex PCR (SCL, Yongin, Korea);
	Gyeongsang National University Changwon Hospital	BIOFIRE Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France),	STANDARD F Influenza A/B FIA (SD Biosensor, Suwon, Korea) STANDARD F COVID-19 Ag FIA (SD Biosensor, Suwon, Korea)	BioFire FilmArray Pneumonia Panel (bioMérieux, Marcy-l'Étoile, France)	*Mycoplasma pneumoniae* Antibody Diagnostic Reagent (Livzon Diagnostics, Zhuhai, China)	BioFire FilmArray Pneumonia Panel (bioMérieux, Marcy-l'Étoile, France)
Busan	Pusan National University Hospital	AdvanSure™ RV-plus Real-Time RT-PCR (Invitros, Seoul, Korea)	Not performed	Respiratory Pathogen Bacteria Panel [multiplex real-time PCR] (GC Labs, Yongin, Republic of Korea)	IgM CHORUS (Diesse)	Respiratory Pathogen Bacteria Panel [multiplex real-time PCR] (GC Labs, Yongin, Republic of Korea)
Gangwon	Kangwon National University Hospital	BIOFIRE Respiratory 2.1 Panel (bioMérieux, Marcy-	STANDARD F COVID-19 Ag FIA	BIOFIRE Respiratory 2.1 Panel	IgM CHORUS (Diesse)	Allplex™ PneumoBacter

Location (Province)	Hospital	Respiratory virus PCR	Respiratory virus antigen test	Atypical PCR [a]	*Mycoplasma* serology [b]	Bacterial PCR [c]
		l'Étoile, France), Allplex™ Respiratory Panel 1/2/3 (Seegene, Seoul, Korea)	(SD Biosensor, Suwon, Korea)	(bioMérieux, Marcy-l'Étoile, France); Allplex™ PneumoBacter Assay (Seegene, Seoul, Korea)		Assay (Seegene, Seoul, Korea)
Gwangju	Chosun University Hospital	BIOFIRE Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France);	Sofia Influenza A+B FIA (QuidelOrtho, San Diego, CA, USA)	BIOFIRE Respiratory 2.1 Panel (bioMérieux, Marcy-l'Étoile, France); Allplex™ PneumoBacter Assay (Seegene, Seoul, Korea)	IgM LIAISON (DiaSorin)	Allplex™ PneumoBacter Assay (Seegene, Seoul, Korea)

Blank cells indicate that the corresponding diagnostic test was not performed at that institution.

[a] Atypical PCR included assays for *Mycoplasma pneumoniae, Chlamydia pneumoniae, Legionella pneumophila, Bordetella pertussis, and Bordetella parapertussis*.

[b] Serologic assays included particle agglutination (PA), chemiluminescent immunoassay (CLIA), and enzyme-linked immunosorbent assay (ELISA).

[c] Bacterial PCR included assays for *Streptococcus pneumoniae* and *Haemophilus influenzae* and was performed only when clinically indicated.

Supplementary Table S3. Seasonal Distribution of Etiologic groups in Children with Community-Acquired Pneumonia (CAP) by age group**.**

Age group	Season [a]	Atypical CAP	Pyogenic CAP	Viral CAP	No pathogen	Total
All ages	Fall	22 (30.1)	5 (6.8)	21 (28.8)	25 (34.2)	73
	Winter	6 (23.1)	3 (11.5)	12 (46.2)	5 (19.2)	26
	Spring	27 (25.0)	2 (1.9)	36 (33.3)	43 (39.8)	108
	Summer	132 (64.4)	3 (1.5)	22 (10.7)	48 (23.4)	205
	Fall [b]	109 (64.9)	2 (1.2)	17 (10.1)	40 (23.8)	168
	Winter [b]	20 (19.2)	3 (2.9)	61 (58.7)	20 (19.2)	104
	Spring	7 (12.5)	2 (3.6)	29 (51.8)	18 (32.1)	56
<5 years	Fall	8 (19.0)	2 (4.8)	17 (40.5)	15 (35.7)	42
	Winter	1 (6.3)	1 (6.3)	12 (75.0)	2 (12.5)	16
	Spring	4 (8.0)	0 (0.0)	23 (46.0)	23 (46.0)	50
	Summer [b]	25 (43.9)	1 (1.8)	13 (22.8)	18 (31.6)	57
	Fall [b]	30 (51.7)	0 (0.0)	11 (19.0)	17 (29.3)	58
	Winter	7 (10.6)	1 (1.5)	47 (71.2)	11 (16.7)	66
	Spring	3 (7.0)	0 (0.0)	25 (58.1)	15 (34.9)	43
≥5 years	Fall	14 (45.2)	3 (9.7)	4 (12.9)	10 (32.3)	31
	Winter	5 (50.0)	2 (20.0)	0 (0.0)	3 (30.0)	10
	Spring	23 (39.7)	2 (3.4)	13 (22.4)	20 (34.5)	58
	Summer [b]	107 (72.3)	2 (1.4)	9 (6.1)	30 (20.3)	148
	Fall [b]	79 (71.8)	2 (1.8)	6 (5.5)	23 (20.9)	110
	Winter	13 (34.2)	2 (5.3)	14 (36.8)	9 (23.7)	38
	Spring	4 (30.8)	2 (15.4)	4 (30.8)	3 (23.1)	13

Values are presented as n (%), with percentages calculated for each season and age group.
[a] Seasons are presented in chronological order from fall 2023 through spring 2025. The *M. pneumoniae* epidemic period corresponded to the summer and fall 2024.
[b] *Mycoplasma pneumoniae* epidemic period.

Supplementary Table S4. Clinical Features of Children With Community-Acquired Pneumonia (CAP) According to Etiologic Group

Variable	Viral CAP (N=198)	Atypical (N=323)	Pyogenic (N=20)	*P* value
Clinical Presentation				
Fever	173 (87.4)	307 (95.0)	19 (95.0)	0.006
Cough	190 (96.0)	313 (96.9)	14 (70.0)	<0.001
Rhinorrhea	83 (41.9)	66 (20.4)	3 (15.0)	<0.001
Dyspnea	64 (32.3)	48 (14.9)	8 (40.0)	<0.001
Rales	111 (56.1)	159 (49.2)	8 (40.0)	0.185
Wheezing	69 (34.8)	41 (12.7)	2 (10.0)	<0.001
Decreased breath sounds	35 (17.7)	120 (37.2)	4 (20.0)	<0.001
Chest retraction	36 (18.2)	28 (8.7)	1 (5.0)	0.003
Radiographic finding				
Bronchial infiltration	132 (66.7)	107 (33.1)	3 (15.0)	<0.001
Consolidation	94 (47.5)	269 (83.3)	16 (80.0)	<0.001
Pleural effusion	8 (4.0)	51 (15.8)	7 (35.0)	<0.001
Treatment and Hospitalization				
IV antibiotics ≥3 days	126 (63.6)	183 (56.7)	20 (100.0)	<0.001
Steroid ≥3 days	56 (28.3)	153 (47.4)	3 (15.0)	<0.001
Length of stay, days, median (IQR) [n = 191/283/20]	5.0 (4.0–10.0)	6 (4.0–8.0)	12.0 (7.0–26.0)	<0.001
Inflammatory markers				
WBC, $\times 10^3/\mu L$, median (IQR) [n = 191/316/20]	9.5 (6.2–14.0)	8.1 (6.2–11.3)	22.2 (14.4–31.8)	<0.001
CRP, mg/dL, median (IQR) [n = 198/321/20]	2.2 (0.5–5.6)	3.5 (1.2–8.7)	15.3 (7.8–23.5)	<0.001
Procalcitonin, ng/mL, median (IQR) [n = 100/161/17]	0.2 (0.1–1.6)	0.1 (0.1–0.3)	0.5 (0.2–6.2)	<0.001

Sample sizes for each variable are indicated where applicable.

CAP, community-acquired pneumonia; IQR, interquartile range.