

Steckbrief COVID-19 – Clinical characteristics in children and adolescents
 updated 19 March 2020

<http://www.kinderkliniken.insel.ch/de/coronavirus/>

Causative agent	SARS-CoV-2 ¹
Receptor	<ul style="list-style-type: none"> • Angiotensin-Converting Enzyme 2 (ACE2 receptor)² • convalescent sera from SARS-1 patients block SARS-CoV-2 entry via ACE2³
Transmission	<ul style="list-style-type: none"> • droplet, contact; <u>aerosol?</u> $\frac{1}{2}$ life in aerosol ~1 hour, $\frac{1}{2}$ life on plastic/steel 6-8 hours^{4,5} • viral transmission can start 1-2 days <u>before</u> the onset of symptoms («serial interval» < incubation period⁶; recovery of virus from NPA before onset of symptoms (Woelfel R, medRxiv)⁷ • viral RNA in NPA from children until 6-22 days after disease onset^{8,9} [Xu] • viral RNA in feces from day ~5 to > 4 weeks after disease onset⁹⁻¹¹ [Xu] • viral load in NPA <u>does not</u> correlate with severity of COVID-19¹² [Xu] • CDC recommends two consecutive negative RT-PCR tests within >24h before discontinuing isolation in hospitalized patients
Incubation period	4-6 days (range, 1 to >14 days)
Epidemiology	<ul style="list-style-type: none"> • basic reproduction rate R_0 2.2 (90% CI, 1.4-3.8)^{13,14} • high risk for «superspreader events» (dispersion parameter $k \downarrow$)¹⁴ • age <15 years: 0.9% of all cases (China CDC Weekly)^{15,16} • transmission to children mainly within families^{9,11,17} • mortality in symptomatic cases (adjusted case fatality rate) age 0-9 years, 0%; age 10-19 years, 0.25%; all ages, 1.5% (Riou J, medRxiv)
Clinical manifestations	<ul style="list-style-type: none"> • common: asymptomatic^{18,19} • common: fever (<u>may be short, low-grade or absent</u>)^{9,15,17,18,20,21} [Xu] • common: rhinorrhea, cough^{9,18,21} • common: mild diarrhea^{9,11,15,19} • <u>infrequent</u>: pharyngitis, <u>wheezing</u>^{9,15,17,19,21} • infrequent: malaise, headache, myalgias • co-infections reported (e.g. Influenza A/B, <i>M. pneumoniae</i>)¹⁸
Laboratory findings	<p><u>CBC differential, CRP, PCT, chemistry generally uncharacteristic</u>²²</p> <ul style="list-style-type: none"> • leucopenia, lymphopenia and thrombocytopenia are uncommon^{9,22} • CRP/PCT at first presentation normal to moderately elevated^{9,18,21}

Microbiology	<ul style="list-style-type: none"> • RT-PCR from NPA (ifik, private laboratories and NAVI HUG Geneva) • seroconversion ~1 week after onset of symptoms (Woelfel R, medRxiv) • serum IgM/IgG tests under development, <u>not</u> routinely available²³
Radiology	<ul style="list-style-type: none"> • conventional CXR: normal or non-specific findings • chest CT: unilateral or bilateral, uni- or multifocal, peripheral, commonly subpleural lesions; focal lesions typically with central consolidation and halo sign or ground glass opacities (GGOs)^{18,21,24} • <u>no</u> pleural effusion^{18,24} [Xu] • <u>no</u> hilar lymphadenopathy^{18,24} [Xu]
Clinical course	<ul style="list-style-type: none"> • common: asymptomatic (reported in infants^{8,9,17} and children^{9,25}) • common: upper respiratory tract infection (children and healthy adults)⁹ • common: pneumonia (with absent, mild or moderate clinical disease)^{18,21,26} • very rare: progressive lung disease with respiratory failure^{11,21}; reported in one cohort (<u>34% of cases</u> virologically confirmed) to be more common in infants²⁵ • <u>currently 1 pediatric fatal case in a 14-year-old reported</u>²⁵
Clinical course - immunodeficiency	<ul style="list-style-type: none"> • severe disease appears to be rare • <u>no case series or risk estimates are currently available</u> • <u>the case of a 8-year-old with ALL, neutropenia and progressive lung disease has been reported</u> • mortality in adults with cancer is elevated²⁷
Clinical course - pregnancy	<ul style="list-style-type: none"> • infections reported mainly in 3rd trimester; characteristic complications have not been reported to date^{28,29} • no evidence for vertical transmission and fetal infection²⁹⁻³¹
Clinical course - neonates	<ul style="list-style-type: none"> • asymptomatic infection in neonates (including normal chest CT) has been reported^{11,18,30} • complicated perinatal/postnatal courses among <u>non-infected neonates</u> of COVID-19 infected mothers have been reported³²
Treatment	<ul style="list-style-type: none"> • mainly supportive • currently no evidence from clinical trials available • drugs with antiviral activity against SARS-CoV-2 in vitro: remdesivir (nucleoside analog)^{33,34}, lopinavir/ritonavir (Kaletra®)³⁴, darunavir/ritonavir, chloroquine/hydroxychloroquine (Plaquenil®)³⁵ • immunomodulation with tocilizumab (Actemra®, anti-IL6 mAb) reported • ACE2/viral entry blocker (TMPRSS2 inhibitors, e.g. Nafamostat) effective in vitro^{3,36} • <u>recommendations not to use NSAID (e.g. ibuprofen; upregulation of ACE2 receptor expression?) currently lack a firm scientific basis</u>
Prevention	<ul style="list-style-type: none"> • Inpatients: precautions according to Swissnoso/PIGS • Outpatients: precautions according to BAG, KAZA • Neonates: no separation of well mother/child pairs (Swissnoso/PIGS, SGGG, WHO); management IMC/NICU according to local infection control policy • IMPORTANT: scheduled routine immunizations in children ≤ 2 years of age should not be postponed (EKIF/BAG/SGP)

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