

Recommendations for primary healthcare doctors for the management of acute respiratory infections in children during the SARS-CoV-2 pandemic – COVID COMPASS

Recommendations developed by the following experts: Polish Pediatric Society, Polish Society of Vaccinology, Polish Society of Pediatric Pneumology, Polish Society of Family Medicine

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Summary Respiratory tract infections are one of the most common health problems among children during the winter season. Viruses are responsible for a vast majority of respiratory tract infections. Bacterial infections usually affect specific locations (for example, otitis media, nasal sinuses, lungs or, sometimes, throat) and are more frequent in risk groups, or they can complicate a previous viral infection. During the ongoing COVID-19 pandemic, it is essential to consider SARS-CoV-2 as a possible causative agent for any infectious disease affecting the respiratory tract. Recommendations aim to establish an optimal manner for management of respiratory infections. Any patient should be pre-screened by telephone consultation to reduce the risk to healthcare workers. Regardless of the infection's etiology and location, the top priority should be to determine the patient's general condition and the place of treatment and treatment method (hospital, home, symptomatic, antimicrobial). For epidemic reasons, it is advisable to exclude infection with the new coronavirus in the case of a doubtful clinical picture, as well as patients with SARS-CoV-2 infection. The primary purpose of any consultation is to choose the best treatment for the patient (ambulatory/hospital/symptomatic/antimicrobial), and it is not always crucial to know the exact etiology of the infection. Due to epidemiologic reasons, it is reasonable to exclude SARS-CoV-2 infection in every patient with atypical symptoms or after contact with a person infected with SARS-CoV-2.

Key words: human influenza, COVID-19, algorithms.

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Abbreviations. COVID-19 – Coronavirus Disease 2019 – an infectious disease caused by the new coronavirus SARS-CoV-2; CRP – C-reactive protein; PCR – Polymerase Chain Reaction – diagnostic method; NIZP–PZH – National Institute of Public Health – National Institute of Hygiene; RSV – Respiratory Syncytial Virus.

Background

Each year, during the season of influenza and influenza-like illnesses (normally between 1 September and 30 April), primary care physicians face a dilemma of diagnosis and therapy related to respiratory infections in children. The ongoing pandemic is an additional burden, as the new coronavirus infection itself is a huge challenge due to a variety of signs and symptoms, limited access to virology assessments and problems with epidemiological investigations. The lack of population immunity has resulted in the whole-year transmission of infections rather

than a seasonal outbreak. Moreover, the previous year brought about a new challenge to the healthcare system, i.e. widely spread remote consultations via telephone and video appointments, which significantly modified the patient management process. It was essential to acquire the skill for remote clinical assessment of a patient's general condition and identification of patients requiring urgent medical attention. This paper presents an overview on the aspects of management of a child with respiratory tract infection in the primary healthcare settings during the COVID-19 pandemic.

Epidemiology

Respiratory tract infections, along with fever in infants and young children, are the most common reasons of appointments with a general practitioner or a paediatrician [1].



Respiratory infections that are most widely diagnosed in paediatric patients during the current infection season include:

- Common cold.
- Acute rhinosinusitis.
- Acute otitis media.
- Acute pharyngitis and tonsillitis.
- Acute subglottic laryngitis (viral croup syndrome).
- Acute bronchitis.
- Acute bronchiolitis.
- Pneumonia.
- Influenza and influenza-like illness.
- COVID-19 [2].

According to data from the National Institute of Public Health – National Institute of Hygiene (NIZP-PZH), 2.1 million cases of suspected or confirmed influenza were reported in 2019. In 2020 (as of 15 December 2020), there were 1.147 million cases of confirmed SARS-CoV-2 infection and 3.162 million cases of influenza or influenza-like illness reported [3, 4], which means that the new coronavirus has become one of the most common aetiological factors of respiratory infections in the Polish population.

Clinical presentation of respiratory infections

- A viral infection typically affects the entire respiratory tract. Conventionally, a diagnosis indicates the dominant signs and symptoms, such as acute pharyngitis, but the infection usually involves other regions, causing problems with reaching a clear diagnosis.
- Frequent (eight to ten times a year) respiratory tract infections are typically observed in young children attending day nurseries and kindergartens. The time overlap of further infections may be a source of doubts about their character (recurrence, complications, new infection). The most typical features of respiratory infections that facilitate performing a physical examination and medical history, as well as linking the clinical situation to the proper diagnosis, are presented in Table 1.
- Mild viral infections (common cold) develop gradually with the onset of malaise and nasal symptoms (e.g. nasal discharge and congestion). General signs and symptoms, such as low-grade or mild fever and malaise, are most severe during the period of the first 2 to 3 days. Parainfluenza is characterised by rapid high temperature, as well as general signs and symptoms (malaise, feeling cold, asthenia, rigors, myalgia and arthralgia), during the first 2 to 3 days. These symptoms are followed by cough and respiratory disorders. Axial symptoms are observed in some cases, enabling identification of the most affected inflammatory site within the respiratory tract, such as otalgia or discharge in the auditory canal, sinus headache, rhonchi or dyspnoea suggestive of bronchitis/pneumonia (bronchiolitis in infants). When the dominant signs and symptoms are present, such as high temperature, myalgia and arthralgia, rigors, asthenia or headache, assessment should begin with excluding influenza and COVID-19.

Table 1. The most common features of respiratory tract infections in children (authors' version based on [2, 12, 18, 19])

<p>Acute post-viral rhinosinusitis</p> <ul style="list-style-type: none"> • Common cold complication • Children of all ages • Good or moderate general condition • Blocked nose, nasal discharge – initially rhinorrhoea, then thick, purulent (with infiltrating granulocytes which contain coloured granules) • Cough – initially dry, then possibly productive • Headache • Usually moderate and short-lasting temperature increase • Physical exam: nasal discharge, nasal congestion 	<p>Acute viral pharyngitis</p> <ul style="list-style-type: none"> • Usually pre-school and school children • Sore throat, dysgeusia • Rhinorrhoea, cough, frequent dysphonia and conjunctivitis • Moderate or low-grade fever • Physical exam: nasal discharge, nasal congestion, pharyngeal oedema and hyperaemia, palatal erythema 	<p>Acute subglottic laryngitis</p> <ul style="list-style-type: none"> • Children 6 months to 6 years of age • Onset (12–72 hours): signs and symptoms of mild respiratory infection, slightly elevated temperature or fever • Subsequently: barking cough, inspiratory dyspnoea (tachypnoea, nasal flaring, chest indrawing) • Physical exam: stridor, barking cough, anxiety, restlessness
<p>Acute otitis media</p> <ul style="list-style-type: none"> • Infants and young children • Frequently preceded by viral rhinitis along with poor feeding, restlessness • Rapid onset • Presence of fluid in the eardrum: bulging of the tympanic membrane, discharge in the external auditory canal (perforation of the tympanic membrane) or a visible air-fluid level behind the tympanic membrane • Otalgia, erythematous tympanic membrane 	<p>Acute bronchitis</p> <ul style="list-style-type: none"> • Children up to 2 years of age or school children • Cough – initially dry, then possibly productive following a short period of unspecific signs and symptoms • Physical exam (auscultation): rhonchi, prolonged expiration 	<p>Bronchiolitis</p> <ul style="list-style-type: none"> • Infants, less frequently young children up to 2 years of age • Fever, rhinorrhoea, cough followed by expiratory dyspnoea after a few days (often the first episode in life) • Physical exam (auscultation): rhonchi, additional crackles, prolonged expiration, tachypnoea, nasal flaring, chest indrawing
<p>Pneumonia</p> <ul style="list-style-type: none"> • Fever, cough, tachypnoea • Physical exam: chest indrawing; crackles (sometimes rhonchi); focal, unilateral changes on auscultation 	<p>Influenza</p> <ul style="list-style-type: none"> • Short incubation period (1–2 up to 4 days) • Frequently infections in the home-based environment (20–40%), also child-to-child transmission • Fever (commonly but not always), asthenia, myalgia, arthralgia, headache • Young children: possible AOM, emesis 	<p>COVID-19</p> <ul style="list-style-type: none"> • Incubation period: 2–14 days, 5 days on average • <u>Children: usually infected by adults</u> • Fever, cough, sore throat or other signs and symptoms of upper respiratory tract infection, features of gastrointestinal disorder, anosmia and dysgeusia (less frequent in children: 1% in patients less than 10 years of age, 10% in older children)

- Typical features of subglottic laryngitis are barking cough, inspiratory stridor, dysphonia and dyspnoea (usually at night). The disease most commonly affects children 6 to 36 months of age and frequently recurs.
- COVID-19 is characterised by anosmia and dysgeusia, fever, rigors, asthenia, dyspnoea and a worsening of the general condition after approx. 7 days, with dyspnoea and increasingly severe respiratory signs and symptoms which are more frequently observed in adults but also reported in the paediatric population.
- Bacterial infections are associated with gradually worsening signs and symptoms, including fever, and features usually limited to the affected site without previous upper respiratory tract manifestation. An exception is observed for atypical infections where milder signs or symptoms similar to those of viral diseases are common. They may be manifested by both upper and lower respiratory tract disorders, absence of fever and no significant effects on the child's general condition ("walking pneumonia").

Risk factors: infections

Age is a predisposing factor in terms of specific localisation and severity of respiratory infections.

- Infants and young children: otitis media, bronchiolitis, bronchitis and subglottic laryngitis (pseudocroup).
- Pre-school children: acute rhinitis and pharyngitis, acute subglottic laryngitis, acute pharyngitis and tonsillitis.
- School children: acute pharyngitis and acute bronchitis.
- Considering pneumonia, age influences the incidence rate and dominant aetiological factors of infections. The periods of infancy and early childhood (< 5 years of age) are characterised by the highest rates of viral pneumonia, followed by bacterial types of diseases (pneumococcal infections in younger children and atypical *Mycoplasma pneumoniae* or *Chlamydoiphila* spp. infections among adolescents).
- The new coronavirus (SARS-CoV-2) infection affects all age groups, although approx. half as many cases, with a far milder course of the illness compared to adults, are reported for children up to 10 years of age. In addition, due to lockdown measures (closed schools, restrictions on leaving home) during the pandemic, paediatric infections are mainly observed in home-based settings. Contrary to this, adolescents and young adults are affected far more frequently due to social reasons.

Risk factors: viral exposure

- The SARS-CoV-2 infection: Literature data suggests that the most common sources of infection among children are affected adult household members [5–8]. The observed risk of infection in children via home contacts was 4% to 58% in observational studies [9]. Moreover, cases related to visits in healthcare facilities and school employee-student transmission were reported [10]. The role of children (younger children in particular) in the spread of infection has been confirmed [22].
- Influenza is a common illness transmitted by the paediatric population and diagnosed among school children. It is estimated that the risk of infection through home contacts is as high as approx. 40% [2], and thus this route of transmission is fairly important. The peak influenza season in Poland includes the first months of a year (January to March).
- An important difference between influenza and SARS-CoV-2 infections is the much shorter incubation period (1 to 3 days) for influenza compared to 5–7 days on average for the coronavirus. In rare cases, this period may last up to 14 days [2, 11].

Practical management of children during telephone consultations (Algorithm 1)

During a telephone consultation, it is essential to determine the child's general condition and to identify children requiring urgent medical attention or admission to hospital. For this purpose, the following questions must be answered:

- Is the child presenting any life-threatening signs at the time of consultation?
- Is the child at a higher risk of severe infection?
- Should the child be referred to a face-to-face appointment and evaluation due to the signs or symptoms being manifested?
- What personal protective equipment should be used during an appointment in the primary care setting?
- Can the child receive treatment at home?

It is essential to assess the child's general condition when talking to his/her carer and to determine whether urgent referral to the medical emergency team and admission to hospital are required. For this purpose, it is necessary to focus on the assessment of consciousness level, as well as respiratory and cardiovascular function. The alarm signs and symptoms include:

- Impaired consciousness: increased somnolence, apathy, the child looking "poisoned", hypotonia (floppiness), inability to awaken or an overactive state, restlessness, not responding normally to carers (younger children) or inability to respond logically (older children).
- Dyspnoea or enhanced breathing – described by parents as rapid breathing (particularly > 60 breaths/minute), shallow breathing, poor feeding due to acute cough, a forced sitting position, inspiratory stridor, signs of increased airway resistance (chest indrawing, use of accessory respiratory muscles).
- Signs of brain sparing effect or cardiovascular failure: cyanotic, ashen or pale skin; spotted or mottled skin; a significant difference between the temperature of limbs and the rest of the body (cold hands and feet); prolonged capillary refill time (> 3 s); blood oxygen saturation of 95% (pulse oximeter reading).

Other alarm signs and symptoms include:

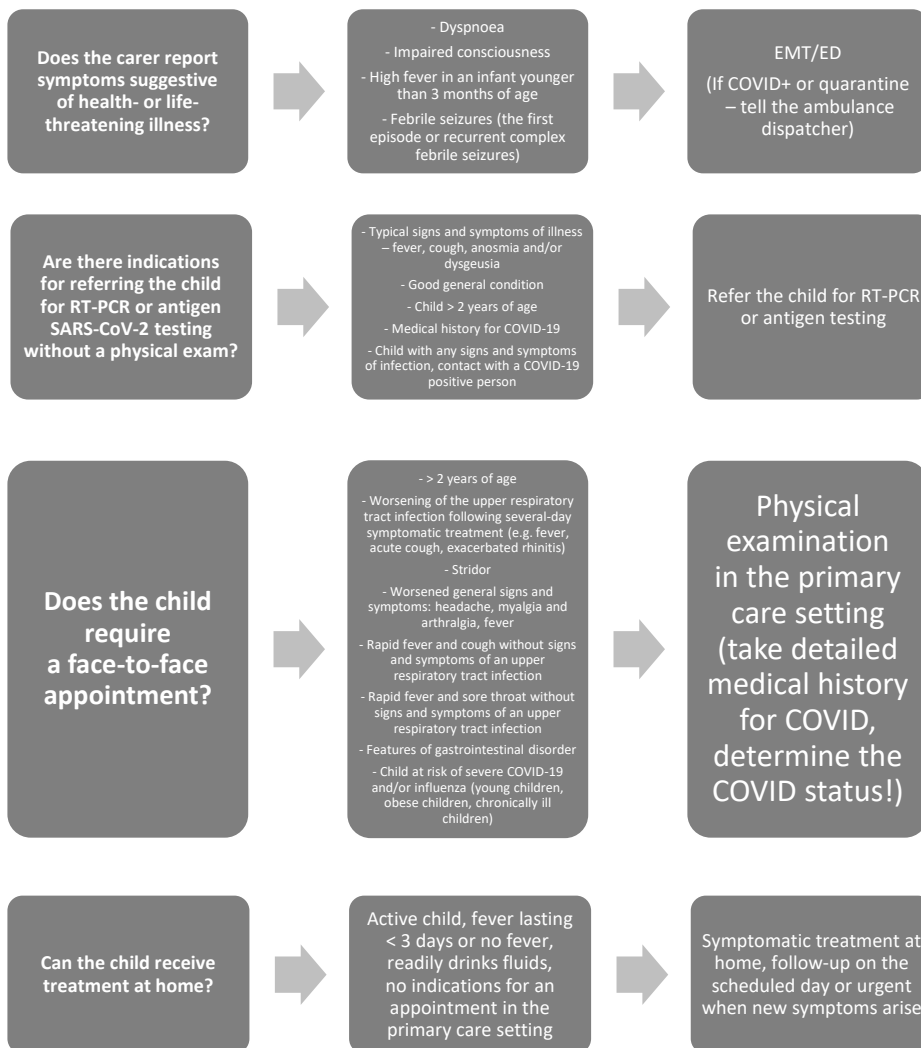
- High, persistent fever in infants under the 3 months of age.
- An episode of seizures (the first episode or recurrent complex febrile seizures).
- Emesis.
- Signs of significant dehydration (anuria, oliguria, decreased skin turgor, dry mucosa).
- Haematochezia, haematemesis.
- Petechial, non-blanching rash.

What is more, assessment of the child's general condition, as well as alarm signs and symptoms, remain universal for both SARS-CoV-2 positive children and paediatric patients with other respiratory tract infections.

During the pandemic, it is necessary to take a medical history for COVID-19.

SARS-CoV-2 infection, quarantine or isolation and recent contact with a COVID-19 positive person are important facts that should be communicated to the ambulance dispatcher, who will inform the emergency medical team that personal protective equipment is required and will determine the ultimate site where the patient is transported.

When the child does not need urgent medical attention, the other procedure of the telephone consultation is to determine whether the patient should be assessed in the ambulatory setting. Face-to-face appointments are particularly advised for the following paediatric patients:



Algorithm 1. Management of a child with a respiratory tract infection during a telephone consultation

- Neonates, infants and young children under 2 years of age.
- Children at high risk of severe infection (e.g. immunosuppression; recent surgery; infection-predisposing congenital disorders; chronic diseases, such as cancer including leukaemia; bronchopulmonary dysplasia; cystic fibrosis; bronchial asthma; renal failure; diabetes mellitus; HIV infection; congenital heart disease; obesity etc.) [12].
- Significantly deteriorated children (manifesting fever, cough, exacerbation of clinical features) following a previous several-day episode of mild upper respiratory tract infection that was managed at home.
- Children presenting rapid fever with unclear source and no signs or symptoms of upper respiratory tract infection (suspected FUO).
- Febrile children presenting mainly general signs and symptoms such as headache, abdominal pain, myalgia and arthralgia, limb pain.
- Children with barking cough and stridor, including patients with a recurrent episode of subglottic laryngitis.
- Children with fever and acute cough without signs or symptoms of upper respiratory tract infection (suspected streptococcal pharyngitis).
- Children with fever lasting longer than 5 days (suspected Kawasaki disease or PIMS).
- Febrile children with gastrointestinal symptoms (suspected PIMS or appendicitis).

Symptomatic treatment at home with the option of follow-up telephone consultation is possible providing that the following conditions are met:

- A child with signs and symptoms of mild upper respiratory tract infection.
- No problems with feeding.
- The child is active and playful following fever resolution.
- Absence of fever or a short episode of low-grade fever, absence of marked general signs or symptoms.
- Absence of dyspnoea or good response to treatment provided by parents, e.g. nebulised budesonide or oral dexamethasone for subglottic laryngitis.
- Good social conditions and communication with parents do not raise any concerns regarding childcare and treatment compliance.

Each child with signs and symptoms of acute infection should be assessed.

When a child is referred to a face-to-face appointment, a thorough medical history for COVID-19 should be taken to determine the preventive measures for the site personnel. During the pandemic, special precautions should be taken, and minimum protection should be ensured in the case of each child with clinical features of respiratory infection. In the absence of aerosol-generating procedures, the minimum preventive measures, according to the WHO, are as follows:

- surgical face mask
- disposable apron
- gloves

- eye protection: goggles or face shield
- careful hand hygiene [13].

The patient (if tolerates wearing a mask, a child over 4 years of age) and his/her carer should wear surgical face masks during the visit.

Practical management of children during face-to-face assessment (Algorithm 2)

In addition to the assessment of a child’s general condition, the aim of a face-to-face appointment is to determine required diagnostic, therapeutic and preventive measures. The most important procedures are as follows:

- Assessment of indications and possible admission to hospital.
- Antigen or serology SARS-CoV-2 testing.
- Influenza infection testing.
- Rapid test for *Staphylococcus*.

- Laboratory tests and imaging scans (complete blood count, CRP, blood oxygen saturation, blood pressure).
- Prescription of antibiotic therapy.

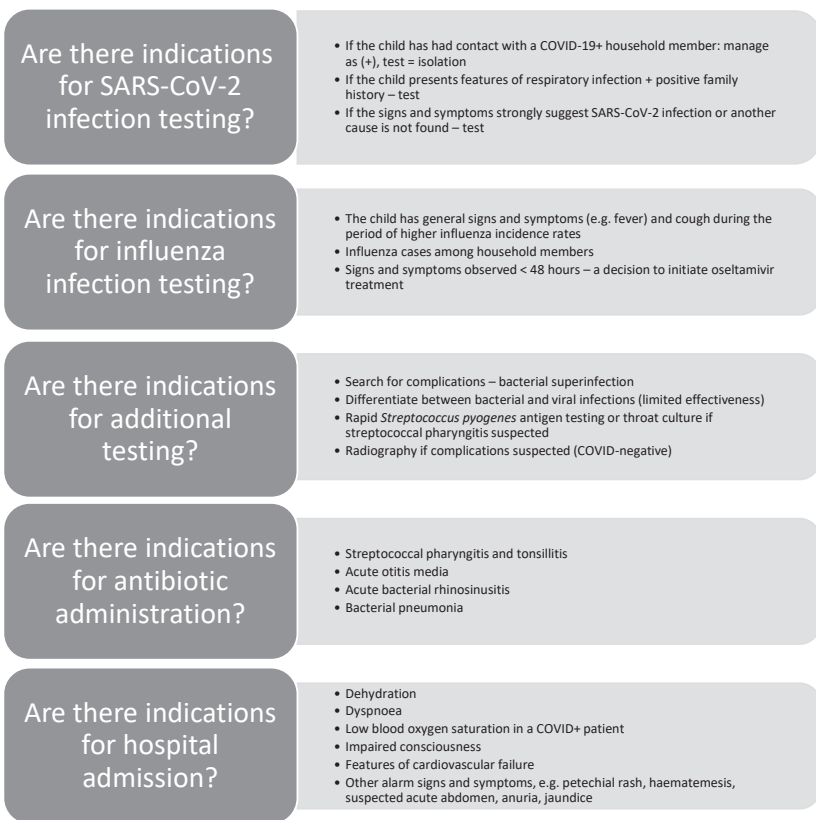
Indications for hospital treatment determined during the face-to-face appointment include:

- Signs of significant dehydration, the child refuses to drink fluids.
- Dyspnoea, difficulty breathing, chest indrawing.
- Ambulatory treatment failure.
- Identification of serious complications.

Antibiotic therapy may be indicated in the following clinical situations:

- Acute bacterial rhinosinusitis.
- Acute otitis media.
- Streptococcal pharyngitis and tonsillitis.
- Bacterial pneumonia.

The clinical picture of the above diseases to be treated with antibiotics is summarised in Table 2.



Algorithm 2. Management of a child with upper respiratory tract infection during a face-to-face appointment

Table 2. Complications of respiratory tract infections and conditions requiring antimicrobial treatment or additional interventions – possible signs/symptoms and clinical situations (authors’ version based on [2, 12, 18, 19])

<p>Bacterial sinusitis</p> <ul style="list-style-type: none"> • Recurrent fever or fever following several days of signs and symptoms and/or transient improvement. • Headache, maxillary odynophagia. • Increased nasal discharge, purulent discharge (particularly on one side). • Unilateral facial pain. 	<p>Bacterial pharyngitis and tonsillitis</p> <ul style="list-style-type: none"> • Usual age: 5 to 15 years. • Bacterial infection: rapid onset, acute sore throat and neck pain, acute odynophagia, salivary oversecretion, high fever. • Physical exam: enlarged palatal tonsils with fur coating, cervical lymphadenopathy, possibly abdominal pain, possible macular/popular rash, absence of rhinorrhoea, cough or dysphonia. • High score in the Centor criteria assessment. 	<p>Subglottic laryngitis</p> <ul style="list-style-type: none"> • Significant restlessness or lethargy. • Permanent stridor, even at rest. • Considerable tachypnoea or difficulty breathing. • Clear signs of dyspnoea (chest indrawing, nasal flaring, forced body position). • Low blood oxygen saturation requiring oxygen therapy. <p>Epiglottitis</p> <ul style="list-style-type: none"> • At all ages. • Rapid onset. • Salivary oversecretion, dysphagia, high fever, rare cough, frequent “poisoned” appearance, Amoss sign. • Absence of the Hib vaccination!
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Table 2. Complications of respiratory tract infections and conditions requiring antimicrobial treatment or additional interventions – possible signs/symptoms and clinical situations (authors' version based on [2, 12, 18, 19])

<p>Acute otitis media requiring antibiotic administration</p> <ul style="list-style-type: none"> • Children under 6 years of age. • High fever, emesis, acute otalgia. • Children under 2 years of age with bilateral acute otitis. • Discharge in the external auditory canal due to perforation of the tympanic membrane. • Children with facial skeleton abnormalities, Down syndrome, recurrent AOM or immunodeficiency. 	<p>Severe bronchiolitis</p> <ul style="list-style-type: none"> • Severe dyspnoea: chest indrawing, nasal flaring, Amoss sign, tachypnoea. • Low blood oxygen saturation. • Acute cough provoking emesis, poor feeding. 	<p>Severe pneumonia</p> <ul style="list-style-type: none"> • Signs and symptoms of sepsis or shock. • Cardiovascular failure. • Tachypnoea: > 70 breaths/min in infants, 40 breaths/min in older children. • Tachycardia: > 160 beats/min in infants, 140 beats/min in older children. • High leukocytosis or leukopenia. • Low blood oxygen saturation (< 92%). • Impaired consciousness, seizures, neurological signs/symptoms. • Dehydration. • Age: < 6 months. • Vast inflammatory lesions in imaging scans.
<p>Influenza</p> <ul style="list-style-type: none"> • Signs and symptoms of lower respiratory tract infection (bronchi, lungs) with low blood oxygen saturation and respiratory failure. • Signs and symptoms of myositis including carditis. • Signs of bacterial overinfection (leukocytosis, high levels of inflammatory markers). • Neurological signs/symptoms, seizures, impaired consciousness. • Dehydration, electrolyte imbalance. 	<p>COVID-19</p> <ul style="list-style-type: none"> • Prolonged fever, acute cough, dehydration. • Low blood oxygen saturation (< 95%). • Signs and symptoms of sepsis or multiple organ failure. • Exacerbation of the chronic disease or the risk of exacerbation. • Symptomatic neonatal infection. 	

Additional testing

Laboratory and imaging findings that change the management algorithm for patients with respiratory infection are as follows:

- CRP level (point-of-care testing: a rapid semi-quantitative test). However, it should be noted that the CRP level is a measure of inflammatory severity, and therefore, this marker is only slightly useful in situations where it seems to be particularly important, i.e. for differentiation between bacterial and viral pulmonary infections. Thus, only extreme values are of diagnostic relevance: < 20 mg/L indicates the absence of bacterial infection, while a value of > 100 mg/L suggests a serious bacterial infection. In addition, CRP testing does not allow for distinguishing between typical and atypical bacterial aetiologies [2]. In the present pandemic situation, high CRP values, prolonged fever and lack of improvement following antibiotic therapy should be suggestive of PIMS. CRP testing alone does not contribute to diagnosing acute COVID-19 in paediatric patients.
- Complete blood count is of a limited diagnostic value. Leukocytosis itself does not confirm the bacterial aetiology of infection. For influenza, values of > 15,000/ μ L indicate bacterial overinfection [14]. Lymphopenia is a relevant measure of suspected SARS-CoV-2 infection.
- Rapid antigen tests for *Streptococcus pyogenes* causing pharyngitis and tonsillitis. If unavailable, pharyngeal culture is a valuable diagnostic measure.
- Routine chest X-ray in children with suspected community-acquired pneumonia is not justified. Anterior/posterior chest X-ray should be performed when no improvement is seen after treatment, complications are suspected or a serious general condition is observed. Regarding a possible SARS-CoV-2 infection, imaging assessment is worth considering, along with referral for hospital or ambulatory treatment after COVID-19 is excluded.

- Each patient with signs and symptoms suggestive of SARS-CoV-2 infection should be referred to testing, particularly those who have had contact with a COVID-19+ person or stay in the affected area. Positive tests have a high epidemic value, as they help limit transmission of the virus due to isolation of the affected individuals. In terms of patient management, positive findings enable immediate referral to COVID-19 departments in the case of symptom exacerbation or complications. A method of choice in diagnosis of the new coronavirus infection is still RT-PCR testing of nasopharyngeal swabs. Sensitivity of the method depends on the test technique and dramatically decreases with tests based on pharyngeal or buccal swabs alone. As in adults, children can and should be tested using nasopharyngeal material.
- Tests for influenza infection, especially during the seasonal outbreak in Poland (January to April), are justified when influenza is suspected but not essential for treatment decisions. It should be noted that a delay in initiation of causative treatment is undesirable, as the highest effectiveness of oseltamivir is observed up to 48 hours after onset, and therefore, it should be administered to patients at risk of severe influenza. In the population at developmental age, the age-related risk factors for severe influenza occur among all children younger than 5 years of age and for chronically ill patients [2].

Co-infections

- Research findings related to co-existence of the SARS-CoV-2 virus and other pathogens are unclear. Available data shows that other pathogenic microorganisms should be identified, e.g. influenza and RSV viruses [15].
- Infections caused by other pathogens do not exclude new coronavirus infections, and therefore, a doubtful clinical picture should be clarified by SARS-CoV-2 testing [20].

- In a group of hospitalised patients due to COVID-19, bacterial infections, including sepsis, were reported, although the rate of cases was small. Based on available data, there are no indications for routine antibiotic administration to SARS-CoV-2-infected patients without confirmed bacterial infection [21].

Recommendations

1. We recommend that management of acute respiratory infections is based on assessment of the patient's general condition and identified factors of severe infection regardless of their aetiologies.
2. During the COVID-19 pandemic, the SARS-CoV-2 and influenza viruses should be considered as potential aetiological factors regardless of the illness severity.
3. When dominant signs and symptoms are present, such as high temperature, myalgia and arthralgia, rigors, asthenia or headache, assessment should begin with excluding influenza and COVID-19.
4. Anosmia and ageusia, which are typical of COVID-19, are rarely observed in children, but their identification significantly increases the chance of SARS-CoV-2 infection diagnosis.
5. We recommend that assessment of a child's general condition to identify patients requiring urgent medical attention is of priority during telephone consultations. The other procedure is to identify axial signs and symptoms, particularly in the case of illnesses that require antibiotic therapy, such as acute streptococcal pharyngitis and tonsillitis or otitis media.
6. We recommend parental education regarding basic assessment of vital signs: respiratory rate, heart rate, capillary refill time, assessment of the child's behaviour and, if possible, measuring peripheral blood oxygen saturation by means of a pulse oximeter.
7. During another episode of subglottic laryngitis, parents can administer glucocorticoids on their own, e.g. nebulised budesonide, or oral dexamethasone, under a doctor's supervision.
8. As the most common sources of SARS-CoV-2 infection are infected adult household members, the epidemic relationship should be the basis for children assessment.
9. Mild SARS-CoV-2 infections in children should be treated symptomatically as with other viral respiratory tract infections. Antibiotic administration is an erroneous decision. The only respiratory infection that can be managed with antiviral treatment in the ambulatory setting is influenza (oseltamivir).
10. We recommend the use of the diagnostic algorithm during telephone consultations, as it reduces the risk of diagnostic errors and prevents one from missing cases requiring urgent medical attention.

Justification

The COVID-19 pandemic is a huge challenge to primary care healthcare providers. Taking into account many aetiological factors of respiratory tract infections during the autumn and winter seasons, including COVID-19 and influenza, this may create dilemmas over both indications for diagnostic assessment and therapy choice and logistics solutions regarding management of ambulatory patients. When seeking optimal solutions, we should think about whether and how the knowledge of illness aetiology may affect the management of patients. The patient's general condition and the chance of a worsening condition remain the most important aspects. A vast majority of respiratory tract infections are mild cases and only require symptomatic treatment regardless of their causes.

Therefore, the main priority of primary care should be identification of patients with severe infection who need antibiotic therapy or admission to hospital, while the type of infection

Table 3. Abnormalities identified in physical examination for respiratory tract infections (authors' version based on [2, 16, 17])

Upper respiratory tract		Lower respiratory tract	
Nose	Nasal congestion, nasal discharge (green or yellow discharge does not indicate bacterial infection)	Bronchi	Rhonchi, prolonged expiration, possibly reduced blood oxygen saturation
Sinuses	Headache, sinus headache, pain while biting and chewing (often unilateral), nasal discharge dominating on the affected side – sometimes purulent	Bronchioles	Rhonchi, rales, prolonged expiration, air trapping, possibly reduced blood oxygen saturation
Pharynx	Odynophagia, palatal erythema, enlargement of tonsils, oedema, white coating (in bacterial infections but also possible in viral cases, e.g. adenoviruses, EBV).	Lungs	Tachypnoea, crackles, prolonged expiration, possibly reduced blood oxygen saturation
Larynx	Stridor during turbulent air flow through a partially narrowed larynx Possibly reduced blood oxygen saturation		
<p>Respiratory sounds – physiological sounds over the larynx and trachea, over the airless lung area in pathologies (e.g. lobar pneumonia). Rhonchi – heard on auscultation, usually during expiration, when the air passes through narrowed bronchi (e.g. due to discharge, oedema smooth muscle contractions). Crackles – created during opening (aeration) of alveoli in atelectasis (best heard during the inspiratory peak). They also include moist rales created when the air passes through the accumulated discharge in bronchi (heard both during inspiration and expiration). Their sound depends on the diameter of affected bronchus (coarse, medium, fine). Prolonged expiration – typical of lower respiratory tract obstruction. Tachypnoea – indicative of pneumonia. Air trapping – abnormal retention of air in the lungs.</p>			
<p>Number of breaths/min – normal values: Infants: 30 to 53 breaths/min Young children: 22 to 37 breaths/min Pre-school children: 20 to 28 breaths/min School children: 20 to 25 breaths/min Adolescents: 12 to 20 breaths/min</p>			
<p>Inspiratory/expiration ratio: expiration equals approx. 1/5 of the inspiration physiologically.</p>			

(new coronavirus or other pathogens) is not a determining factor. On the other hand, COVID-19 patients should be identified and isolated for epidemic reasons, as well as patients should be encouraged to undergo SARS-CoV-2 testing. Moreover, the chance of co-infections should be considered, as bacterial over-infections are possible in COVID-19 patients, as well as concomitant infections caused by other pathogens. In view of available data, overlapping infections caused by other bacteria and viruses may increase the risk of severe COVID-19 and may suggest administration of antiviral treatments, e.g. oseltamivir or antibacterial agents [20].

Due to the upcoming peak influenza season, diagnostic assessments of this infection should be performed. To date, acute respiratory symptoms (cough and high fever) during the winter period have shown a high > 70% positive predictive value regarding influenza identification [2]. In the current year, two most frequent infections should be considered concerning an influenza-like illness: influenza and COVID-19. Rapid diagnosis of influenza is an important aspect, as it enables administration of oseltamivir to infected patients and post-exposure prevention ensured for individuals in contact in the patient's immediate environment.

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