Disclosures / Disclaimer

- I have no financial disclosure or conflict of interest concerning the material discussed in this presentation.

- The COVID-19 pandemic is a rapidly evolving incident: please refer to the Centers for Disease Control and Prevention’s COVID-19 website for the most up-to-date information and resources.

- The information in “The School Nurse & COVID-19” series are recommendations at this point in time on August 20, 2020, based on CDC and DESE guidance.
Coronaviruses

- Enveloped, non-segmented, single-stranded, positive-sense RNA viruses
- Corona = “crown-like” surface proteins
- Infect humans, variety of animals
- Diverse clinical syndromes

- Human coronaviruses - 229E, OC43, NL63, and HKU1
  - Spectrum of illness, self-limited (peak day 3-4)

- Severe Acute Respiratory Syndrome (SARS) Coronavirus
  - Global outbreak in 2002-2003, more severe symptoms, 10% overall mortality, no infant or child deaths

- Middle Eastern Respiratory Syndrome (MERS)
  - Spectrum of illness, primarily male adults with comorbidities, children present with milder symptoms
SARS-CoV-2 or COVID-19

- Incubation Period: 2-14 days

- Transmission / How it’s spread
  - Primarily through droplets generated when an infected person coughs or sneezes
  - Also spread through droplets of saliva or discharge from the nose
  - Can be direct (cough/sneeze) or indirect (contaminated surfaces/objects)

- Range of symptoms

- Diverse spectrum of illness
Transmission of COVID-19

- Droplet (≤ 6 feet) most important mode of transmission
- Direct contact with infected individuals also very important
- Indirect contact (via contaminated environment can occur but only accounts for ~ 6% of infections
- Pre-symptomatic (i.e. up to 48 hours before person develops symptoms: transmission well documented
- Asymptomatic (infection demonstrated): infectivity undefined
- Airborne (> 6 feet): no definitive evidence for transmission

Adapted from David Weber, SHEA Town Hall 7/12/20
# Distinguishing COVID-19

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>COVID-19</th>
<th>COMMON COLD</th>
<th>FLU</th>
<th>ALLERGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>Common</td>
<td>Rare</td>
<td>Common</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Dry Cough</td>
<td>Common</td>
<td>Mild</td>
<td>Common</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Loss of Smell &amp; Taste</td>
<td>Common</td>
<td>Common</td>
<td>Common</td>
<td>Common</td>
</tr>
<tr>
<td>Shortness of Breath</td>
<td>Sometimes</td>
<td>X</td>
<td>X</td>
<td>Common</td>
</tr>
<tr>
<td>Headaches</td>
<td>Sometimes</td>
<td>Rare</td>
<td>Common</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Aches, Muscle Pains</td>
<td>Sometimes</td>
<td>Mild</td>
<td>Common</td>
<td>X</td>
</tr>
<tr>
<td>Sore Throat</td>
<td>Sometimes</td>
<td>Common</td>
<td>Sometimes</td>
<td>X</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Sometimes</td>
<td>Sometimes</td>
<td>Common</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Chills, Shaking</td>
<td>Sometimes</td>
<td>Rare</td>
<td>Common</td>
<td>X</td>
</tr>
<tr>
<td>Diarrhea, Vomiting</td>
<td>Rare</td>
<td>X</td>
<td>Sometimes</td>
<td>X</td>
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<tr>
<td>Swollen Toes</td>
<td>Rare</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Runny Nose</td>
<td>Rare</td>
<td>Common</td>
<td>Sometimes</td>
<td>Common</td>
</tr>
<tr>
<td>Sneezing</td>
<td>X</td>
<td>Common</td>
<td>Sometimes</td>
<td>Common</td>
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</tbody>
</table>

Where the world comes for answers
COVID-19 symptoms can also be symptoms of other illnesses

<table>
<thead>
<tr>
<th>Symptoms of COVID-19</th>
<th>Strep Throat</th>
<th>Common Cold</th>
<th>Flu</th>
<th>Asthma</th>
<th>Seasonal Allergies</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEVER</td>
<td></td>
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<tr>
<td>COUGH</td>
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<tr>
<td>SORE THROAT</td>
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<td>SHORTNESS OF BREATH</td>
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<tr>
<td>FATIGUE</td>
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<tr>
<td>DIARRHEA OR VOMITING</td>
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<td>RUNNY NOSE</td>
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</tr>
<tr>
<td>BODY/MUSCLE ACHES</td>
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</table>

COVID-19 in Children

- In the U.S. children (age 0-17 years) account for 7.3% of all COVID-19 cases (8/3/20)
- Hospitalization rates in children are lower than in adults
- Similar symptoms as adults
  - Milder
  - Less complications
- Similar to other respiratory viral infections
- Initial presentation may differ from adults
- Recent evidence suggests children have higher viral loads in their nasopharynx compared to adults and that children can spread the virus effectively in households and camp settings
- Asymptomatic infection = infection without symptoms (Assaker, 2020)
  - Recent systematic review estimates 16% are asymptomatic
- Why the difference?
  - Fewer viral receptors?
  - Pre-existing cross-protection?

COVID-19 Symptoms in Children

most common are **fever** and **cough**

- Fever
- Fatigue
- Headache
- Myalgia
- Cough
- Nasal congestion or rhinorrhea
- New loss of taste or smell

- Sore throat
- Shortness of breath / difficulty breathing
- Abdominal pain
- Diarrhea
- Nausea or vomiting
- Poor appetite or poor feeding

Risk Factors for Individuals of Any Age

- **Blood Disorders** (e.g. sickle cell disease or on blood thinners)
- **Chronic Kidney Disease** as defined by your doctor. Patient has been told to avoid or reduce the dose of medications because kidney disease, or is under treatment for kidney disease, including receiving dialysis.
- **Chronic Liver Disease** as defined by your doctor. Patient has been told to avoid or reduce the dose of medications because liver disease, or is under treatment for liver disease.
- **Compromised Immune System** (immunosuppression) (e.g. seeing a doctor for cancer and treatment such as chemotherapy or radiation, received an organ or bone marrow transplant, taking high doses of corticosteroids or other immunosuppressant medications, HIV or AIDS)
- **Current or Recent Pregnancy** in the last two weeks
- **Endocrine Disorders** (e.g. diabetes mellitus)
- **Metabolic Disorders** (such as inherited metabolic disorders and mitochondrial disorders)
- **Heart Disease** (such as congenital heart disease, congestive heart failure, and coronary artery disease)
- **Lung Disease** (including asthma or chronic obstructive pulmonary disease, chronic bronchitis or emphysema, or other chronic conditions associated with impaired lung function or that require home oxygen
- **Neurological & Neurologic & Neurodevelopment Conditions** (including disorders of the brain, spinal cord, peripheral nerve, and muscle such as cerebral palsy, epilepsy (seizure disorders), stroke, intellectual disability, developmental delay)
Risk Factors for Severe Illness in Children

- Children with genetic disorders
- Neurologic disorders
- Metabolic conditions
- Congenital Heart Disease
- Obesity
- Diabetes
- Asthma
- Chronic Lung Disease
- Sickle Cell Disease
- Immunosuppression

Limited Evidence
Globally, as of 10:38am CEST, 19 August 2020, there have been 21,938,171 confirmed cases of COVID-19, including 775,581 deaths, reported to WHO.

https://covid19.who.int
COVID-19 National Epidemiology

USA
5,422,242 TOTAL CASES
CDC | Updated: Aug 18 2020 12:15PM

USA
169,870 TOTAL DEATHS
CDC | Updated: Aug 18 2020 12:15PM

USA
1,654 Cases per 100,000 People
CDC | Updated: Aug 18 2020 12:15PM

COVID-19 Local Epidemiology

Massachusetts Department of Public Health COVID-19 Dashboard - Tuesday, August 18, 2020

Daily and Cumulative Confirmed Cases
Confirmed COVID-19 Cases To Date by Date Individual Tested

- Newly Reported Confirmed Cases Today: 175
- Total Confirmed Cases: 114,786
- Newly Reported Deaths among Confirmed Today: 6
- Total Deaths among Confirmed Cases: 8,617

Data Sources: COVID-19 Data provided by the Bureau of Infectious Disease and Laboratory Sciences; Figures and tables created by the Office of Population Health.
Note: all data are current as of 10:00am on the date at the top of the page. Data previously shown according to date report received; data now presented according to date the individual was tested. Due to lag in reporting by laboratories, counts for most recent dates are likely to be incomplete.

Massachusetts COVID-19 Cases by Age

Massachusetts Department of Public Health COVID-19 Dashboard - Wednesday, August 12, 2020

Cases and Case Rate by Age Group for Last Two Weeks

This data covers 7/26/2020 to 8/8/2020

Massachusetts COVID-19 Hospitalizations by Age

Hospitalizations & Hospitalization Rate by Age Group for Last Two Weeks

This data covers 7/26/2020 to 8/8/2020

Average Age of Total Cases Reported as Hospitalized* 59


Where the world comes for answers
Massachusetts COVID-19 Deaths by Age

Deaths and Death Rate by Age Group for Last Two Weeks

This data covers 7/26/2020 to 8/8/2020


Where the world comes for answers

Boston Children's
COVID-19 Community-Level Data Map

Vaccine Development

- 167 vaccines in development globally
  - 138 candidates in preclinical evaluation
  - 29 candidates in clinical evaluation

Source: Callaway, 2020
COVID-19 Prevention

- Stay home if you are sick
- Daily symptom screening/attestation
- **6 feet physical distancing** (separate desks, install physical barriers, create visible cues/stickers/ways to walk)
- **Hand hygiene** (20 seconds soap and water or hand sanitizer that contains at least 60% alcohol)
- Cough etiquette
- Masks/face coverings
- **Adequate supplies** (soap, hand sanitizer, paper towels, tissues, disinfectant wipes, trash cans)
- **Cleaning of surfaces** (high touch surfaces, avoid sharing of objects)
- **Avoid large gatherings** (field trips, assemblies, meetings)
- **Ventilation** (ensure systems operate properly and increase circulation of outdoor air – open windows, doors)
- **Contact tracing for close contacts** (within 6 feet for a consecutive time of 15 minutes) with a person with confirmed COVID-19

Hand Hygiene

- Prior to
  - Touching any mucous membranes (eyes, nose, mouth)
  - Going towards your face (adjusting glasses, fixing your mask)
  - Eating
  - Drinking

- After going to the bathroom

- If visibly soiled
Cloth Face Coverings (Masks)

- Creates a barrier
- Contains the droplets from falling to the ground, on a desk, on another child
- Protects other people
- Prevents asymptomatic transmission

**CDC recommends masks:**
- When students are seated less than 6 feet apart (riding a bus/carpooling, entering/exiting school, moving from classroom to classroom, circle time, moving from place to place in a classroom)

**CDC considers mask:**
- At recess or in PE
- Students in band, choir or music
- When sitting at least 6 feet apart in a classroom
- Severe asthma, breathing problems
- Deaf, hard of hearing, lip reading (clear masks available)

**Mask not worn:**
- Eating, drinking, sleeping
COVID-19 Management

- Supportive
  - Complications of severe disease
  - Complications from prolonged hospitalization
- No FDA-approved therapies
  - >250 biopharma products in development
- IDSA Guidelines
  - Recommendations for use of investigational therapies in the context of clinical trials
- Ensure Immunizations and Well-Child Care after recovery
MIS-C: Clinical Presentation, Evaluation & Treatment

- **Clinical Presentation**
  - Persistent fever, fatigue, variable signs/symptoms, elevated inflammatory markers
  - Weeks following infection with COVID-19 (may have been mild or undetected)

- **Evaluation**
  - Testing aimed at identifying inflammation
  - Nucleic acid or antigen testing
  - Serology (prior to IVIG, exogenous antibody therapies)
  - Baseline cardiac evaluation (ECHO, EKG, cardiac enzymes or troponin, BNP, etc.)
  - Additional evaluation per patient signs/symptoms

- **Treatment**
  - No published guidelines or CDC recommendations
  - Primarily supportive, directed at underlying inflammatory process
Multisystem Inflammatory Syndrome in Children (MIS-C)

- An individual aged < 21 years presenting with fever*, laboratory evidence of inflammation**, and evidence of clinically severe illness requiring hospitalization, with multisystem (≥ 2) organ involvement (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatologic or neurological); AND
- No alternative plausible diagnoses; AND
- Positive for current or recent (SARS-CoV-2 infection by RT-PCT serology, or antigen test, or exposure to a suspected or confirmed COVID-19 case within the 4 weeks prior to the onset of symptoms.

* Fever ≥ 38°C for ≥ 24 hours, or report of subjective fever lasting ≥ 24 hours

** Including, but not limited to, one or more of the following: an elevated C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), fibrinogen, procalcitonin, d-dimer, ferritin, lactic acid, dehydrogenase (LDH), or interleukin 6 (IL-6), elevated neutrophils, reduced lymphocytes and low albumin.
School Reopening: Global Experience

- Varied, overall favorable
  - No change in COVID-19 cases: Australia, Austria, Finland, New Zealand, Norway
  - Initial increase & subsequent drop in COVID-19 cases: Denmark, Singapore
  - Increase in cases and subsequent school closures: France, Israel, South Korea, United States
  - The best available evidence from countries that have opened schools indicates that COVID-19 pose low risks to school-age children in areas with low community transmission

- Keys to successful school reopening:
  - Low rates of community transmission
  - Communication with students, parents & families
  - Stay home when ill
  - Have a testing plan
  - Wearing masks
  - Hand hygiene
  - Physical distance

COVID-19 Symptom Screening in Schools

- Parents should be screening their children for the following symptoms prior to coming to school. If, however, students present to school with these symptoms, they should be isolated and must test negative or isolate for 14 days before returning to school:
  - Fever (100°F Fahrenheit or higher), chills, or shaking chills
  - Cough (not due to other known cause, such as chronic cough)
  - Difficulty breathing or shortness of breath
  - New loss of taste or smell
  - Sore throat
  - Headache, when in combination with other symptoms
  - Muscle aches or body aches
  - Nausea, vomiting, or diarrhea
  - Fatigue, when in combination with other symptoms
  - Nasal congestion or runny nose (not due to other known causes, such as allergies) when in combination with other symptoms

*per DESE guidelines 8/18/20*
Management of Children with COVID-19 Symptoms in Schools

- Although families are the most important first line of defense for monitoring symptoms, teachers will play an important role in referring possible symptomatic students to the school nurse or other medical point of contact. (Note: This will require training for teachers.)

- Teacher ensures the student is wearing a mask that fully covers nose and mouth at all times.

- Teacher calls the nurse or school medical point of contact to inform them that they have a possible case. Nurse or school medical point of contact comes to get the student from class.

- Nurse (or school medical point of contact) should evaluate the student for symptoms (see slide 27)
  - IF ANY SYMPTOM:
    - Place the student in the designated medical waiting room. There is no specific capacity limit for the medical waiting room, but all students in the COVID-19 waiting room must be as far apart as possible, and no less than 6 feet. Strict mask wearing covering the nose and mouth at all times for every person in the room must be enforced. Students can work on individual schoolwork or other activities while in the medical wait
    - Contact caregiver for pick-up.
  - IF NO SYMPTOMS:
    - If the evaluation shows the student does not have symptoms, send the student back to class.

*per DESE guidelines 6/25/20*
Symptomatic Student in School, cont’d

- IF CAREGIVER CAN PICK UP DURING THE DAY: Student waits to be picked up in the **medical waiting room**. Caregivers must wear a mask/face covering when picking up their student. Students should not ride the school bus to get home. Caregivers and students should wash their hands upon arriving at home and change their clothes as a precaution.

- IF CAREGIVER CANNOT PICK UP DURING THE DAY: The student should wait in the **medical waiting room** until the end of the day to be picked up by caregiver. The student should not go home on a school bus with other students.

- Current Massachusetts DPH guidance is that all symptomatic individuals in Massachusetts, even those with mild symptoms, should be tested. An individual who does not wish to be tested should instead isolate for 14 days and until asymptomatic.

*per DESE guidelines 6/25/20*
COVID-19 Testing for Children

- Molecular Testing
  - Nasopharyngeal swab test vs. rapid saliva test
- Antibody Testing
  - Not FDA-approved nor recommended as sole basis for diagnosis of acute infection

- Towns/districts may recommend testing centers, and an interactive map of pediatric testing sites can be found on the Boston Children’s website.

- For a positive test result, students must:
  - Remain at home at least 10 days and until at least 1 day has passed with no fever and improvement in other symptoms.
  - Answer the call from the contact tracing team (local board of health or Community Tracing Collaborative) and help identify close contacts to help prevent transmission. The contact tracing team will ultimately clear your child for return to school.

- For a negative test result, return to school will depend on resolution of symptoms for at least 24h. Check with the school nurse before returning to school.
References