

RESPIRATORY TRACT INFECTIONS

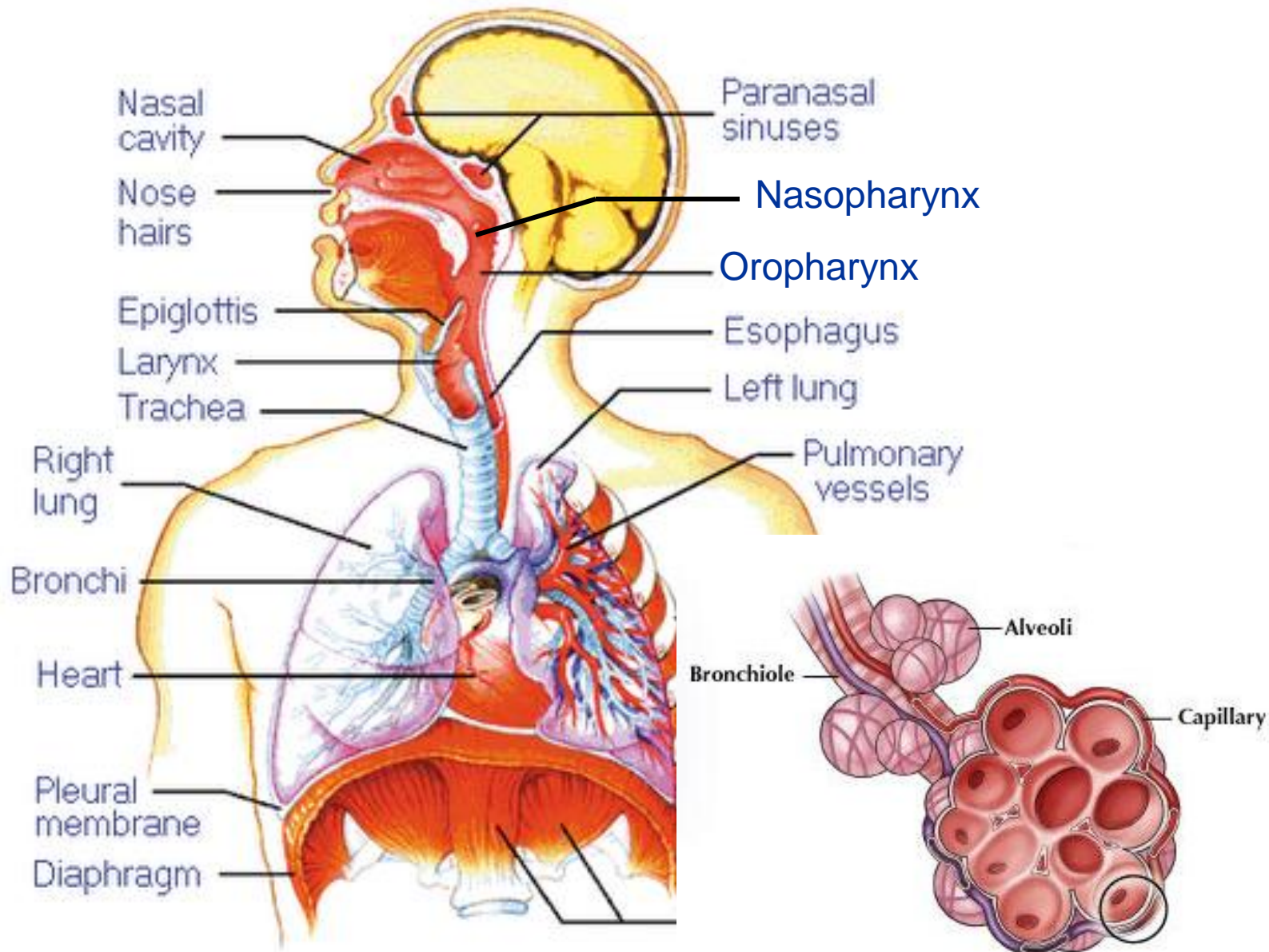
CLS 212: Medical Microbiology

Zeina Alkudmani

Anatomy of the Respiratory System

Upper Respiratory Tract

Lower Respiratory Tract



Respiratory Tract Infections

- Normal flora of the upper respiratory tract (URT) might cause opportunistic infections of the respiratory system.
- Infectious diseases of the URT are more common than infectious diseases of the LRT because they put the patient at risk of more serious infection.

Terms to be Known

Sinusitis

Inflammation of the lining of one or more of the paranasal sinuses.

Pharyngitis

Inflammation of the mucous membrane and the underlying tissue of the pharynx.

Laryngitis

Inflammation of the mucous membrane of the larynx.

Epiglottitis

Inflammation of the epiglottis. It may cause respiratory obstruction especially in children.

Terms to be Known

Bronchitis

Inflammation of the mucous membrane lining the bronchial tubes.

Pneumonia

Inflammation of one or both lungs. The alveolar sacs will be filled with inflammatory cells, fibrin, and exudates.

Bronchopneumonia

Combination of bronchitis and pneumonia.

Infections of the URT

Viral Infection:

- Common Cold.

Bacterial infections:

- Pharyngitis (Sore throat).
- Diphtheria.





Common Cold

Common Cold

- Viral infection of the lining of the nose, throat, and sinuses. Also known as: *Acute Viral Rhinitis*.
- **Symptoms:** coughing, sneezing, runny nose, sore throat, fever, chills, and malaise.
- Secondary bacterial infection (otitis media, sinusitis) may follow.
- **Causative viruses:** rhinovirus, influenza virus, parainfluenza virus, coronavirus,...
- Rhinoviruses is the major cause of cold in adults (more than 100 types).
- **Transmission:** (person-to person)
airborne droplet inhalation, direct contact with infected human or his belongings.

Pharyngitis



Pharyngitis

- Acute bacterial infection of the throat.
- Also known as: *Strept throat*.
- **Symptoms:** sore throat, chills, fever, headache; beefy red throat; white pus patches on pharynx; enlarged tonsils & cervical lymph nodes.
- The infection might spread to sinuses, middle ear, or hearing organs.
- **Causative Bacteria:** Gram positive *Streptococcus pyogenes* also known as Strept group A.
- **Transmission:** (person-to person)
Airborne droplet inhalation, direct contact with infected human or his belongings. Also direct contact with nasal carrier of the infection.
- **Treatment:** Penicillin G (Erythromycin).

Acute Bacterial Pharyngitis

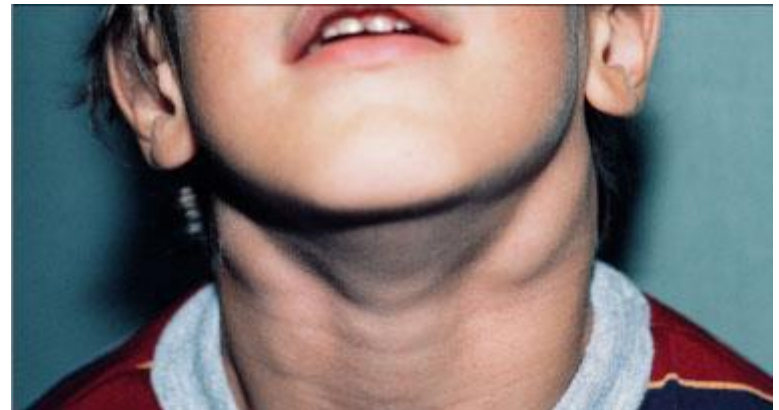
White pus patches on
pharynx; enlarged
tonsils



enlarged cervical lymph nodes



Impetigo: Skin Infection,
more common on the face
of children.



Scarlet Fever

Characterized by pharyngitis, fever, and rash.

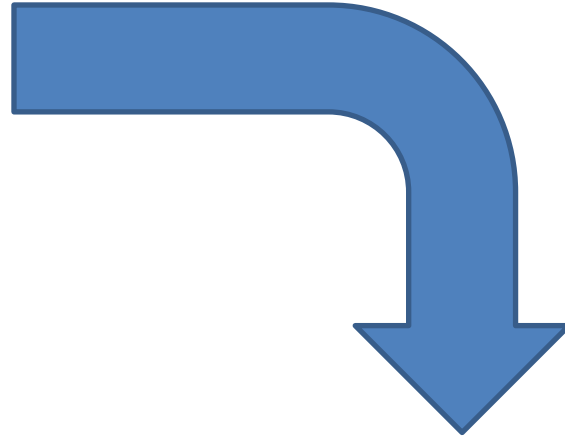


Strawberry Tongue



Rheumatic Fever

A systemic disease affecting the connective tissue (heart, joints, skin, and brain) and can occur 2-3 weeks after an untreated streptococcal Group A infection.



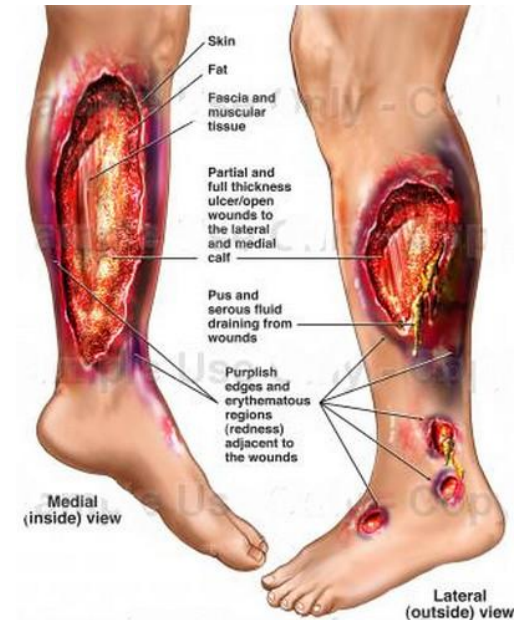
Rheumatic Heart Disease

Is a condition in which the heart valves are damaged by rheumatic fever.

Invasive group A strep.

- **Necrotizing Fasciitis "flesh-eating disease"**

Bacteria produce **toxin** that quickly and irreparably destroys flesh and muscle.



- **Streptococcal Toxic Shock Syndrome**

The toxin damages the tissues and organs so quickly that treatment is difficult and often too late. Causes a dangerous drop in blood pressure, shock, and damage to the kidneys, liver, and lungs.

Infections of the LRT

Viral:

- Viral Respiratory disease.
- Avian Influenza (Bird Flu).
- Influenza (flu).
- Severe Acute Respiratory Syndrome (SARS).
- Hantavirus Pulmonary Syndrome (HPS).

Bacterial:

- Legionnaire's Disease (Pontiac Fever).
- Primary Atypical Pneumonia
- Tuberculosis (TB).
- Whooping Cough.

Fungal:

- Pneumocystis pneumonia (PCP).

Pneumonia

Acute non-specific infection of the alveoli and the lungs.

- Often secondary to viral respiratory infection.
- **Symptoms:** fever, cough, acute chest pain, chills, and shortness of breath.
- **Transmission:** (person-to person or bird-to-person) airborne droplet inhalation, direct oral contact.
- Pneumonia can be community acquired or hospital acquired.
- **Types of Community Acquired Pneumonia:**
 1. Typical Pneumonia.
 2. Atypical Pneumonia.

“Typical” vs. “Atypical” Pneumonia

Typical Pneumonia: (Bacteria: *Strept. pneumoniae*)

- Sudden onset.
- Productive cough with purulent sputum.
- Pleuritic chest pain.
- leukocytosis (high no. of WBC) or leukopenia (low no. of WBC).

Atypical Pneumonia: (bacteria, virus, fungi)

Pneumonia not due to *Strept. pneumoniae*

- Gradual onset.
- Nonproductive cough.
- Substernal chest pain.
- White blood count normal.

Hospital Acquired Pneumonia

- Account for 15% of hospital acquired infections.
- The most common fatal hospital acquired infection with a mortality rate of: 20-50%.
- **People at risk:** Immunocompromised patients.
- Most often caused by **Gram-negative bacteria** and more resistant organisms **e.g.**
Pseudomonas aeruginosa, Enterobacter, Klebsiella, ..



Influenza (Flu)

Influenza is an acute viral respiratory infection

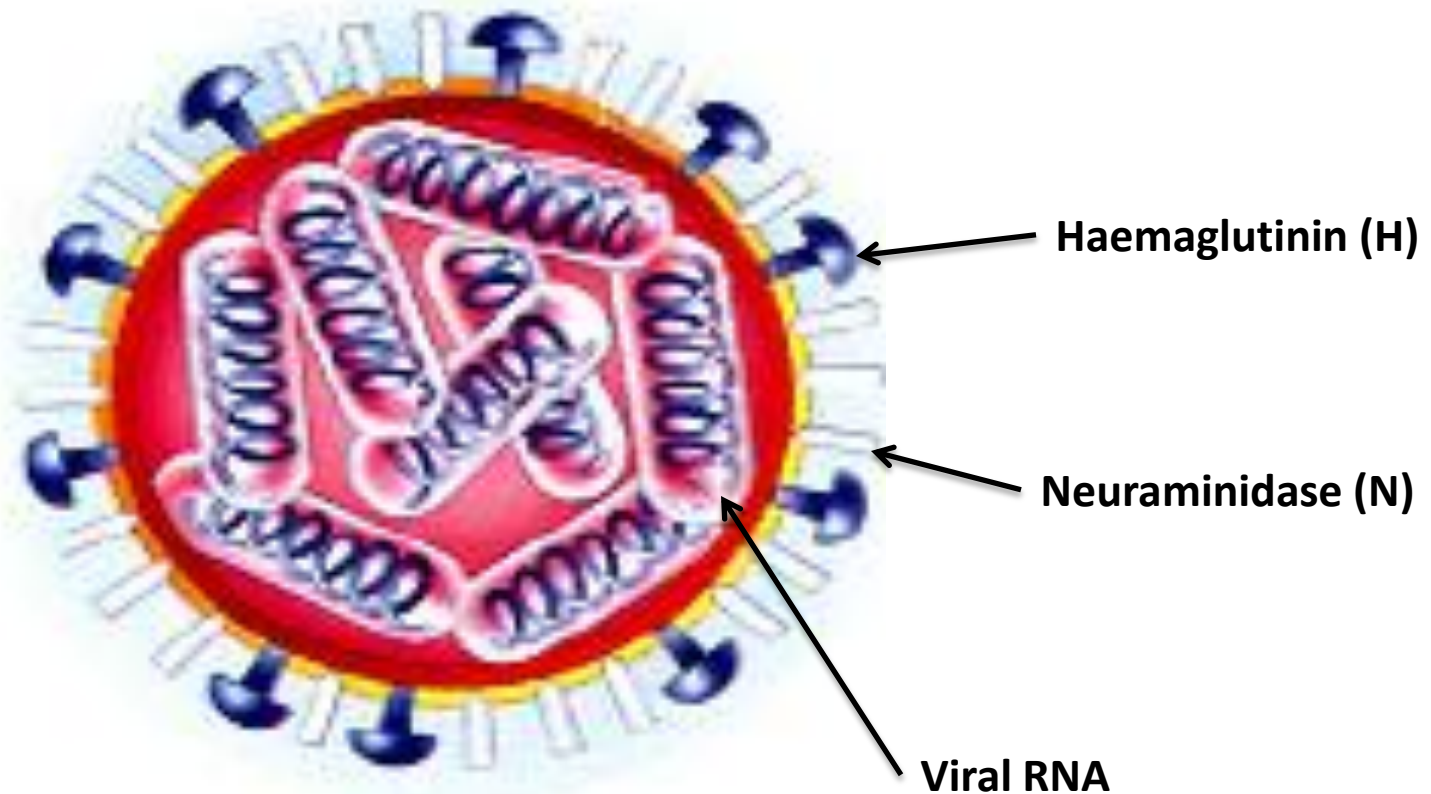
- **Symptoms:** fever, chills, headache, body aches and pain, sore throat, cough, nasal drainage.
Sometimes: nausea, vomiting, and diarrhea especially in children.
- **Carriers:**
 - Human (main carrier).
 - Birds and pigs.
- **Transmission:**
Airborne spread or direct contact.

Influenza (Flu)

Causative Agent: Influenza virus A, B, and C.

- **Influenza A viruses** causes severe symptoms and are associated with pandemics and epidemics.
- **Influenza B viruses** causes less severe disease and more localized epidemics.
- **Influenza C viruses** usually do not cause significant disease or epidemics.

Structure of Influenza A Virus



Antigenic **DRIFT** causes yearly epidemics.

Antigenic **SHIFT** causes influenza pandemic (every 10-40 years).

Flu Vaccine

- Travelers.
- Children 6 months – 5 years.
- Elderly > 65.
- Residents of nursing homes.
- People with long term-illnesses (e.g. heart/lung).
- People with depressed immunity.
- Pregnant women in 2nd-3rd trimester.
- Healthcare workers.
- EVERYONE in the face of a Pandemic-threat.

Flu Pandemics

- **1918-1919 Spanish flu:** also known as the swine flu epidemic which killed 20-50 million people worldwide.
- **1957-1958 Asian flu** killed about 1 million people.
- **1968-1969 Hong Kong flu** killed about 0.7 million people.

Swine Flu H1N1 Outbreak- 2009

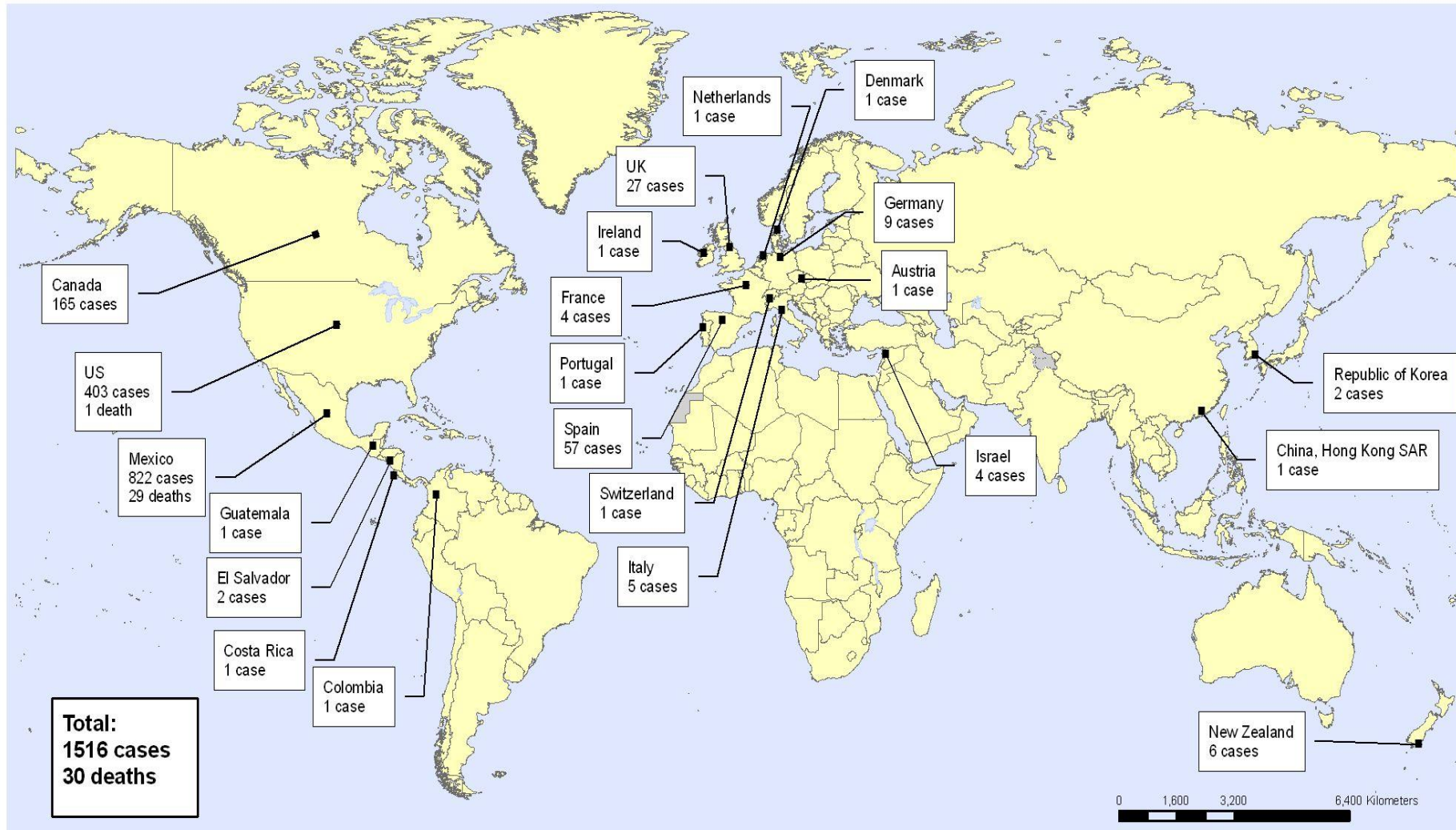


Cases

- April 4: 1st case in Mexico.
- April 12: First death.
- April 21-23: US confirms first 4 cases.
- April 26: Canada confirms first cases.
- April 27: Europe, Spain & Britain. WHO raises pandemic alert status to phase 4.
- April 28: New Zealand & Israel.
- April 29-30: Germany, Austria, Switzerland, Netherlands.
- May 1: Hong Kong, Denmark, France.
- May 2: South Korea, Italy.

New Influenza A (H1N1), Number of laboratory confirmed cases and deaths as reported to WHO

Status as of 6 May 2009
06:00 GMT



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Public Health Information
and Geographic Information Systems (GIS)
World Health Organization



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The A/H1N1 virus

*An unusual cocktail
of avian, swine and human viruses*



Bird flu

Human flu



Swine flu

Pigs may harbour several flu viruses simultaneously. The pathogens may mix to create a new viral strain



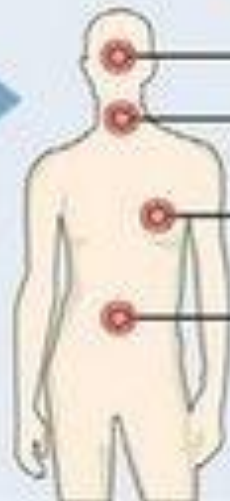
Transmission

Pig to human

*By inhaling viral particles
(there is no risk from eating cooked pork)*



Human to human
By inhaling viral particles



Symptoms

- High fever
- Coughing, sneezing
- Breathing difficulties
- Loss of appetite

Transmission

- **Primary:**

Person to Person

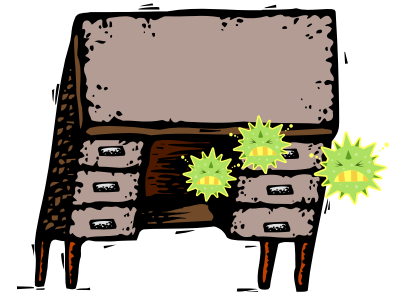
- Inhalation of Airborne Droplets from Infected Person Coughing or Sneezing.



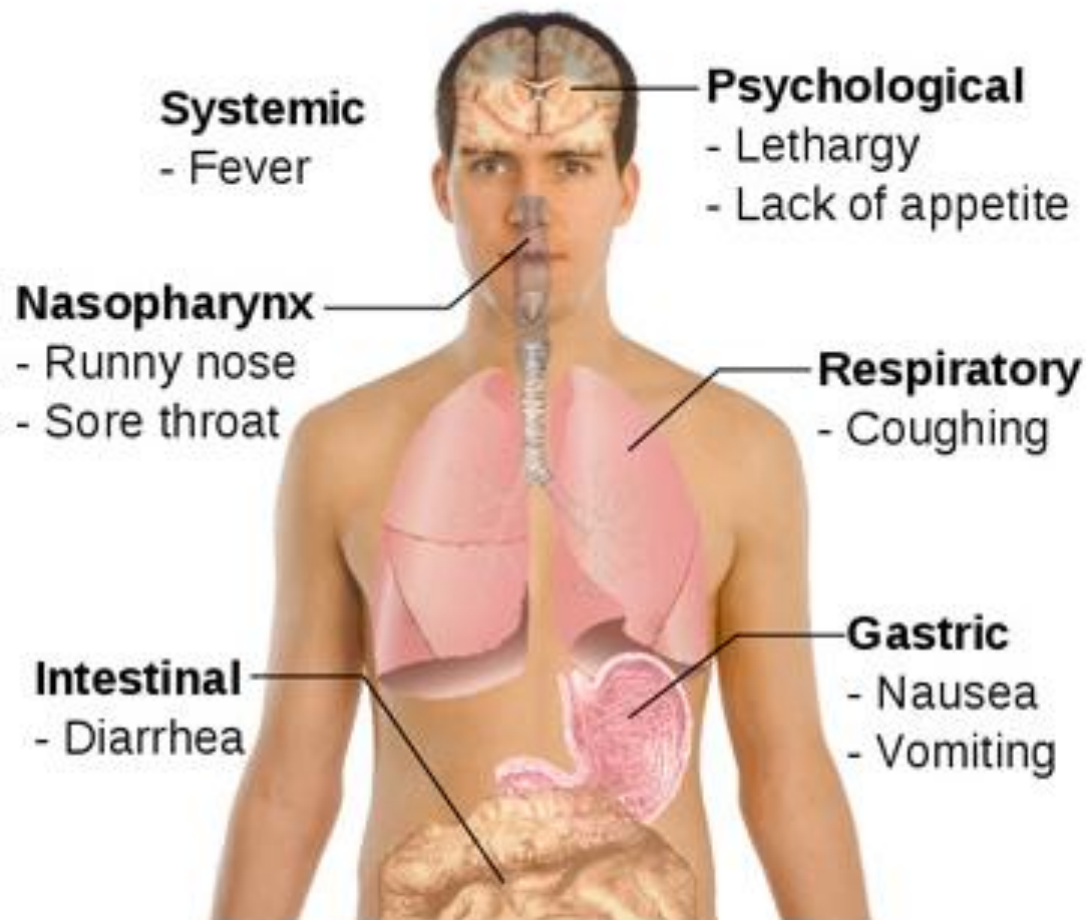
- **Secondary:**

Viruses on Surfaces

- Can Live on Surfaces for 2 Hours or More.
- Person Touching Contaminated Tables, Doorknobs, Desks, Then Touching Face, Eyes, Nose, or Mouth.



SYMPTOMS OF INFLUENZA A (H1N1-2009)



Does Influenza Vaccine Protect from H1N1??

In the PAST: It does NOT protect against H1N1.



NOW: It protect against H1N1 as they integrated it in the Influenza vaccine.

Treatment for Influenza H1N1





World Health Organization





Corona Virus

About Coronavirus

Q: What are coronaviruses?

A: Coronaviruses are common viruses that most people get some time in their life. Human coronaviruses usually cause mild to moderate upper-respiratory tract illnesses.

Coronaviruses are named for the crown-like spikes on their surface. There are three main sub-groupings of coronaviruses, known as alpha, beta and gamma, and a fourth provisionally-assigned new group called delta coronaviruses.

Human coronaviruses were first identified in the mid 1960s. The five coronaviruses that can infect people are: alpha coronaviruses 229E and NL63 and beta coronaviruses OC43, HKU1, and SARS-CoV, the coronavirus that causes severe acute respiratory syndrome.

Coronaviruses may also infect animals. Most of these coronaviruses usually infect only one animal species or, at most, a small number of closely related species. However, SARS-CoV can infect people and animals, including monkeys, Himalayan palm civets, raccoon dogs, cats, dogs, and rodents.

Q: How common are human coronavirus infections?

A: People around the world commonly get infected with human coronaviruses. However, one exception is SARS-CoV. Since 2004, there have not been any known cases of SARS-CoV infection reported anywhere in the world.

Q: Who can get infected?

A: Most people will get infected with human coronaviruses in their life time. Young children are most likely to get infected. However, you can have multiple infections in your life time.



Corona Virus

Q: How do I get infected?

A: The ways that human coronaviruses spread have not been studied very much, except for SARS. However, it is likely that human coronaviruses spread from an infected person to others through—

- the air by coughing and sneezing, and
- close personal contact, such as touching or shaking hands.

These viruses may also spread by touching contaminated objects or surfaces then touching your mouth, nose, or eyes.

In one case, the SARS virus was thought to spread through infected stool that got into the air; people breathed this in and got infected.

Q: When can I get infected?

A: In the United States, people usually get infected with human coronaviruses in the fall and winter. However, you can get infected at any time of the year.

Q: What are the symptoms?

A: Human coronaviruses usually cause mild to moderate upper-respiratory tract illnesses of short duration. Symptoms may include runny nose, cough, sore throat, and fever. These viruses can sometimes cause lower-respiratory tract illnesses, such as pneumonia. This is more common in people with cardiopulmonary disease or compromised immune systems, or the elderly.



Corona Virus

Q: How can I protect myself?

A: There are currently no vaccines available to protect you against human coronavirus infection. You may be able to reduce your risk of infection by—

- washing your hands often with soap and water,
- not touching your eyes, nose, or mouth, and
- avoiding close contact with people who are sick.

For information about hand washing, see [CDC's Clean Hands Save Lives!](#)

Q: What should I do if I get sick?

A: If you have an illness caused by human coronaviruses, you can help protect others by —

- staying home while you are sick,
- avoiding close contact with others,
- covering your mouth and nose when you cough or sneeze, and
- keeping objects and surfaces clean and disinfected.



Corona Virus

Q: How do I get diagnosed?

A: Laboratory tests can be done to confirm whether your illness may be caused by human coronaviruses. However, these tests are not used very often because people usually have mild illness. Also, testing may be limited to a few specialized laboratories.

Specific laboratory tests may include:

- virus isolation in cell culture,
- polymerase chain reaction (PCR) assays that are more practical and available commercially, and
- serological testing for antibodies to human coronaviruses.

Nose and throat swabs are the best specimens for detecting common human coronaviruses. Serological testing requires collection of blood specimens.

Q: Are there treatments?

A: There are no specific treatments for illnesses caused by human coronaviruses.

Most people with coronavirus illness will recover on their own. However, some things can be done to relieve your symptoms, such as—

- taking pain and fever medications (Caution: Aspirin should not be given to children), and
- using a room humidifier or taking a hot shower to help ease a sore throat and cough.

If you are sick, you should —

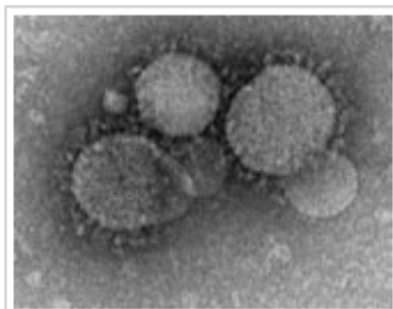
- drink plenty of liquids, and
- stay home and rest.

If you are concerned about your symptoms, you should see your healthcare provider.



MERS

Middle East Respiratory Syndrome (MERS)



Middle East Respiratory Syndrome (MERS) is viral respiratory illness first reported in Saudi Arabia in 2012. It is caused by a [coronavirus](#) called MERS-CoV. Most people who have been confirmed to have MERS-CoV infection developed severe acute respiratory illness. They had fever, cough, and shortness of breath. About 30% of these people died.

So far, all the cases have been linked to six countries in or near the Arabian Peninsula. This virus has spread from ill people to others through close contact. However, the virus has not shown to spread in a sustained way in communities. The situation is still evolving.

CDC is working with partners to better understand the risks of this virus, including the source, how it spreads, and how infections might be prevented. CDC has provided information for travelers and is working with health departments, hospitals, and other partners to prepare for possible cases in the United States.

Countries With Lab-Confirmed MERS Cases

Countries in the Arabian Peninsula with Cases

- Saudi Arabia
- United Arab Emirates (UAE)
- Qatar
- Oman
- Jordan
- Kuwait

Countries with Travel-associated Cases

- United Kingdom (UK)
- France
- Tunisia
- Italy
- Malaysia
- United States of America (USA)

ما هو فيروس كورونا الجديد؟

هو فيروس من فصيلة الكورونا، إلا أنه فيروس جديد لا يعرف حتى الآن الكثير من خصائصه وطرق انتقال العدوى به أو الوقاية منه على مستوى العالم. وتتسق الوزارة مع منظمة الصحة العالمية وعدد من المراكز الطبية الدولية لمعرفة المزيد حوله.

ما هي أعراض الإصابة به؟

بناءً على الحالات المكتشفة حتى الآن فقد تشمل أعراضه ما يلي:

- حمى وسعال.
- قد يصاحب ذلك إسهال واستقراغ.
- كما قد يصاب المريض بضيق وصعوبة في التنفس.
- وقد يتطور الوضع في بعض الحالات إلى الإصابة بعوارض تنفسية حادة ووخيمة قد تؤدي للوفاة.



ما هي طرق العدوى بالفيروس؟

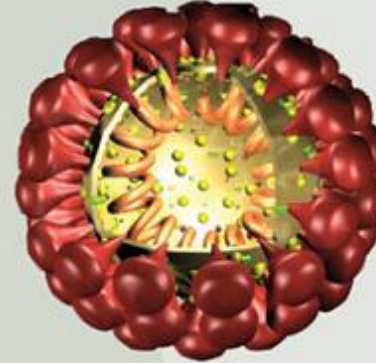
بناءً على المعلومات المحدودة والمقرونة حتى الآن فلا يوجد براهين تحدد طرق انتقاله، ولكن يحتمل أنها مشابهة لانتقال العدوى الموجودة في أنواع فيروس الكورونا الأخرى. وتسعى وزارة الصحة مع شركائها في المنظمات الدولية بما فيها منظمة الصحة العالمية لمعرفة المزيد حول طرق انتقاله.

وتشمل طرق انتقال العدوى من أنواع الكورونا الأخرى والإنفلونزا بشكل عام ما يلي:

- الانتقال المباشر من خلال الرذاذ المتطاير من المريض أثناء الكحة أو العطاس، أثناء المخالطة المباشرة للمصابين،
- الانتقال غير المباشر من خلال لمس الأسطح والأدوات الملوثة بالفيروس ومن ثم لمس الفم أو الأنف أو العين.



فيروس
كورونا
الجديد



ما هي طرق الوقاية من فيروس كورونا الجديد؟

لا يعرف حتى الآن الكثير من خصائص وطرق انتقال عدوى هذا الفيروس، وتنسق الوزارة مع منظمة الصحة العالمية وعدد من الخبراء الدوليين لمعرفة المزيد حوله. وإلى أن يتم التعرف على طرق انتقاله، فتنصح وزارة الصحة المواطنين والمقيمين بالتقيد بالإرشادات الصحية للحد من انتشار الانفلونزا والالتهابات التنفسية المعدية بشكل عام وهي:

المداومة على غسل اليدين جيداً بالماء والصابون أو المواد المطهرة الأخرى التي تستخدم لغسيل اليدين، خصوصاً بعد السعال أو العطاس



استخدم المنديل عند السعال أو العطاس، ثم تخلص منه في سلة النفايات، ثم أغسل يديك جيداً، وإذا لم يتوفر المنديل فاستخدم أعلى الذراع وليس اليدين

حاول قدر المستطاع تجنب ملامسة العينين والأنف والفم باليد، فاليد يمكن أن تنقل الفيروس بعد ملامستها للأسطح الملوثة بالفيروس



تجنب قدر الإمكان الاحتكاك المباشر بالمصابين ومشاركتهم في أدواتهم الشخصية

لبس الكمامات في أماكن التجمعات والازدحام، خصوصاً أثناء الحج أو العمرة



المحافظة على النظافة الشخصية مع الحرص على نظافة الأسطح والأرضيات

حافظ على العادات الصحية الأخرى كالتوازن الغذائي والنشاط البدني وأخذ قسط كافٍ من النوم



كيف يتم التعامل مع المرض عند الإصابة به؟

بطبيعة الحال فلا يمكن أن يعرف المريض أنه مصاب بهذا المرض تحديداً إلا بعد تشخيصه في المنشآت الصحية.

إلا أنه وبشكل عام فيتم التعامل مع المرض مثل أي مرض تنفسي معدي آخر كالانفلونزا، حيث يجب على المريض إتباع الإرشادات التالية:

١. تناول الأدوية الخافضة للحرارة والمسكنات.
٢. الإكثار من السوائل وأخذ قسط كافٍ من الراحة، وتناول الغذاء الصحي.

٣. إتباع الإرشادات المتعلقة بالحد من انتقال العدوى والتي من أهمها:

- استعمال المناديل عند العطس والسعال والتخلص من البلغم والتخلص منها بطريقة آمنة وفي سلة المهملات.

- غسل الأيدي بصفة دورية وعدم مشاركة الآخرين في الأدوات الشخصية كالمناشف أو الأكواب والملاعق وغيرها.

- الحد من الخروج خارج المنزل إلا للضرورة.
٤. في حال الضرورة أو اشتداد أعراض المرض فيجب زيارة المنشأة الصحية مباشرة.

٥. ينصح كبار السن والمصابين بالأمراض المزمنة أو الأمراض التي تؤثر على جهاز المناعة بمراجعة المنشأة الصحية عند الشعور بأعراض المرض.

كيف يمكن التعامل مع المريض المصاب بفيروس كورونا الجديد؟

كما أشير سابقاً فلا يعرف الكثير عن طرق انتقال الفيروس للآخرين على وجه التحديد. وبشكل عام فتتبع الوزارة المخالطين للمصابين بإتباع قواعد

مكافحة العدوى التي يعمل بها للحد من انتشار الانفلونزا والأمراض التنفسية المعدية، والتي من أهمها ما يلي:

١. غسل الأيدي جيداً بالماء والصابون أو أي من المطهرات المخصصة للأيدي بعد التعامل مع المريض أو أغراضه الخاصة، كالمناشف وأدوات الأكل وغيرها.

٢. التأكيد على المصاب باستخدام المناديل عند العطس أو السعال، مع التخلص الآمن بعد استخدامها ورميها في سلة النفايات.

٣. الحد من المخالطة المباشرة مع المصاب قدر الإمكان، والعمل على لبس الكمامة الواقية عند المخالطة المباشرة.

٤. عدم مشاركة المصاب في استخدام أدواته الخاصة به، كأكواب الشرب أو الملاعق والمناشف وغيرها.

٥. وضع المريض في غرفة منفردة إن أمكن ذلك.

٦. يوصى بعدم زيارة كبار السن ومرضى الأمراض المزمنة للمريض.

٧. على المخالطين المباشرين زيارة الطبيب عند الشعور بأي أعراض تنفسية.



عند السفر:

- عليك بالتقيد بالإرشادات الصحية المذكورة سابقاً.
- كما تنصح الوزارة بزيارة الطبيب قبل السفر، وخصوصاً المصابين بالأمراض المزمنة، ومعرفة مدى الحاجة لبعض التطعيمات كتطعيم الانفلونزا الموسمية والتطعيم ضد التهابا السحايا وغيرها.

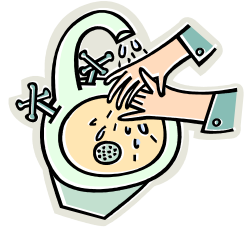
مع تحيات قسم مكافحة العدوى

جامعة الملك سعود _ المستشفيات الجامعية

E-mail: icd_kkuh@hotmail.com

TEL: 01-4699352

Prevention



1. Wash Hand with Soap & Water (At Least 20 Seconds) or Use Alcohol-Based Hand Sanitizers.
2. Cough/Sneeze - Cover Nose/Mouth with Tissue or Sneeze into the Sleeve.

“Dispose Used Tissues in the Trash”.



3. Avoid Touching Eyes, Nose, or Mouth.
4. Avoid Contact with Sick People.

“If Sick, Stay at Home Away from Work or School and Limit Contact with Others”.

How to wash your hands properly



1 Wet your hands



2 Liquid soap



3 Lather and scrub - 20 sec



4 Rinse - 10 sec



5 Dry your hands



6 Turn off tap

DON'T FORGET TO WASH:

- between your fingers
- under your nails
- the tops of your hands