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The Crux

BIMONTHLY FORUM FOR THE LABORATORIANS

CONTENTS

Editorial

Swine influenza is an infection caused by any of several types of swine influenza viruses. **Swine influenza virus** (**SIV**) or **swine-origin influenza virus** (**S-OIV**) refers to any strain of the influenza family of viruses that is endemic in pigs. As of 2009, identified SIV strains include influenza C and the subtypes of influenza A known as H1N1, H1N2, H2N1, H3N1, H3N2, and H2N3.

The swine influenza virus is common throughout pig populations worldwide. Transmission of the virus from pigs to humans is rare and does not always lead to human illness, often resulting only in the production of antibodies in the blood. If transmission causes human illness, it is called a zoonotic swine flu. People with regular exposure to pigs are at increased risk of swine flu infections.

Around the mid-20th century, the identification of influenza subtypes was made possible, allowing accurate diagnosis of transmission to humans. Since then, only 50 such transmissions have been confirmed. These strains of swine flu rarely pass from human to human. Symptoms of zoonotic swine flu in humans are similar to those of influenza and influenza-like illness and include chills, fever, sore throat, muscle pains, severe headache, coughing, weakness, shortness of breath, and general discomfort.

It is estimated that, in the 2009 flu pandemic, 11–21% of the then global population (of about 6.8 billion), equivalent to around 700 million to 1.4 billion people, contracted the illness—more, in absolute terms, than the Spanish flu pandemic. There were 18,449 confirmed fatalities. However, in a 2012 study, the CDC estimated more than 284,000 possible fatalities worldwide, with numbers ranging from 150,000 to 575,000. In August 2010, the World Health Organization declared the swine flu pandemic officially over.

Subsequent cases of swine flu were reported in India in 2015, with over 31,156 positive test cases and 1,841 deaths. "**DISEASE DIAGNOSIS"** segment discusses SWINE FLU lucidly.

Rheumatoid arthritis (**RA**) is a long-term autoimmune disorder that primarily affects joints. It typically results in warm, swollen, and painful joints. Pain and stiffness often worsen following rest. Most commonly, the wrist and hands are involved, with the same joints typically involved on both sides of the body. The disease may also affect other parts of the body, including skin, eyes, lungs, heart, nerves, and blood. This may result in a low red blood cell count, inflammation around the lungs, and inflammation around the heart. Fever and low energy may also be present. Often, symptoms come on gradually over weeks to months.

UNDERSTANDING and TROUBLESHOOTING part smartly yet precisely highlight Rheumatoid arthritis alongwith in-use Diagnostic criteria for you.

Turnover to see What's missing. If at all!

DISEASE DIAGNOSIS

H1N1, SWINE FLU

Background

Swine influenza is a highly contagious respiratory disease in pigs caused by one of several swine influenza A viruses, as recently reviewed. In addition, influenza C viruses may also cause illness in swine. Strategies to control swine influenza virus (SIV) in animals typically include one of several commercially available bivalent swine influenza virus vaccines. Transmission of swine influenza viruses to humans is uncommon. However, the swine influenza virus can be transmitted to humans via contact with infected pigs or environments contaminated with swine influenza viruses. Once a human becomes infected, he or she then can spread the virus to other humans, presumably in the same way as seasonal influenza is spread (ie, via coughing or sneezing).

History

The ability to trace outbreaks of swine flu in humans dates back to investigation of the 1918 Spanish influenza pandemic, which infected one third of the world's population (an estimated 500 million people) and caused approximately 50 million deaths. In 1918, the cause of human influenza and its links to avian and swine influenza was not understood. The answers did not begin to emerge until the 1930s, when related influenza viruses (now known as H1N1 viruses) were isolated from pigs and then humans. In humans, the severity of swine influenza can vary from mild to severe. From 2005 until January 2009, 12 human cases of swine flu were reported in the United States; none were fatal. In 1988, however, a previously healthy 32-year-old pregnant woman in Wisconsin died of pneumonia as a complication of swine influenza. A 1976 outbreak of swine influenza in Fort Dix, New Jersey, involved more than 200 cases, some of them severe, and one death. The first discovered case involved a soldier at Fort Dix who complained of feeling weak and tired. He died the next day. The fear of an influenza pandemic in 1976 led to a national campaign in the United States designed to immunize nearly the entire population. In October 1976, approximately 40 million people received the A/NewJersey/1976/H1N1 vaccine (ie, swine flu vaccine) before the immunization initiative was halted because of the strong association between the vaccine and Guillain-Barré syndrome (GBS).About 500 cases of GBS were reported, with 25 deaths due to associated pulmonary complications. A recent investigation sought to determine the link between GBS and the 1976 swine flu vaccine, because subsequent influenza vaccines did not have this strong association. Nachamkin et al found that inoculation of the 1976 swine flu vaccine, as well as the 1991-1992 and 2004-2005 influenza vaccines, into mice prompted production of antibodies to antiganglioside (anti-GM1), which are associated with the development of GBS. They proposed that further research regarding influenza vaccine components is warranted to determine how these components elicit antiganglioside effects.

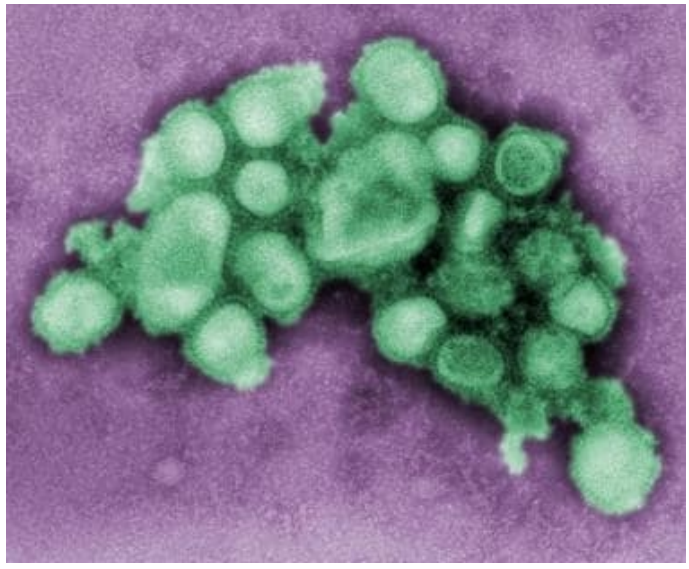


Fig.1

This preliminary negative stained transmission electron micrograph (Fig.1) depicts some of the ultrastructural morphology of the A/CA/4/09 swine flu virus.

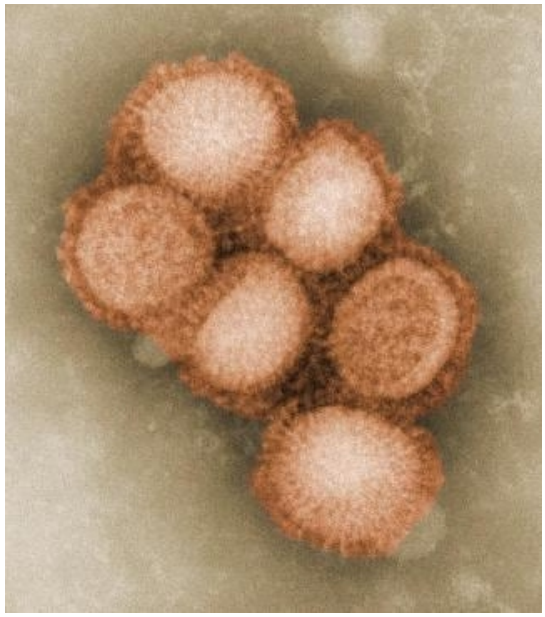


Fig.2

This preliminary negative stained transmission electron micrograph (Fig.2) depicts some of the ultrastructural morphology of the A/CA/4/09 swine flu virus.

Human cases of influenza A (H1N1) have been reported worldwide.

Epidemiology

Mortality/Morbidity

H1N1 influenza (swine flu) tends to cause high morbidity but low mortality rates (1%-4%).

Age

Belongia et al provide an excellent epidemiologic comparison of the clinical characteristics of the 2009 influenza A H1N1 versus other seasonal influenza A strains. In their study, the clinical manifestations and risk for hospitalization were similar between the 2009 H1N1 strain and other seasonal influenza A strains. However, children were disproportionately affected by the 2009 H1N1 strain but not necessarily by severity of illness.

Prognosis

A review of medical records from the 2009 US pandemic found hospitalized patients with pandemic H1N1 and pneumonia were at risk for severe outcomes including ARDS, sepsis, and death. However, patients often received delayed antiviral treatment (>2 days after illness onset). Patients with H1N1 and pneumonia should receive early and aggressive treatment with antibiotics and influenza antiviral agents. In a multicenter study in Britain consisting of over 1500 patients, independent predictors of severe outcome included age 55 to 64 years, certain chronic lung diseases, underlying neurological disease, obesity, delayed admission (≥5 days after illness onset), pneumonia, and others.

Clinical Presentation

History

Manifestations of H1N1 influenza (swine flu) are similar to those of seasonal influenza. Patients present with symptoms of acute respiratory illness, including at least 2 of the following:

- Fever
- Cough
- Sore throat
- Body aches
- Headache
- Chills and fatigue
- Diarrhea and vomiting (possible)

Persons with these symptoms should call their healthcare provider promptly. If an antiviral agent is warranted, it ideally should be initiated with 48 hours from the onset of symptoms (see Medication). The duration of illness is typically 4-6 days. The infectious period for a confirmed case is defined as 1 day prior to the onset of symptoms to 7 days after onset. In children, signs of severe disease include apnea, tachypnea, dyspnea, cyanosis, dehydration, altered mental status, and extreme irritability. In children hospitalized for influenza, neurologic complications are common and sometimes life-threatening. In an effort to assess the extent and range of such complications in this population, Australian investigators in 6 tertiary pediatric referral centers carried out active hospital-based surveillance of 506 children younger than 15 years who had laboratory-confirmed pandemic influenza A (H1N1) 2009 infection (pH1N1'09). Of the 506, 49 (9.7%) had neurologic complications.

Further study findings were as follows:

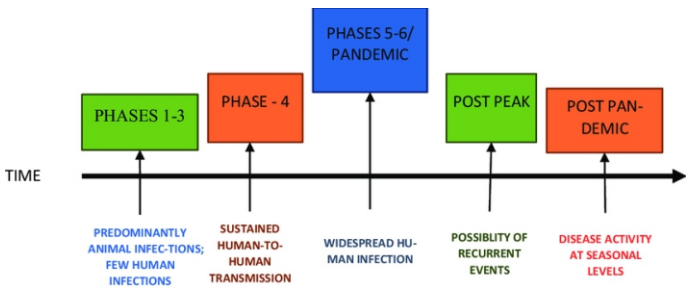
- Patients with neurologic complications tended to be slightly older than those without (median age, 4.8 years versus 3.7 years)
- Of patients with neurologic complications, 55.1% had preexisting medical conditions and 42.8% had preexisting neurologic conditions
- On presentation, only 36.7% had cough, fever, and coryza or runny nose; 38.7% had only 1 respiratory symptom or none at all
- Neurologic complications, in descending order of frequency, included seizure (7.5%), encephalitis or encephalopathy (1.4%), confusion or disorientation (1.0%), loss of consciousness (1.0%), and paralysis or Guillain-Barré syndrome (0.4%)
- Intensive care unit (ICU) admission was required in 30.6% of the patients, mechanical ventilation in 24.5%
- Mean hospital stay was 6.5 days, mean ICU stay 4.4 days
- Two (4.1%) of the 49 patients died

Specific treatment for influenza-related neurologic complications generally is unavailable. Consequently, early diagnosis of influenza, appropriate use of antiviral therapy, and universal influenza vaccination in children are vital. Influenza should be considered as a diagnosis in children with neurologic symptoms, even when few or even no respiratory symptoms are noted.

Workup

Laboratory Studies

Outbreaks of H1N1 influenza (swine flu) are common in pigs year-round. Historically, when humans have become infected, it is a result of close contact with infected pigs (but not consumption of pork). In major outbreaks, human-to-human transmission occurs. In the 2009-2011 outbreak, the WHO raised its pandemic alert level for H1N1 influenza to phase 6, indicating that a global pandemic was identified.



In the 2009-2010 outbreak in the United States, preliminary testing showed that, in all cases, the viruses had the same genetic pattern. The virus is being described as a new subtype of influenza A/H1N1 not previously detected in pigs or humans. Clinicians should consider the possibility of H1N1 influenza virus infections in patients who present with febrile respiratory illness. The CDC criteria for suspected H1N1 influenza are as follows:

- Onset of acute febrile respiratory illness within 7 days of close contact with a person who has a confirmed case of H1N1 influenza A virus infection, or
- Onset of acute febrile respiratory illness within 7 days of travel to a community (within the United States or internationally) where one or more H1N1 influenza A cases have been confirmed, or
- Acute febrile respiratory illness in a person who resides in a community where at least one H1N1 influenza case has been confirmed.

In September 2011 the FDA approved a new CDC-developed test to diagnose seasonal flu as well as the influenza viruses that could become pandemic. The Human Influenza Virus Real-Time RT-PCR Detection and Characterization Panel (rRT-PCR Flu Panel) is an in vitro laboratory diagnostic test that can provide results within 4 hours. It is the only in vitro diagnostic test for influenza that is cleared by the FDA for use with lower respiratory tract specimens and will be given at no cost to qualified international public health laboratories. Laboratories should send all influenza A specimens that they are unable to subtype to the Viral

Surveillance and Diagnostic Branch of the CDC's Influenza Division as soon as possible for further diagnostic testing.

Since the outbreak, multiple methods of diagnosing influenza have been reported. Influenza tests may include the following:

- Molecular tests: These may include conventional reverse-transcriptase PCR, office-based rapid molecular testing, and multiplex molecular platforms that can detect influenza in addition to several other common respiratory pathogens. RT-PCR yields the best performance based on sensitivity and specificity data.
- Rapid antigen or antibody immunoassays: Although these are available, most choose molecular testing over these immunoassays owing to their lower sensitivity.
- Viral culture: Although viral culture is available, it not very useful in clinical practice.
- Serology: Serologic testing is not recommended for diagnosis because paired sera (acute and convalescent) are required, thereby limiting the timeliness of these tests in patient care. They may be more useful in epidemiologic studies.

Viral tracking and research

Internationally, scientists have been collaborating on genetic analysis of current animal and human influenza viruses. These researchers have created a human/swine A/H1N1 influenza wiki to facilitate rapid dissemination of the results of this work. The collaboration is producing insights on the origin of the H1N1 virus and should enable scientists to track its evolution as the outbreak spreads around the world. Information from the National Institute of Allergy and Infectious Disease regarding influenza genome sequencing is available to researchers studying how influenza viruses evolve and those developing new and improved ways to prevent, diagnose, and treat influenza disease.

Treatment & Management

Medical Care

Treatment is largely supportive and consists of bedrest, increased fluid consumption, cough suppressants, and antipyretics and analgesics (eg, acetaminophen, nonsteroidal anti-inflammatory drugs) for fever and myalgias. Severe cases may require intravenous hydration and other supportive measures. Antiviral agents may also be considered for treatment or prophylaxis (see Medication). Patients should be encouraged to stay home if they become ill, to avoid close contact with people who are sick, to wash their hands often, and to avoid touching their eyes, nose, and mouth. The CDC recommends the following actions when human infection with H1N1 influenza (swine flu) is confirmed in a community :

- Patients who develop flulike illness (ie, fever with either cough or sore throat) should be strongly encouraged to self-isolate in their home for 7 days after the onset of illness or at least 24 hours after symptoms have resolved, whichever is longer.
- To seek medical care, patients should contact their health care providers to report illness (by telephone or other remote means) before seeking care at a clinic, physician's office, or hospital.
- Patients who have difficulty breathing or shortness of breath or who are believed to be severely ill should seek immediate medical attention.
- If the patient must go into the community (eg, to seek medical care), they should wear a face mask to reduce the risk of spreading the virus in the community when coughing, sneezing, talking, or breathing. If a face mask is unavailable, ill persons who need to go into the community should use tissues to cover their mouth and nose while coughing.
- While in home isolation, patients and other household members should be given infection control instructions, including frequent hand washing with soap and water. Use alcohol-based hand gels (containing at least 60% alcohol) when soap and water are not available and hands are not visibly dirty. Patients with H1N1 influenza should wear a face mask when within 6 feet of others at home.
- Antiviral therapy may be indicated. Available medications are discussed in the Medication section.

Prevention

Vaccination campaign

The 2009 influenza A (H1N1) monovalent vaccine was released in mid October. The immunization series consisted of 2 doses for children younger than 10 years, consisting of an initial dose and a booster to be administered several weeks later. Adults and children 10 years and older received a single dose. Targeted populations recommended to receive the 2009 H1N1 vaccine included pregnant women, household contacts and caregivers of children younger than 6 months, healthcare and emergency medical services personnel, children aged 6 months to 18 years, young adults aged 19-24 years, and persons aged 25 through 64 years with conditions associated with higher risk of medical complications from influenza. A separate seasonal influenza vaccine was needed for the 2009/2010 influenza season because it was too late to incorporate the new strain into the regular influenza vaccine already in production. Now H1N1 is a component of the trivalent and quadrivalent influenza vaccines. A 2011 CDC analysis reaffirms the importance of vaccinating pregnant women regardless of trimester and prompt treatment with a neuraminidase inhibitor (ie, within 2 d of symptom onset) if influenza occurs during pregnancy. There are only a limited number of studies that describe the safety of giving influenza vaccine to pregnant women. A 2012 study in Denmark found no evidence of an increased risk of fetal death associated with exposure to an adjuvanted pandemic A/H1N1 2009 influenza vaccine during pregnancy.

Community precautions

The CDC recommends the following actions when human infection with H1N1 influenza (swine flu) is confirmed in a community :

Household contacts who are not ill

- Remain home at the earliest sign of illness.
- Minimize contact in the community to the extent possible.
- Designate a single household family member as caregiver for the patient to minimize interactions with asymptomatic persons.
- School dismissal and childcare facility closure

- Strong consideration should be given to close schools upon a confirmed case of H1N1 flu or a suspected case epidemiologically linked to a confirmed case.
- Decisions regarding broader school dismissal within these communities should be left to local authorities, taking into account the extent of influenzalike illness within the community.
- Cancelation of all school or childcare related gatherings should also be announced.
- Encourage parents and students to avoid congregating outside of the school if school is canceled.
- Duration of schools and childcare facilities closings should be evaluated on an ongoing basis depending on epidemiological findings.
- Consultation with local or state health departments is essential for guidance concerning when to reopen schools. If no additional confirmed or suspected cases are identified among students (or school-based personnel) for a period of 7 days, schools may consider reopening.
- Schools and childcare facilities in unaffected areas should begin preparation for possible school closure.

Social distancing

- Large gatherings linked to settings or institutions with laboratory-confirmed cases should be canceled (eg, sporting events or concerts linked to a school with cases); other large gatherings in the community may not need to be canceled at this time.
- Additional social distancing measures are currently not recommended.
- Persons with underlying medical conditions who are at high risk for complications of influenza should consider avoiding large gatherings.

Preventive measures for health care personnel

The CDC has issued interim recommendations for controlling the spread of H1N1 influenza in health care settings. Recommended measures for care of patients with suspected or confirmed H1N1 influenza include the following:

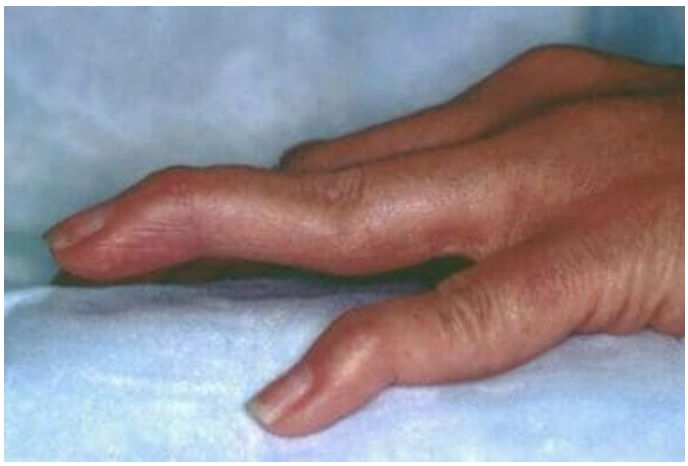
- Place patients in a single-patient room with the door kept closed. An airborne-infection isolation room with negative-pressure air handling can be used, if available. Air can be exhausted directly outside or can be recirculated after filtration by a high efficiency particulate air (HEPA) filter.
- Suctioning, bronchoscopy, or intubation should be performed in a procedure room with negative-pressure air handling.
- Patients should wear a surgical mask when outside their room.
- Encourage patients to wash their hands frequently and to follow respiratory hygiene practices. Cups and other utensils used by the ill person should be washed with soap and water before use by other persons.
- Routine cleaning and disinfection strategies used during influenza seasons can be applied.
- Standard, droplet, and contact precautions should be used for all patient care activities and maintained for 7 days after illness onset or until symptoms have resolved.
- Health care personnel should wash their hands with soap and water or use hand sanitizer immediately after removing gloves and other equipment and after any contact with respiratory secretions.
- Personnel providing care to or collecting clinical specimens from patients should wear disposable nonsterile gloves, gowns, and eye protection (eg, goggles) to prevent conjunctival exposure.
- As per previous recommendations regarding mask and respirator use during influenza pandemics, personnel engaged in aerosol-generating activities (eg, collection of clinical specimens, endotracheal intubation, nebulizer treatment, and bronchoscopy) and/or resuscitation involving emergency intubation or cardiac pulmonary resuscitation should wear a fit-tested disposable N95 respirator.
- Pending clarification of transmission patterns for the 2009 H1N1 influenza A (swine flu) virus, personnel providing direct patient care for suspected or confirmed cases should wear a fit-tested disposable N95 respirator when entering the patient's room.

UNDERSTANDING

RHEUMATOID ARTHRITIS

Practice Essentials

Rheumatoid arthritis (RA) is a chronic systemic inflammatory disease of unknown etiology. It usually presents as bilateral symmetric polyarthritis (synovitis) that affects the hands and feet (see the image below). Any joint lined by a synovial membrane may be affected, however, and extra-articular involvement of organs such as the skin, heart, lungs, and eyes can be significant. RA is theorized to develop when a genetically susceptible individual (eg, a carrier of HLA-DR4 or HLA-DR1) experiences an external factor (eg, cigarette smoking, infection, trauma) that triggers an autoimmune reaction.



Rheumatoid arthritis. Rheumatoid changes in the hand.

Signs and symptoms

In most patients with RA, onset is insidious, often beginning with fever, malaise, arthralgias, and weakness before progressing to joint inflammation and swelling. Signs and symptoms of RA may include the following:

- Persistent symmetric polyarthritis (synovitis) of hands and feet (hallmark feature)
- Progressive articular deterioration
- Extra-articular involvement
- Difficulty performing activities of daily living (ADLs)
- Constitutional symptoms

The physical examination should address the following:

- Upper extremities (metacarpophalangeal joints, wrists, elbows, shoulders)
- Lower extremities (ankles, feet, knees, hips)
- Cervical spine

During the physical examination, it is important to assess the following:

- Stiffness
- Tenderness
- Pain on motion
- Swelling
- Deformity
- Limitation of motion
- Extra-articular manifestations

Diagnosis

No test results are pathognomonic; instead, the diagnosis is made by using a combination of clinical, laboratory, and imaging features. Potentially useful laboratory studies in suspected RA include the following:

- Erythrocyte sedimentation rate
- C-reactive protein level
- Complete blood count
- Rheumatoid factor assay
- Antinuclear antibody assay
- Anti−cyclic citrullinated peptide antibody

Potentially useful imaging modalities include the following:

- Radiography (first choice): Hands, wrists, knees, feet, elbows, shoulders, hips, cervical spine, and other joints as indicated
- Magnetic resonance imaging: Primarily cervical spine
- Ultrasonography of joints: Joints, as well as tendon sheaths, for assessment of changes and degree of vascularization of the synovial membrane, and even erosions

Joint aspiration and analysis of synovial fluid may be considered, including the following:

- Gram stain
- Cell count
- Culture
- Assessment of overall appearance

Management

Treatment of RA should be initiated early, using shared decision making, an integrated approach that includes both pharmacologic and nonpharmacologic therapies, and a treat-to-target strategy. Treating to target is facilitated by use of the following:

- American College of Rheumatology (ACR) recommended RA disease activity measures
- ACR/European Alliance of Associations for Rheumatology (EULAR) criteria for remission

Nonpharmacologic, nonsurgical therapies include the following:

- Heat and cold therapies
- Orthotics and splints
- Therapeutic exercise
- Occupational therapy
- Adaptive equipment
- Joint-protection education
- Energy-conservation education

The following organizations have published guidelines for pharmacologic therapy:

- American College of Rheumatology (2021)
- European Alliance of Associations for Rheumatology (2022)

Nonbiologic disease-modifying antirheumatic drugs (DMARDs) include the following:

- Hydroxychloroquine
- Azathioprine
- Sulfasalazine

- Methotrexate
- Leflunomide
- Cyclosporine
- Gold salts
- D-penicillamine
- Minocycline

Biologic tumor necrosis factor (TNF)–inhibiting DMARDs include the following:

- Etanercept
- Infliximab
- Adalimumab
- Certolizumab
- Golimumab

Biologic non-TNF DMARDs include the following:

- Rituximab
- Anakinra
- Abatacept
- Tocilizumab
- Sarilumab
- Tofacitinib
- Baricitinib
- Upadacitinib

Other drugs used therapeutically include the following:

- Corticosteroids
- Nonsteroidal anti-inflammatory drugs (NSAIDs)
- Analgesics

Surgical treatments include the following:

- Synovectomy
- Tenosynovectomy
- Tendon realignment
- Reconstructive surgery or arthroplasty
- Arthrodesis.

TROUBLESHOOTING

The ACR/EULAR criteria for rheumatoid arthritis (RA):

The American College of Rheumatology (ACR) and European League against Rheumatism (EULAR) 2010 classification criteria for rheumatoid arthritis (RA) use a point system to classify patients based on the following four categories:

- **Joint involvement**: Swollen or tender joints, excluding DIP and 1st CMC/MTP joints
- **Serology**: Rheumatoid factor (RF) and/or anti-citrullinated protein antibody (ACPA)
- **Acute-phase reactants**: C-reactive protein (CRP) and/or erythrocyte sedimentation rate (ESR)
- **Duration of symptoms**: Duration of synovitis signs and symptoms in joints clinically involved at the time of assessment
- A score of at least 6 points indicates definite RA. The points are assigned as follows:
- **Joint involvement**: 1 point for 1 large joint, 2-10 large joints, or 1-3 small joints
- **Serology**: 2 points for low-positive RF or ACPA, and 3 points for high-positive RF or ACPA
- **Acute-phase reactants**: 1 point for abnormal CRP or ESR
- **Duration of symptoms**: 1 point for duration of at least 6 weeks

The ACR/EULAR criteria were developed in a three-phase process, beginning with an analysis of patient cohorts and consensus-based decisions. The goal was to create a scoring system that could predict which patients would develop persistent or erosive disease. (Fig: A)

2010 ACR/EULAR CRITERIA FOR RA DIAGNOSIS		
Add score of categories A-D, score of ≥ 6/10 needed to classify patient as having definite RA		
A	**Joint involvement**	**Score**
	1 large joint	0
	2-10 large joints	1
	1-3 small joints	2
	4-10 small joints	3
	>10 joints (≥1 small joint)	5
B	**Serology (≥1 test result needed)**	
	Negative RF and negative ACPA	0
	Low-positive RF or low-positive ACPA	2
	High-positive RF or high-positive ACPA	3
C	**Acute-phase reactants (≥1 test result needed)**	
	Normal CRP and normal ESR	0
	Abnormal CRP or abnormal ESR	1
D	**Duration of symptoms**	
	< 6 weeks	0
	≥ 6 weeks	1

Fig: A

BOUQUET

In Lighter Vein

Chief Executive	Chiefer Executive	Chiefest Executive
➡	➡	➡

Old trick and it works.... can't afford to pay good package...so encouraging them with designations....!!!

its amazes me dat people re afraid to talk in d exam hall ,
even wen d question clearly said

"discuss"

Teacher to student:
"Can you define who is Lecturer?"

Student to teacher:
A lecturer is a person who has a very bad habit of speaking when someone is sleeping

Wisdom Whispers

"Your only limitation is your imagination."

❄

"It's not what you look at that matters, it's what you see."

❄

"Your problem isn't the problem. Your reaction is the problem."

❄

"Life is like a piano. Anyone can play a song through meaningless repetition, but it takes passion to play a masterpiece."

Brain Teasers

1. **How does swine flu spread?**
   - A By coughing or sneezing
   - B By saliva
   - C By touching a contaminated Surface
   - D All of the above

2. **What is not a symptom of the Swine Flu?**
   - A Cough
   - B Chills
   - C Fever
   - D Violence

3. **The first symptom of rheumatoid arthritis (RA) is most often:**
   - A Pain in the hips and shoulders
   - B Headache
   - C Pain in the joints of the hands and feet
   - D All of the above

4. **What are 3 symptoms of rheumatoid arthritis**
   - A Joint pain
   - B Tenderness
   - C Swelling or stiffness that lasts for six weeks or longer
   - D All of the above

ANSWER: 1: D, 2: D, 3: C, 4: D

Diagnosis of Rheumatoid Arthritis

Serological Markers for RA Classification
RF/CRP/Anti-CCP
and
Vitamin D for Musculoskeletal Health

Tulip Solution

turbo smart™

THE SMARTER SMART CARD ANALYZER

RF/CRP-UV

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Turbosmart CRP UV
Turbosmart HbA1c
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Turbosmart ASO
Turbosmart IgE
Turbosmart D-Dimer
Turbosmart C3
Turbosmart C4
Turbosmart Ferritin...

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Vitamins
Thyroid Markers
Fertility Markers
Cancer Markers
Diabetic Markers
Inflamation
Anemic Marker
Coagulation
Cardiac Markers
Allergy

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