Geriatric Influenza

Background

1. Definition
    - Acute lower respiratory tract febrile illness caused by Influenza A (80-90%) or B virus infection
2. General info
    - Sporadic influenza virus outbreaks or epidemics occur annually during winter months in both hemispheres
    - Influenza A (H3N2) more common in winter
    - Influenza B more frequent in spring

Pathophysiology

1. Pathology of disease
    - Transmission person to person via virus-laden droplets from infected respiratory secretions
    - Droplets settle on respiratory tract mucosal surfaces of persons who are within a few feet
    - Transmission from environmental surfaces not demonstrated
    - Enveloped RNA virus binds to mucoprotein cell surface receptor of respiratory epithelium
    - Virus particle enters cell via endocytosis
    - Incubation period: one to two days
    - Respiratory epithelial cell infection results in destructive changes and classic symptoms
    - Adults may shed virus for several days following clinical resolution
2. Incidence, prevalence
    - Prevalence
        - <3% among febrile respiratory illness patients in non-influenza season
        - 10% during early and late influenza season
        - 40% during peak of influenza season
    - Recent influenza activity in US at http://www.cdc.gov/flu/weekly/
    - Attack rates higher in institutions and areas of overcrowding
3. Risk factors
    - Elderly
    - Chronic illness:
        - Lung disease (e.g. COPD)
        - Neurological and neurodevelopmental conditions,
        - Heart disease, (e.g. CHF)
        - Kidney disease,
        - Liver disease,
        - Weakened immune systems)[5]
        - BMI greater than 40
        - Diabetes Mellitus
    - Long-term care settings

4. Morbidity/mortality
    - Elderly: ≥50% of all hospitalizations (300,000/yr.)
    - 90% of all influenza-attributable deaths (65,681 in 2002) occur in patients >64 y/o
    - General population: elderly fatality rates up to 5%
    - Nursing homes: fatality rates from 14% to 55%

Diagnostics

1. History
    - Clinical Dx of influenza challenging
        - Sx shared with other common respiratory tract infections (RTIs)
    - Sx: usually sudden onset versus other RTIs
    - Elderly patients with documented influenza:
        - 97% upper respiratory sx (nasal congestion, coryza, sore throat, dry cough)
        - 90% temperature > 99 degrees F (37.2 degrees C), up to 103.6 degrees F (39.8 degrees C)
        - 84% systemic symptoms (including 66% malaise)
        - 66% lower respiratory sx (hoarseness, dyspnea, productive cough)
        - 38% GI symptoms (nausea, vomiting, diarrhea)
2. **Physical exam**
    - Fever and prostration common
        - Fever may be blunted in elderly
    - No specific signs rule in/rule out influenza
        - Likelihood 3-4x higher in elderly if fever, cough and sick enough to see physician within 3 d of onset
        - Rigors increases likelihood to 7x
        - If no cough, influenza unlikely (0.38x)
    - Assess for rales (pneumonia)
3. **Diagnostic testing**
    - Laboratory testing
        - CBC may show decreased PMNs
        - BMP if suspect dehydration
        - Viral culture (gold standard)
4. In order of priority, influenza testing recommended, if available:
    - **Reverse-transcriptase polymerase chain reaction (RT-PCR)**.
        - Most sensitive and specific
        - Results available within 4-6 hours RT-PCR has greater sensitivity than viral culture,
        - May be used as confirmatory test
        - Useful for quickly differentiating between influenza types/subtypes **(A-II)**[6]

- **Immunofluorescence**.
  - Direct Fluorescent Antibody staining (DFA) or Indirect Fluorescent Antibody staining (IFA)
    - Tests for influenza antigen; used for screening
  - Immunofluorescence exhibits slightly lower sensitivity/specificity than cell culture
  - Results available within hours **(A-II)**[6]
- **Commercial rapid influenza diagnostic tests**.
  - Antigen detection tests provide results in 10-30 minutes
  - Decreased sensitivity (<40-60% in adults) compared with RT-PCR and viral culture
  - Performance heavily dependent on patient age, duration of illness, sample type, and perhaps viral type.
  - Follow-up testing with RT-PCR and/or viral culture preferred to confirm negative test results **(A-II)**[6]
  - Many rapid tests available
  - FDA- approved office tests identify influenza A and B and provide results to guide individual patient management:
    - QuickVue Influenza Test
      - Likely easiest and fastest
      - Uses nasal swab or aspirate
      - 10 minutes
      - 73-81% sensitivity and 95-99% specificity
    - ZstatFlu
      - Uses throat swab
      - 20 minutes at 41 degrees C (105.8 degrees F)
      - 57-65% sensitivity and 95-100% specificity
    - Flu OIA
      - Uses nasopharyngeal swabs, throat swabs or sputum
      - 15-20 minutes
      - 77% sensitivity and 93% specificity

5. Diagnostic imaging
   - CXR if suspect pneumonia
6. **Diagnostic Criteria**
   - Diagnosis usually presumptive, based on…
     - Hx consistent with influenza Sx, and
     - Prevalence in community
   - Test results interpreted in context of other clinical info
   - Nursing home setting
     - Emerging/early cases should be:
       - Rapidly tested (to treat early), and
       - Cultured to confirm:
         - influenza A, and
         - strain matches vaccine to guide chemoprophylaxis (see prevention)

Differential Diagnosis

1. Respiratory Syncytial Virus
2. Viral URI
3. Pneumonia
4. CO poisoning
    - Esp. if other family members have "the flu" in cold weather

Acute Treatment

1. Treatment recommended for influenza virus infection meeting following criteria:
    - A). Persons with laboratory-confirmed or highly suspected influenza virus infection at high risk of complications and within 48 hours of symptom onset.
        - Fewer data available to make recommendations for treating persons >48 hours after symptom onset.
        - Treatment recommended regardless of influenza vaccination status or illness severity **(A-II)**[6]
    - B). Persons requiring hospitalization for laboratory confirmed or highly suspected influenza illness.
        - Regardless of underlying illness or influenza vaccination status, treat if can initiate within 48 hours of symptom onset **(A-II)**[6]
        - Treatment may benefit hospitalized persons with laboratory-confirmed influenza from specimen taken more than 48 hours after illness onset **(B-II)**[6]
    - C). Outpatients with non-improving illness at high risk of complications,..
        - Who have positive influenza test result from specimen obtained >48 hours after symptom onset **(C-III)**[6]
    - D). Outpatients with laboratory-confirmed or highly suspected influenza virus infection not at increased risk of complications…
        - Who present <48 hours after symptom onset, and
        - Who wish to shorten illness duration and further reduce relatively low complication risk **(A-I)**[6]
    - E). Outpatients in close contact with persons at high complication risk from influenza infection.
        - Those who present > 48 hours after symptom onset may benefit from treatment if persisting moderate to severe illness
        - Safety and efficacy in this population not evaluated prospectively **(B-III)**[6]
2. Supportive treatment
    - Antipyretics
        - May help arthralgias/myalgias
    - Hydration
3. Antiviral pharmacotherapy
    - Agent type depends on:
        - Prevalence of types
        - Underlying diseases
        - Cognitive status

        - Availability
        - Pharmacoeconomics
        - Resistance considerations
    - Initiate antiviral drugs within 48 hr of first Sx,
    - Neuraminidase inhibitors
        - General concepts:
            - Additional cost may be offset by efficacy against influenza B (10-20% of epidemics)
            - Reduces symptoms by 1 - 3 days
            - Oseltamivir also reduces hospitalizations and complications
        - Oseltamivir 75 mg BID for 5 days ($84)
            - Oseltamivir qD for renal impairment
            - Most side effects are GI
        - Zanamivir 10 mg (2 inhalations) BID for 5 days ($61)
            - Most elderly cannot effectively use Diskhaler
    - Ion channel activity blockers (adamantines)
        - Amantadine and rimantadine not recommended for antiviral treatment or chemoprophylaxis of currently circulating influenza A virus strains.

Development of Complications (after first 24 hr)

1. bacterial pneumonia
    - Leading primary complication
    - Usually 5-10 days after first symptoms, develop fever again
    - Tachypnea with oxygen desaturation, productive cough, fine/coarse crackles on exam or consolidation on CXR
    - Treat as institutionally acquired pneumonia in accordance with local practices (common pathogens isolated are S. pneumoniae, H. influenzae and S. aureus)
2. Primary influenza pneumonia is less common
    - Onset 3-5 days after first illness symptoms
    - Worsening vs improvement
    - Bilateral or patchy infiltrates on CXR
    - Rapid worsening, often respiratory failure
3. Worsening of underlying airway disease
    - Early treatment most important in asthmatic and COPD
    - If exacerbation occurs, treat aggressively due to higher death rate
    - Less common complications
        - Myositis/myoglobinuria
            - Fluid resuscitation to extent possible to prevent renal failure
        - Myocarditis
        - Neurological sequelae
            - Guillain-Barré syndrome
            - Transverse myelitis
            - Encephalitis

Long-term Care Considerations

Outbreak Management in Institutional Settings

1. **When to Suspect Institutional Influenza**
    - During influenza season, test for influenza when 2 or more institutional residents manifest signs and symptoms of influenza-like illness (ILI) within 72 hours.
    - When influenza viruses circulating in community, one laboratory-positive laboratory result in conjunction with other compatible illnesses on unit indicates probable influenza outbreak **(A-II)**[6]
2. **Testing Institutional Residents with Influenza-Like Illness (ILI) after Influenza Diagnosis Already Established in One or More Residents**
    - After single laboratory-confirmed influenza case among residents in institution, likely that subsequent temporally-associated ILI cases also caused by influenza virus; however, mixed outbreaks due to other respiratory pathogens may occur[6]
3. **Which residents should be treated with Influenza antiviral medications during outbreak?**
    - Treat all residents with laboratory-confirmed influenza virus infection.
    - After one laboratory-confirmed influenza case detected in facility resident, treat all facility staff/residents subsequently developing ILI or other signs/symptoms consistent with influenza **(A-III)**[6]
    - During documented long-term care facility outbreaks, all residents should receive antiviral chemoprophylaxis, regardless of vaccination status.
    - Chemoprophylaxis should be implemented on all facility floors and wards; breakthrough cases frequently occur when antiviral medications administered only to persons on affected unit/ward and not to all facility residents**(A-I)**[6]
    - With institutional outbreak, continue antiviral chemoprophylaxis for 14 days, or for 7 days after symptom onset in last person infected, whichever longer **(A-II)**[6]

1. Inform staff immediately if suspect influenza
2. Significant functional decrease with acute infection
3. See pneumonia and underlying airway disease above for applicable info
4. Educate facility staff for early symptom recognition for rapid treatment and infection control measures
5. Chemoprophylaxis
    - See prevention

Follow-Up

1. Return to office
    - Community dwelling
        - Treated
            - 48 hours if no change in symptoms or worsening
            - Have staff call if f/u visit missed
            - 1 week if symptoms improved (optional)

        - Untreated
            - 48 hours if worsening
            - 96 hours if no change
            - 1 week if improved (optional)
    - Institutionalized
        - Telephonic follow-up sufficient if treated
        - Standard triage forms for nursing staff
2. Referral
    - CDC hotline for clinicians (877-554-4625) if questions
    - Pulmonologist if needed for pulmonary complications
    - Neurologist for Guillain-Barré Syndrome or other neuro complications
    - Cardiologist for suspected myocarditis (echo first)
3. Admit to hospital
    - Dehydration requiring IV fluids
    - Complications requiring IV therapy
        - Pneumonia
        - COPD/asthma
    - Neuro or cardiac complications

Prognosis

1. Complications more common in elderly
2. Majority recover in 5-7 d; some with residual malaise for weeks
3. Frail elderly at risk for functional decline after influenza
4. Consider OT evaluation following acute infection

Prevention

1. Vaccination (annual, vaccine matched to likely predominant strains)
    - Primary target groups for IM dose
        - 65 years of age and older
        - Residents of nursing homes and other long-term care facilities
    - Give to high risk persons in late October, others in November
    - Vaccination efforts to continue throughout season,
    - Influenza season duration varies
    - Influenza might not appear in certain communities until February or March.
    - Providers should offer influenza vaccine routinely, and organized vaccination campaigns should continue throughout influenza season, including after community influenza activity has begun.
    - Vaccine administered in December or later, even if influenza activity already begun, likely beneficial in majority of influenza seasons.
    - Majority of adults have antibody protection against influenza virus infection within 2 weeks after vaccination[5]
    - Provides good protection and significantly decreases serious influenza complications in elderly
    - Nasal spray (live attenuated influenza vaccine: FluMist) NOT recommended in persons >50 y/o. or health care workers (can shed virus)

2. Chemoprophylaxis
    - Persons to be considered for antiviral chemoprophylaxis:
        - High-risk persons during 2 weeks post-vaccination period, before adequate inactivated vaccine immune response develops
        - Influenza vaccination contraindicated, unavailable, or expected to have low effectiveness
        - Unvaccinated adults:
            - Including healthcare workers in close contact with persons at high risk for influenza complications during elevated influenza activity periods.
            - Whenever possible, administer influenza vaccination, and discontinue chemoprophylaxis two weeks later **(B-III)**[6]
        - Antiviral chemoprophylaxis recommended for all residents (vaccinated and unvaccinated) in institutions (ex. nursing homes and chronic care facilities) with ongoing influenza outbreaks **(A-I)**[6]

References

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