Pulmonary Complications of Influenza

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Pulmonary Complications of Influenza

- **Primary influenza pneumonia**
- **Secondary bacterial pneumonia**
- **Mixed viral and bacterial pneumonia**
- **ARDS**
- **Influenza Associated Pulmonary Aspergillosis**
- **Organizing pneumonia**
- **Asthma & COPD exacerbation**

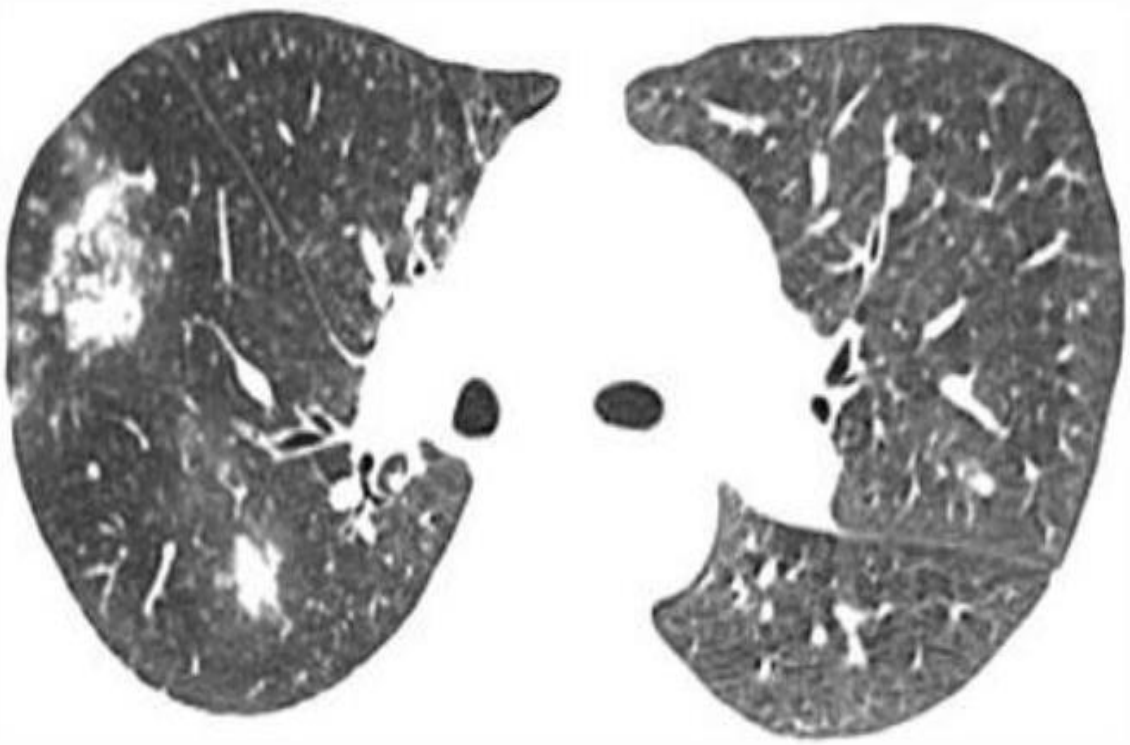
Primary influenza pneumonia

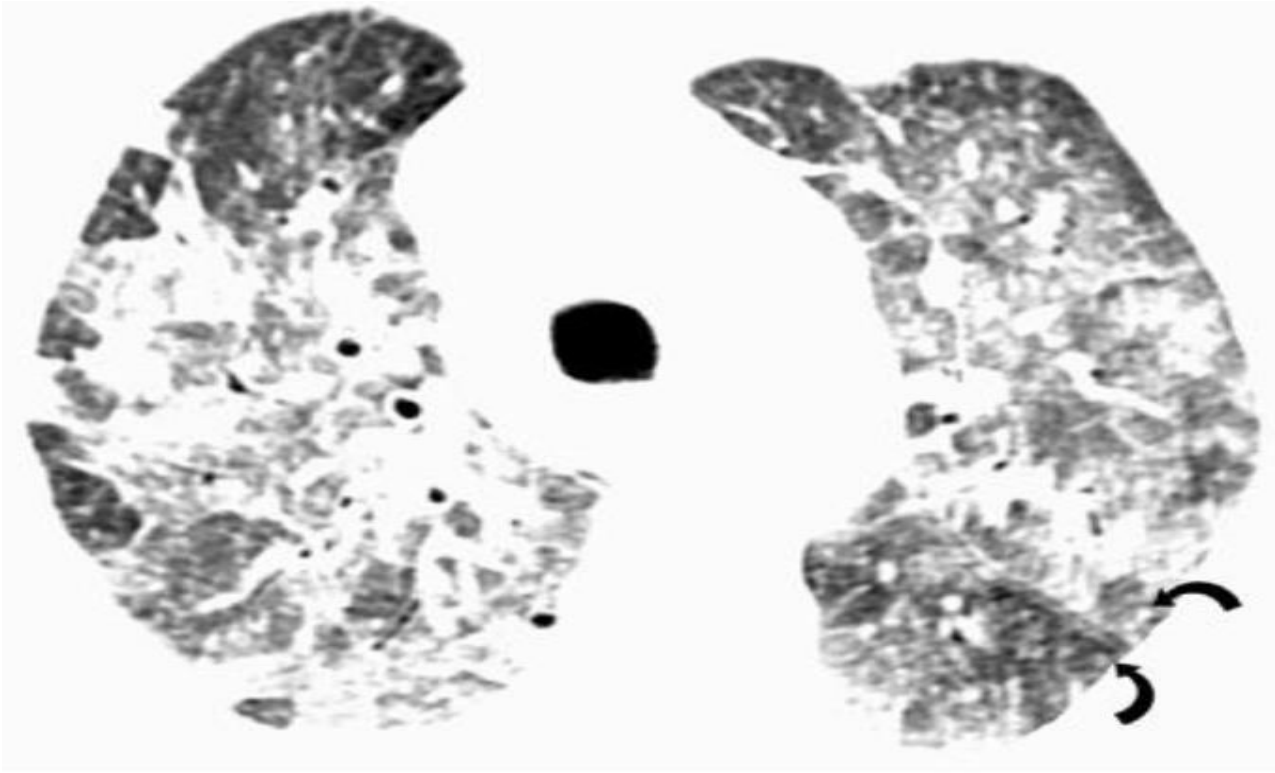
- Clinicians should maintain a high index of suspicion for this diagnosis.
- Uncommon during seasonal epidemics.
- Responsible for much of the mortality associated with the young healthy adult population.
- Preliminary data from the 2009 H1N1 pandemic suggest a shift in age-related mortality.
- Lining of the alveoli with acellular hyaline membranes.

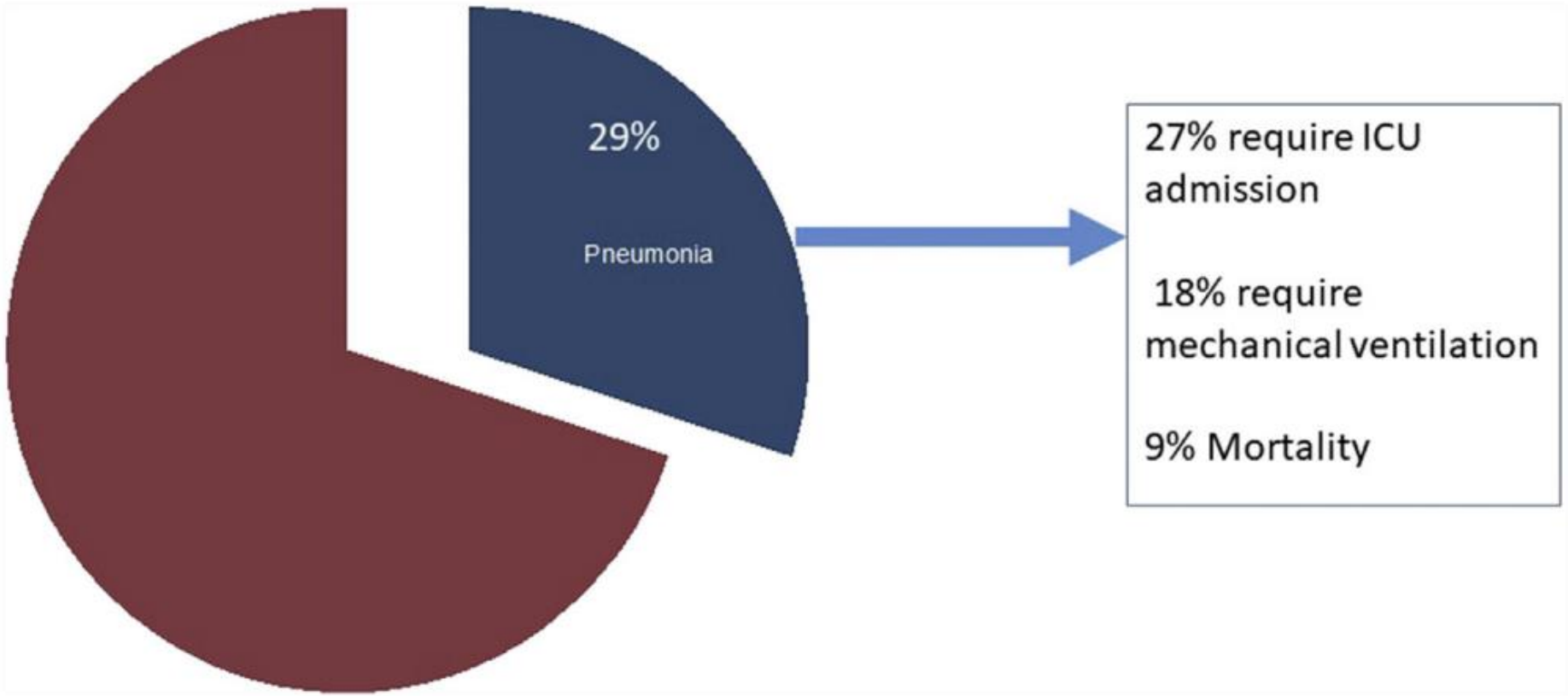
Groups at high risk for serious influenza complications

Children <5 years, but especially <2 years*
Adults ≥65 years of age
People who are pregnant or up to 2 weeks postpartum
Residents of nursing homes and long-term care facilities
Non-Hispanic Black persons, Hispanic or Latino persons, and American Indian or Alaska Native persons¶
People with medical conditions including: ▪ Asthma ▪ Neurologic and neurodevelopmental conditions (including disorders of the brain, spinal cord, and peripheral nerve and muscle such as cerebral palsy, epilepsy, stroke, intellectual disability, moderate-to-severe developmental delay, muscular dystrophy, and spinal cord injury) ▪ Chronic lung disease (eg, chronic obstructive pulmonary disease, cystic fibrosis) ▪ Heart disease (eg, congenital heart disease, congestive heart failure, coronary artery disease) ▪ Blood disorders (eg, sickle cell disease) ▪ Endocrine disorders (eg, diabetes mellitus) ▪ Kidney disorders ▪ Liver disorders ▪ Metabolic disorders (eg, inherited metabolic disorders and mitochondrial disorders) ▪ Weakened immune system due to disease (eg, HIV, AIDS, cancer) or medication (eg, chemotherapy or radiation therapy, chronic glucocorticoids) ▪ Children <19 years of age who are receiving long-term aspirin therapy ▪ People with Class III obesity (body mass index [BMI] ≥40 or ≥140% of the 95th percentile value)

Influenza virus pneumonia







In a cohort study that included laboratory-confirmed cases of influenza admitted to the hospital, those with pneumonia, as compared with those without pneumonia, were more likely to require intensive care unit (ICU) admission ***(27% vs 10%)*** and mechanical ventilation ***(18% vs 5%)***, and to die ***(9% vs 2%)***

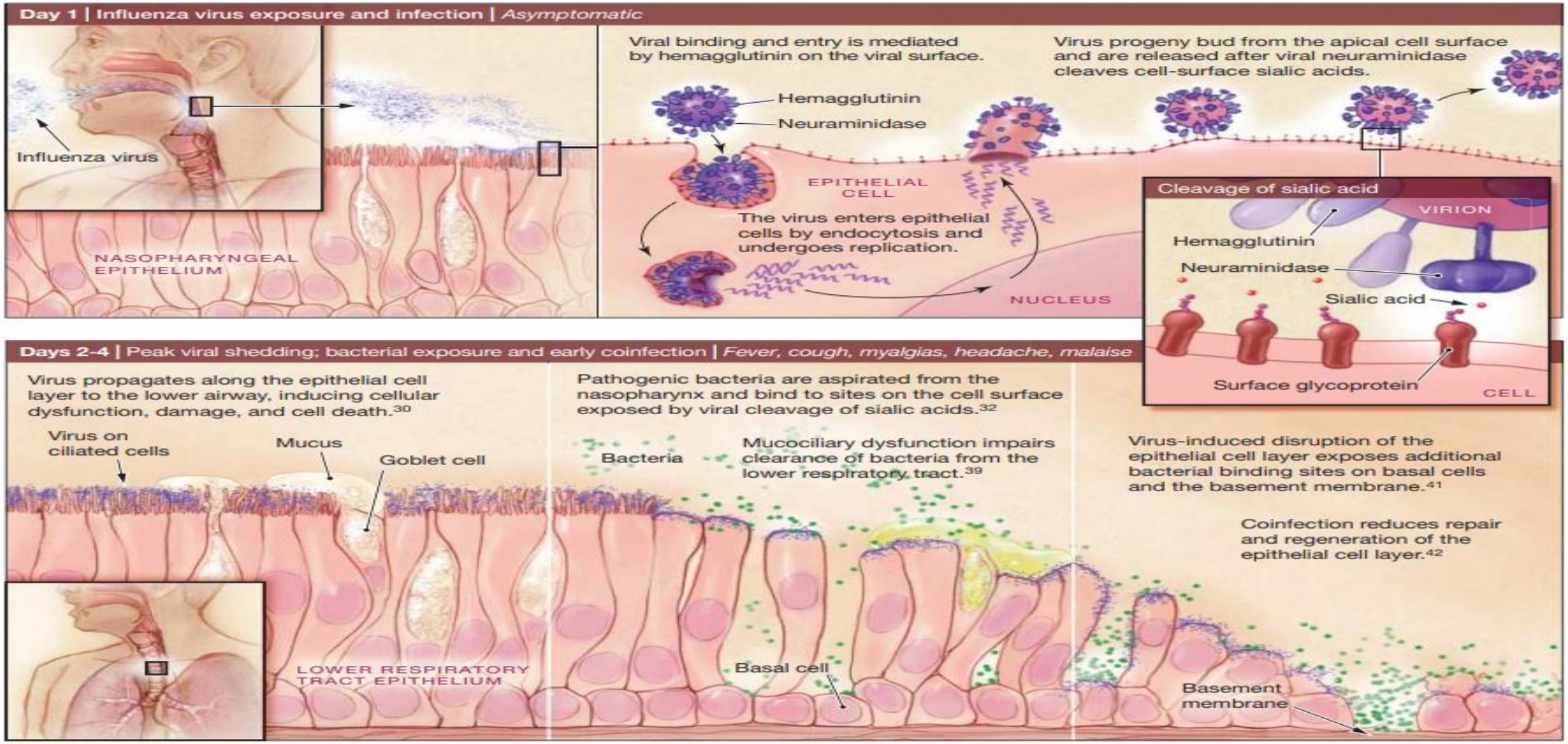
BMC Infect Dis 2015;15:369

Secondary bacterial pneumonia

- Bacterial coinfection complicates approximately 0.5% of all influenza cases in healthy young individuals and at least 2.5% of cases in older individuals and those with predisposing conditions typically with Streptococcus pneumoniae or Staphylococcus aureus.

Intensive Care Med (2020) 46:1524–1535

Model of Severe Influenza and Bacterial Copathogenesis



JAMA, January 16, 2013—Vol 309, No. 3

Diagnosis

- Microbiologic testing of sputum for Gram stain and culture should be performed in patients with suspected coinfection and clinical or radiographic evidence of pneumonia.
- Blood cultures should be obtained in patients with evidence of sepsis, and S pneumoniae urine antigen testing should be performed when available.
- Differentiating viral from bacterial infection remains a challenge for clinicians. ***(Overuse of antibiotics?)***

JAMA, January 16, 2013—Vol 309, No. 3

DOI:10.1111/irv.12398
www.influenzajournal.com

Systematic Review

The frequency of influenza and bacterial coinfection: a systematic review and meta-analysis

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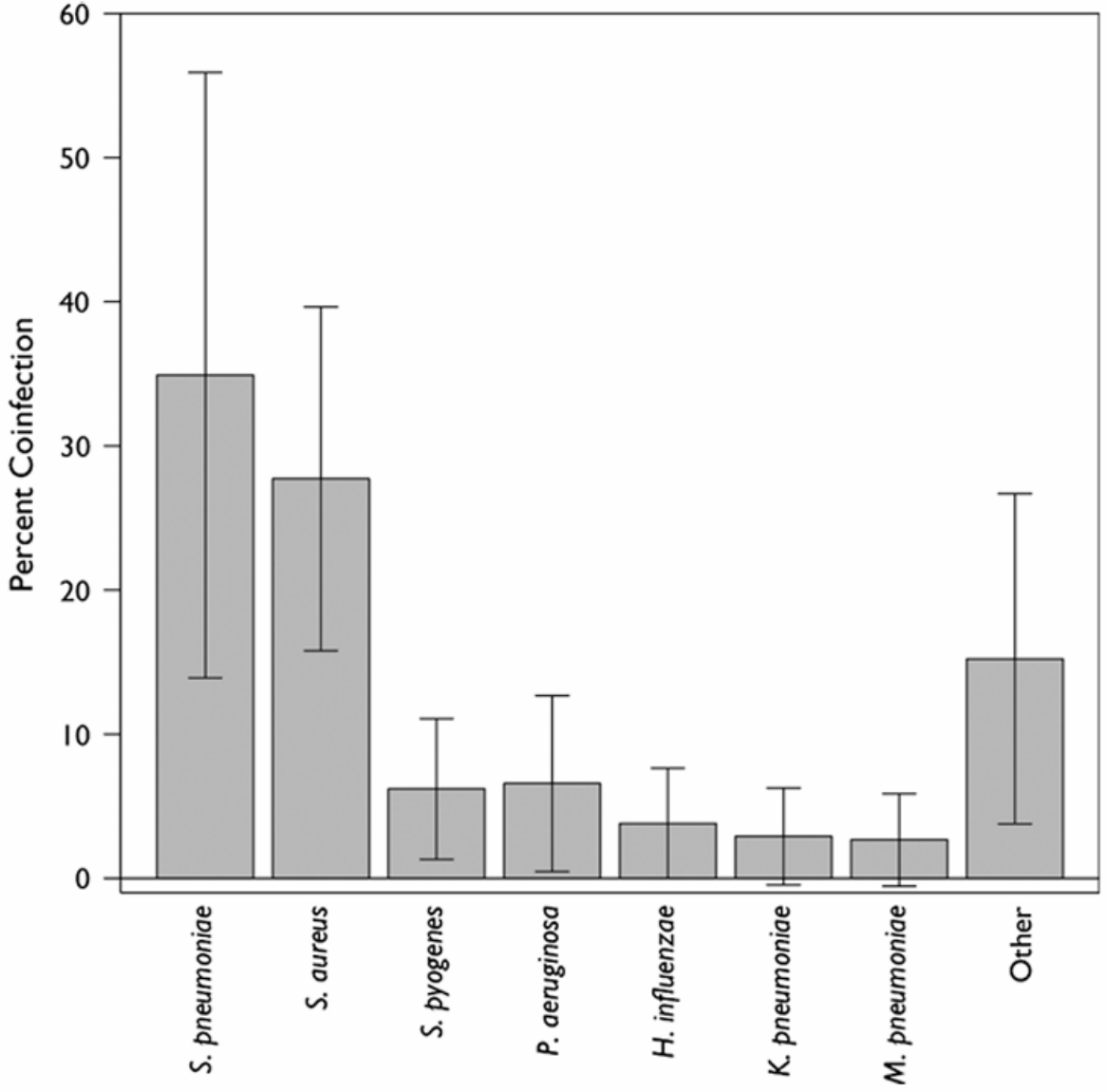
Accepted 14 May 2016.

Results

- 27 studies including 3215 participants included.
- Reported coinfection rates ranging from 2% to 65%.
- The most common coinfecting species were S. pneumoniae and S. aureus, which accounted for ***35%*** (95% CI, 14%–56%) and ***28%*** (95% CI, 16%– 40%) of infections, respectively.
- Approximately ***50%*** of hospital S. aureus isolates are MRSA

Influenza and Other Respiratory Viruses Published by John Wiley & Sons Ltd



Percent of laboratory confirmed influenza infections that were coinfected by each bacterial species.

- ***In a Patient With Suspected or Confirmed Influenza, When Should Bacterial Coinfection of the Upper or Lower Respiratory Tract Be Considered, Investigated, and Treated?***

Recommendations:

24. Clinicians should investigate and empirically treat bacterial coinfection in patients with suspected or laboratory-confirmed influenza who present initially with severe disease (extensive pneumonia, respiratory failure, hypotension, and fever), in addition to antiviral treatment for influenza (A-II).

25. Clinicians should investigate and empirically treat bacterial coinfection in patients who deteriorate after initial improvement, particularly in those treated with antivirals (A-III).

26. Clinicians can consider investigating bacterial coinfection in patients who fail to improve after 3–5 days of antiviral treatment (C-III).

IDSA Influenza Clinical Guidelines 2018

- Given the higher incidence of S. aureus infections, including MRSA among patients with severe pneumonia complicating influenza, agents with activity against MRSA should be included in the empiric treatment regimen for critically ill patients.

IDSA Influenza Clinical Guidelines 2018

IAPA: Under-Recognized

- Patients with IAPA might not have host factors and typical radiological features.
- Decreased use of diagnostic bronchoscopy,
- Low sensitivity of detection of circulating galactomannan in serum.
- Further, detection of aspergillus in specimens of the upper respiratory tract, such as sputum or tracheal aspirate, often does not distinguish between aspergillus colonisation and invasive disease.

Invasive aspergillosis in patients admitted to the intensive care unit with severe influenza: a retrospective cohort study

Alexander F A D Schauwvlieghe, Bart J A Rijnders*, Nele Philips, Rosanne Verwijs, Lore Vanderbeke, Carla Van Tienen, Katrien Lagrou, Paul E Verweij, Frank L Van de Veerdonk, Diederik Gommers, Peter Spronk, Dennis C J J Bergmans, Astrid Hoedemaekers, Eleni-Rosalina Andrinopoulou, Charlotte H S B van den Berg, Nicole P Juffermans, Casper J Hodiamont, Alieke G Vonk, Pieter Depuydt, Jerina Boelens, Joost Wauters, on behalf of the Dutch-Belgian Mycosis study group*

A retrospective multicentre cohort study
Patients with severe influenza admitted to seven ICUs across Belgium and The Netherlands
Patients were older than 18 years with acute respiratory failure,
Had pulmonary infiltrates on imaging, and a confirmed influenza infection

Lancet Respir Med 2018

Findings

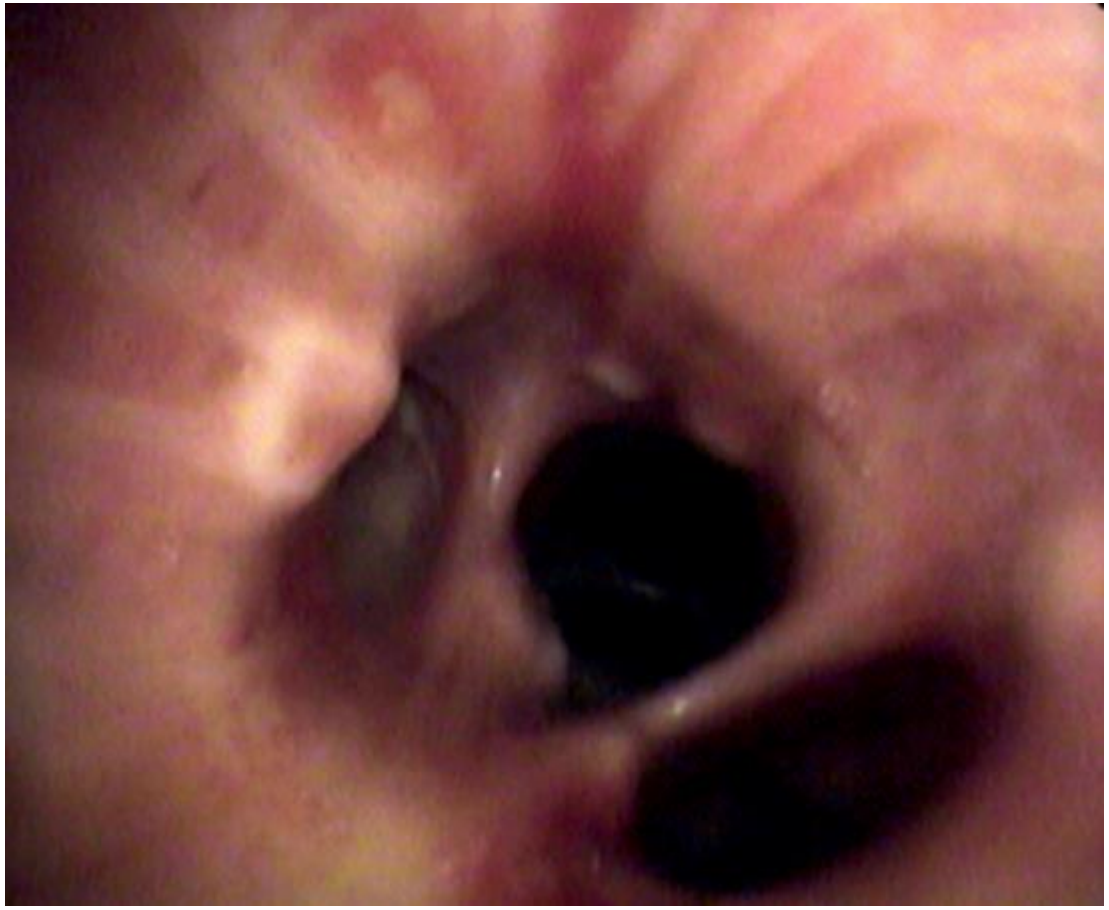
- IPA was diagnosed in ***83 (19%) of 432*** patients admitted with influenza.
- The incidence was similar for influenza A and B.
- Incidence in immunocompromised patients: ***32% (38 of 117 patients).***
- In the non-immunocompromised patients: ***14% (45 of 315 patients).***
- In the control group***: 5%(16 of 315 patients).***
- The 90-day mortality was ***51%*** in patients in the influenza cohort with IPA and ***28%*** in the influenza cohort without IPA (p=0·0001).
- In this study, influenza was found to be independently associated with IPA ***(OR: 5·19; 95% CI 2·63–10·26; p< 0·0001),*** along with a higher APACHE II score, male sex, and use of corticosteroids.

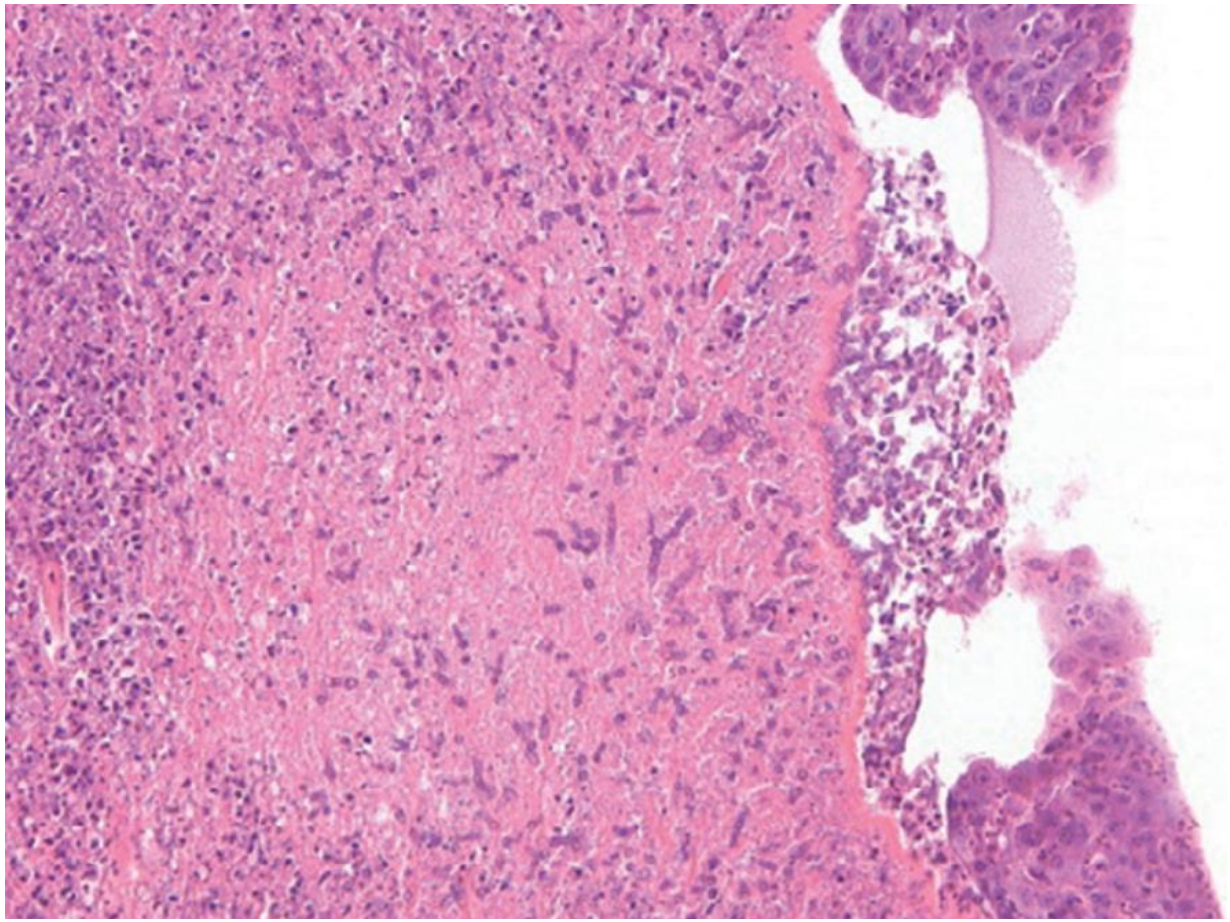
Lancet Respir Med 2018

Aspergillus tracheobronchitis

Chest CT demonstrated peribronchial infiltrates.

The main diagnostic clue for airway-invasive Aspergillus tracheobronchitis is epithelial plaques, pseudomembranes or ulcers that can be visualized via bronchoscopy, as radiological features may be subtle.





Haematoxylin and eosin staining of a biopsied specimen at 100 ×magnification, revealing invasion of submucosa by fungal hyphae, type Aspergillus, and dense infiltration with neutrophils

Use of corticosteroids

- Corticosteroids should not be given to infuenza patients as their use may be associated with increased risk of IAPA.
- Half of the physicians are not aware of IAPA.
- Whenever the use of corticosteroids is unavoidable, more efforts (bronchoscopy with GM detection in BAL fluid or serum β-D-glucan test) should be made to exclude or diagnose IAPA.

SCCM and ESICM 2017, Intensive Care Med 44:474–477

CONFERENCE REPORTS AND EXPERT PANEL

Review of influenza-associated pulmonary aspergillosis in ICU patients and proposal for a case definition: an expert opinion

Paul E. Verweij[1,2*], Bart J. A. Rijnders[3], Roger J. M. Brüggemann[2,4], Elie Azoulay[5], Matteo Bassetti[6,7], Stijn Blot[8,9], Thierry Calandra[10], Cornelius J. Clancy[11,12], Oliver A. Cornely[13,14,15], Tom Chiller[16], Pieter Depuydt[17], Daniele Roberto Giacobbe[6,18], Nico A. F. Janssen[2,19], Bart-Jan Kullberg[2,19], Katrien Lagrou[20,21], Cornelia Lass-Flörl[22], Russell E. Lewis[23], Peter Wei-Lun Liu[24,25], Olivier Lortholary[26,27], Johan Maertens[20,28], Ignacio Martin-Loeches[29,30], M. Hong Nguyen[11,12], Thomas F. Patterson[31,32], Thomas R. Rogers[33], Jeroen A. Schouten[34,35], Isabel Spriet[36], Lore Vanderbeke[20,37], Joost Wauters[37] and Frank L. van de Veerdonk[2,19]

Intensive Care Med (2020) 46:1524–1535

Proposed case definition for IAPA in ICU patients

Entry criteria: influenza-like illness + positive influenza PCR or antigen + temporally relationship		
	***Aspergillus* tracheobronchitis**	**IAPA in patients without documented *Aspergillus* tracheobronchitis**
Proven	Biopsy or brush specimen of airway plaque, pseudomembrane or ulcer showing hyphal elements and *Aspergillus* growth on culture or positive *Aspergillus* PCR in tissue	Lung biopsy showing invasive fungal elements and *Aspergillus* growth on culture or positive *Aspergillus* PCR in tissue
Probable	Airway plaque, pseudomembrane or ulcer and at least one of the following: Serum GM index > 0.5 *or* BAL GM index ≥ 1.0 *or* Positive BAL culture *or* Positive tracheal aspirate culture *or* Positive sputum culture *or* Hyphae consistent with *Aspergillus*	**A**: Pulmonary infiltrate and at least one of the following: Serum GM index > 0.5 *or* BAL GM index ≥ 1.0 *or* Positive BAL culture ***OR*** **B**: Cavitating infiltrate (not attributed to another cause) and at least one of the following: Positive sputum culture *or* Positive tracheal aspirate culture

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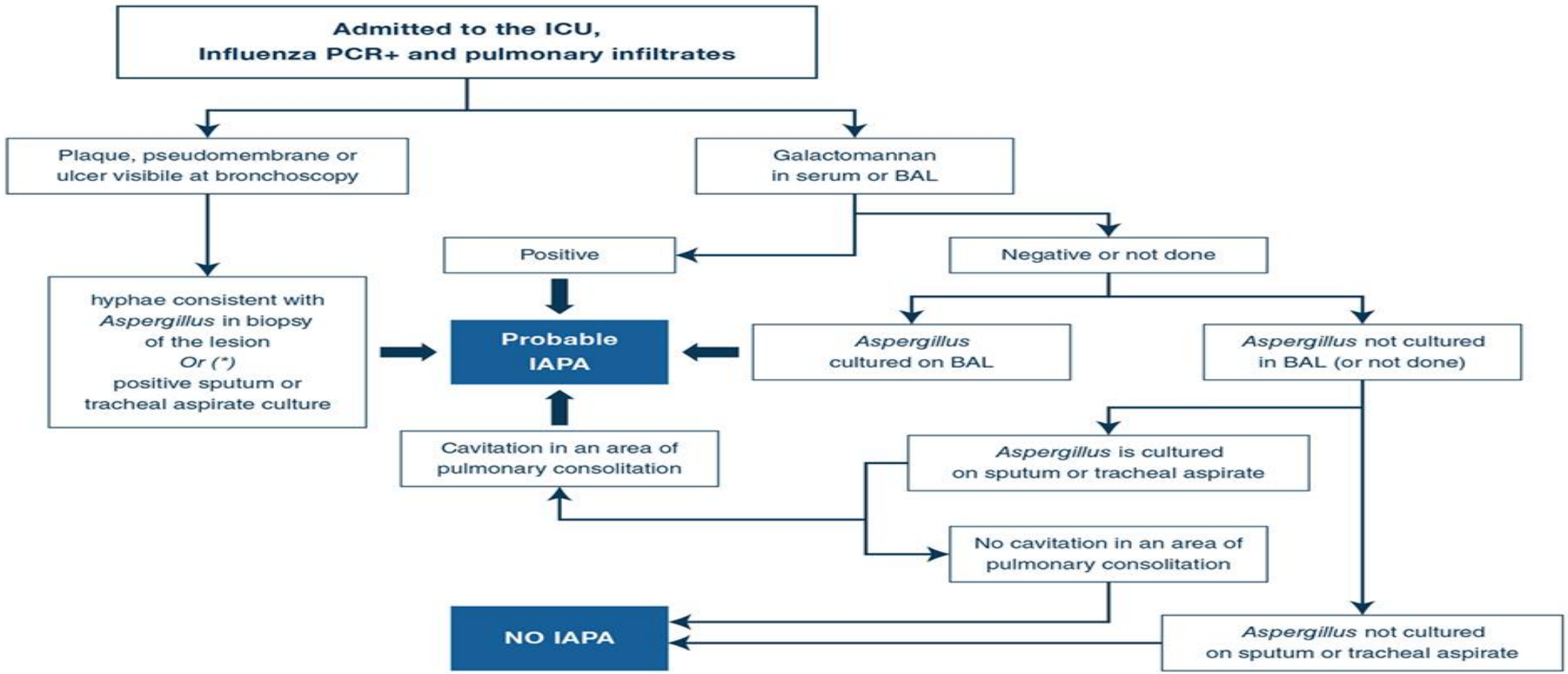
Flowchart of probable IAPA classification



Enferm Infecc Microbiol Clin. 2020;38(3):123–126

Enfermedades Infecciosas y Microbiología Clínica

www.elsevier.es/eimc

Brief report

Organizing pneumonia secondary to influenza infection: Two case reports and a literature review

Andrea Nuñez-Conde[a], Ester Marquez-Algaba[b], Vicenç Falcó[b], Benito Almirante[b], Joaquin Burgos[b,*]

[a] Internal Medicine Department, University Hospital Vall d'Hebron, Universitat Autònoma de Barcelona, Barcelona, Spain
[b] Infectious Diseases Department, University Hospital Vall d'Hebron, Universitat Autònoma de Barcelona, Barcelona, Spain

- Influenza causes significant morbidity and mortality in the general population and contributes to some acute asthma exacerbations.
- A systematic review suggested that influenza vaccination reduce the risk of asthma exacerbations.

Thanks For Your Attention