BC Children's Hospital and
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Influenza & bacterial coinfections in children: testing and treatment considerations

Conflict of Interest

- Nothing to Declare

What is an "ILI"?

- An influenza like illness is characterized by the rapid onset of constitutional and respiratory signs and symptoms;
- Fever
- Myalgia
- Headache and malaise
- Nonproductive cough
- Sore throat
- Rhinitis
- Gastrointestinal symptoms particularly diarrhea may be seen

Who to test for influenza?

- Any child being admitted to the hospital for ILI / bacterial superinfections
- Outpatients i test results will alter clinical management or patient has risk factors
  - Asthma and other chronic pulmonary disease, including bronchopulmonary dysplasia, cystic fibrosis, home ventilation/tracheostomy, •
  - Cardiovascular disease •
  - Malignancy •
  - Immunosuppression or immunodeficiency • First Nations, Inuit and Métis children and youth •
  - Diabetes mellitus and other metabolic diseases • Hemoglobinopathies such as sickle cell disease •
  - Neurological disease and neurodevelopmental disorders that compromise handling of respiratory secretions •
  - Chronic renal insufficiency • Chronic liver disease •
  - Children and Youth residing in homes or chronic care facilities •
  - Individuals aged younger than 18 years who are on chronic aspirin therapy •
  - Obesity with a BMI ≥40 or a BMI >3 z-scores above the mean for age and gender

See Child Health BC notice - https://www.childhealthbc.ca/sites/default/files/CHBC%20BCCH%20PHSA%20Revised%20indications%20for%20Oseltamivir%202022.pdf

Osteltamivir – why would I use it?

- Shortens duration of influenza illness if it is given in the **first 48 hours**
- May decrease risk of mortality / ICU in hospitalised children – up to 75% depending on the study
- Remember the major direct influenza complications include
  - Encephalitis
  - Encephalopathy
  - Myocarditis

Reminder about Aspirin

- For children on chronic aspirin (eg after Kawasaki Disease), pause the aspirin during influenza because of the risk of Reye Syndrome

Who should really get osteltamivir

- **Anyone needing to be hospitalised for influenza – regardless of age**
- **Child with severe, complicated or progressive influenza illness**
- Patients who are at "high risk" for severe flu →

TABLE 1

Risk factors for Influenza complications, consideration for treatment as an outpatient if presenting with a positive influenza test and/or influenza like symptoms

- Asthma and other chronic pulmonary disease, including bronchopulmonary dysplasia, cystic fibrosis, home ventilation/tracheostomy,
- Cardiovascular disease
- Malignancy
- Immunosuppression or immunodeficiency
- First Nations, Inuit and Métis children and youth
- Diabetes mellitus and other metabolic diseases
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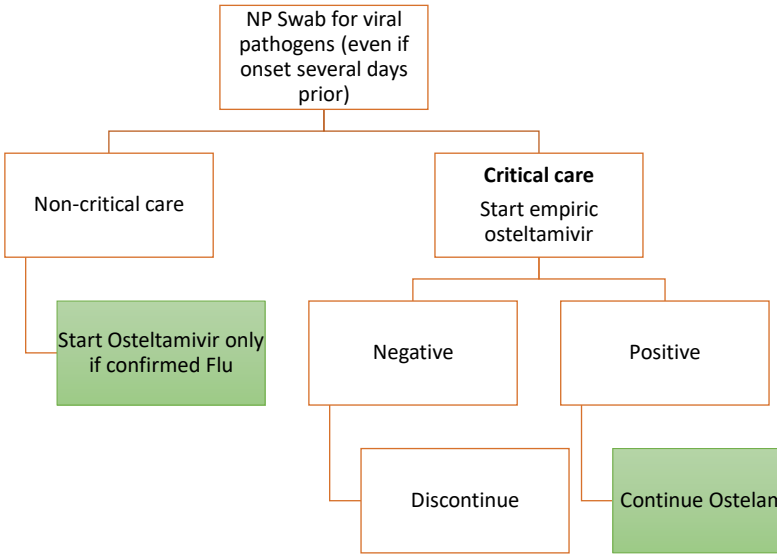
Inpatients admitted for ILI



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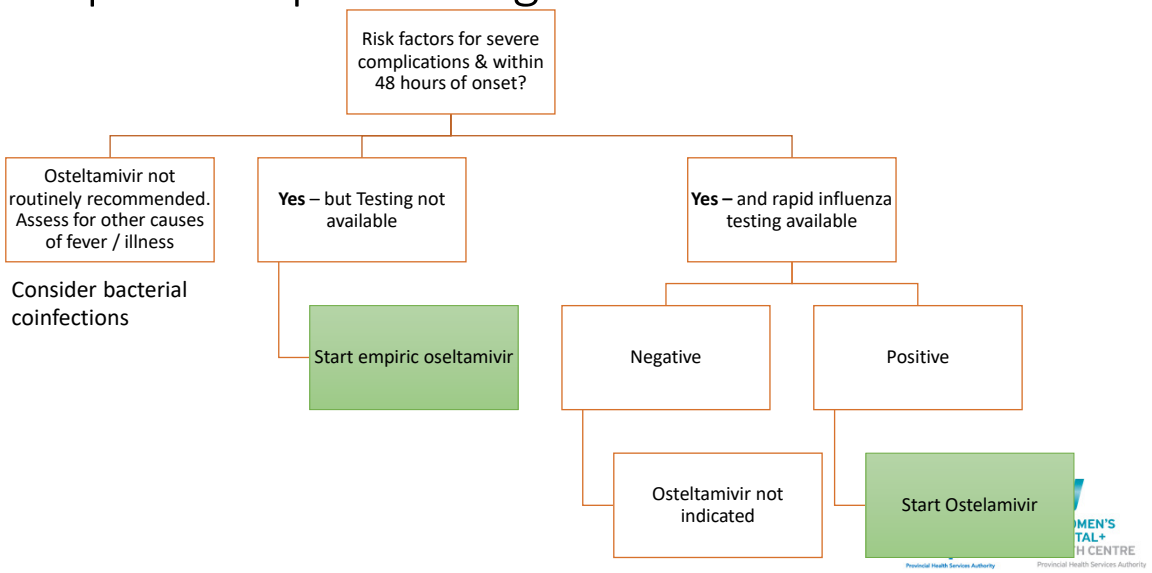
Outpatients presenting with ILI



Should I prescribe Osteltamivir to a child under age 1?

- In Canada, neuraminidase inhibitors (NAIs) are **currently not approved for the routine treatment** of seasonal influenza illness in this age group. However, these infants are at highest risk of severe infection. Consideration for treatment with oseltamivir (Tamiflu) should be made and can be discussed with a local pediatrician in the first instance.
  - Limited safety and efficacy data
  - Recommended if hospitalised for severe influenza
  - In the community – weigh pros and cons in milder illness.
  - Be cautious particularly with neonates (<1mo)
- Any additional concerns from the local pediatrician can be discussed with the BCCH pediatric infectious disease physician oncall (604-875-2345; page Infectious Disease oncall physician)

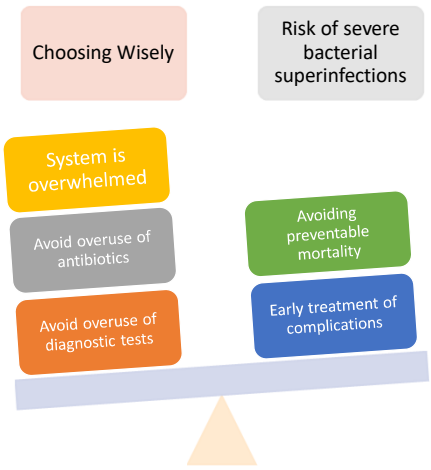
Children for whom the recommendation is less strong…

- Otherwise healthy kids aged 5 years – 16 years with mild disease
  - Only if symptoms <48 hours (but usually they don't present for care in that timing)
- But remember that several of the severe / fatal cases this year may fit into this group so especially early on you may want to be more liberal with treatment in this group

Osteltamivir – prescribing practicalities

- Supply
  - The provincial supply is adequate
  - Stock in individual community pharmacies may be variable
  - Distributors have been notified that there may be increased prescriptions
  - The fluctuations are normally not in the control of the pharmacists & have complex supply chain underlying reasons
- Tablets likely much more available than suspension

Balancing antimicrobial stewardship & risk of bacterial superinfections…



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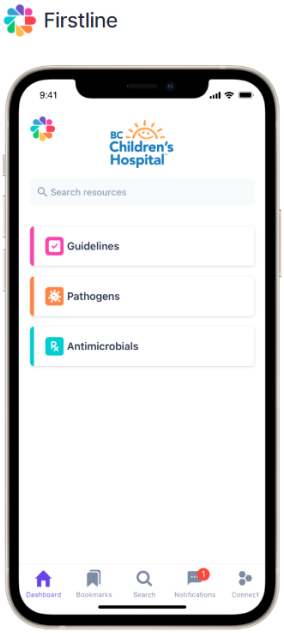
Antibiotic treatment – based on expected microbiology of the infection

- Lymphadenitis → GAS, MSSA, MRSA → 1st gen cephalosporin
- Sinusitis → polymicrobial including S Pneumo, S Anginosus → Amoxil or amox/clav
- Acute Otitis Media → S Pneumo, Moraxella, HiB → Amoxil or amox/clav
- Orbital cellulitis → polymicrobial → cefotaxime +/- vanco +/- flagyl



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Guidelines now available

Firstline

Download

Group A Strep

American Academy of Pediatrics
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From: **Group A Streptococcal Infections**

Often a culprit post-influenza

- Pneumonia
- Tonsillitis
- Retropharyngeal abcess
- Lymphadenitis
- Sepsis
- Scarlet fever
- Impetigo
- Streptococcal toxic shock syndrome
- Necrotising fasciitis

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Streptococcal Toxic Shock Syndrome

Criteria

- **Hypotension**
- **Multi-organ involvement** characterized by two or more of the following:
  - **Renal impairment:** Creatinine >2x ULN.
  - **Coagulopathy:** Platelets less than or equal to 100,000/mm3 (less than or equal to 100 x 106/L) or disseminated intravascular coagulation, defined by prolonged clotting times, low fibrinogen level, and the presence of fibrin degradation products.
  - **Liver involvement:** ALT / AST / bilirubin >2x ULN.
  - **Acute respiratory distress syndrome:** Defined by acute onset of diffuse pulmonary infiltrates and hypoxemia in the absence of cardiac failure or by evidence of diffuse capillary leak manifested by acute onset of generalized edema, or pleural or peritoneal effusions with hypoalbuminemia.
  - A **generalized erythematous macular rash** that may desquamate.
  - **Soft-tissue necrosis**, including necrotizing fasciitis or myositis, or gangrene.

Management

- Add clindamycin to antibacterials
- Fluid management to maintain adequate venous return and cardiac filling pressures to prevent end-organ damage
- Anticipatory management of multisystem organ failure
- Parenteral antimicrobial therapy at maximum doses with the capacity to:
  - Kill organism with bactericidal cell wall inhibitor (eg, beta-lactamase–resistant antimicrobial agent)
  - Decrease enzyme, toxin, or cytokine production with protein synthesis inhibitor (eg, clindamycin)
- IGIV often is used as an adjunct, typically at 1 g/kg on day 1, followed by 0.5 g/kg on 1–2 subsequent days

Scarlet fever

- acute pharyngotonsillitis (pharyngitis), which manifests as sore throat with tonsillar inflammation and often
- tender anterior cervical lymphadenopathy,
- palatal petechiae, or a
- strawberry tongue
- Sandpaper rash

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Critical drug shortages – what pediatricians need to know

- Acetominophen and ibuprofen stocks are coming in – should be less of a problem
- Antibiotics:
  - Many of the limitations are in suspension formulations – so avoid using those if you can for now.
  - The are variable from day to day – based on variability in the supply chain that pharmacies have no control over (or knowledge ahead of time what will arrive and what will not)
- See CPS Practice Point: https://cps.ca/en/documents/position/managing-critical-drug-shortages
- There was also National Grand Rounds on the topic

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What about antibiotic stock-outs? Practical tips:

- On the prescription, write the range from minimum effective dose and maximum safe dose:

Can substitute with capsules for dosing of 50-90mg/kg/day divided TID, and round to the nearest dose.

- Some pharmacists are not comfortable / able to make those substitutions but if you give them "permission" it can make it easier for the family.
- Other antibiotics could be similarly substituted:
  - cephalexin 60-100 mg/kg/day divided QID;
  - cefuroxime 20-60 mg/kg/day divided BID;
  - cefprozil 15-30 mg/kg/day divided BID;
  - clarithromycin 15-20 mg/kg/day divided BID

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Amoxicillin-Clavulanate

- If you use standard dose amoxil (~40mg/kg) than swapping to rounded doses of amox-clav should be fine
- If you require high dose amoxil (90mg/kg) you may need to use 40mg/kg of amox/clav + 40-50 mg/kg of amoxil to avoid side effects

Notes on immunization progress from MOH

- From Dec. 5 to Dec. 11, 2022, more than 77,532 influenza vaccinations were administered to more than:
  - * 9,016 children aged six months to four years, for a total of 52,181 in this age group vaccinated to date. This represents a **26.3%** coverage rate compared to 21.2% on Dec. 5;
  - * 10,464 children from five to 11 years, for a total of 80,737 in this age group vaccinated to date. This represents a **22.6%** coverage rate compared to 19.5% on Dec. 5;
  - * 5,013 tweens and teenagers from 12-17 years, for a total of 53,688 in this age group vaccinated to date. This represents a **16.9%** coverage rate compared to 14.6% on Dec. 5;
  - * 37,860 adults from 18-64, for a total of 774,404 vaccinated in this age group to date. This represents a 23.2% coverage rate compared to 22.1% on Dec. 5; and
  - * 15,179 adults 65 and older, for a total of 624,830 vaccinated in this age group to date. This represents a coverage of 57.4% compared to 53% on Dec. 5.

Acknowledgements

- Pediatric Infectious Diseases Division & Antimicrobial Stewardship Programme
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