INFLUENZA

Standard Operating Procedure (SOP)
Influenza

الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
Garden of Knowledge and Virtue

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17/10/2025

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Approved by:

OBJECTIVES

To establish a standardized protocol for the diagnosis, management, prevention, and reporting of influenza infection at SASMEC @ IIUM.

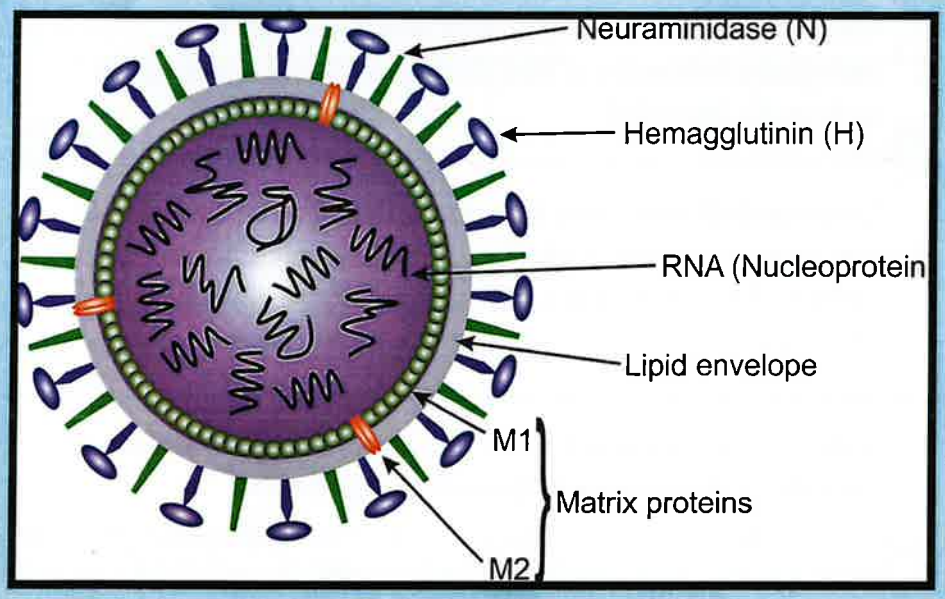
This SOP aims to:

- Ensure timely recognition and management of influenza cases.
- Prevent nosocomial transmission.
- Support rational use of antivirals and vaccination.
- Uphold ethical and Shariah-compliant principles in patient care.

SCOPE

This SOP applies to all healthcare personnel (doctors, nurses, pharmacists, and allied health staff) involved in patient care across wards, clinics, emergency department, and ICU within SASMEC @ IIUM.

INFLUENZA VIRUS STRUCTURE & KEY PROTEINS



Family: Orthomyxoviridae

Genome: Negative-sense single-stranded RNA (ssRNA) virus

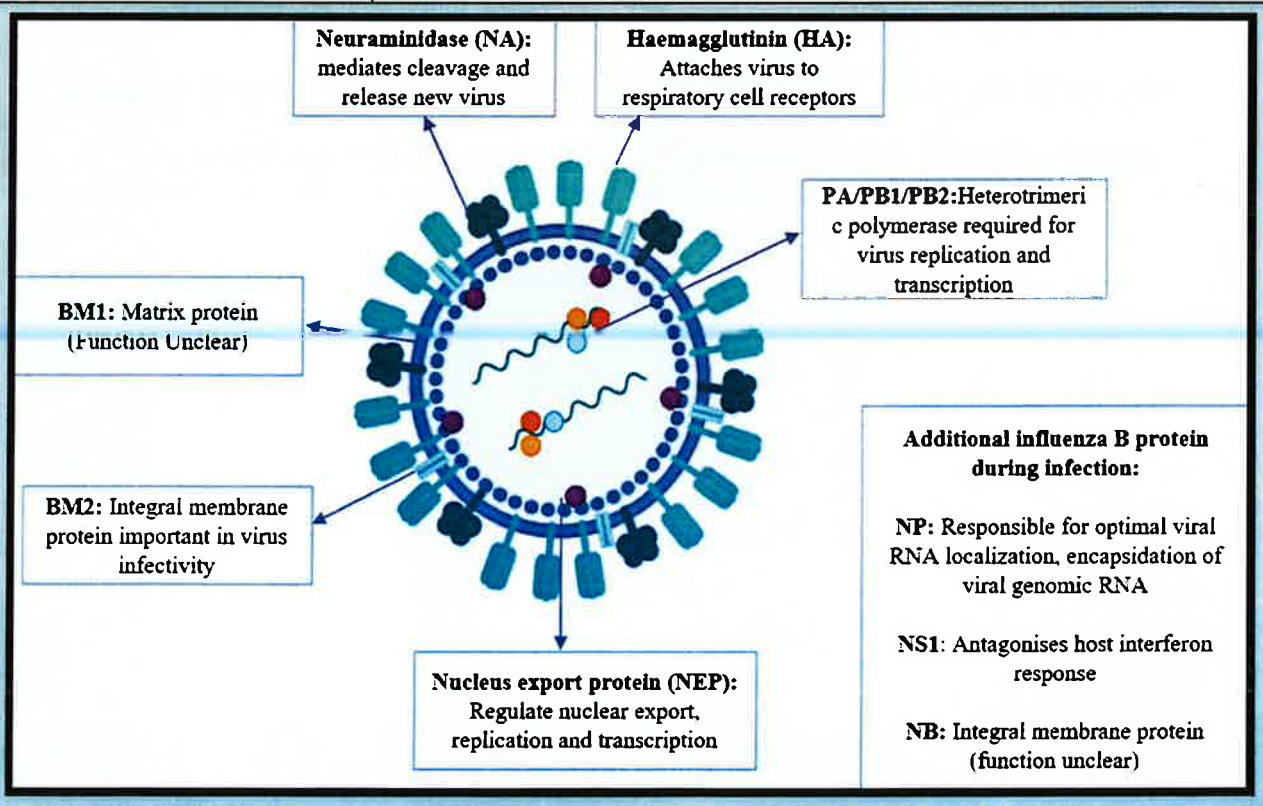
قَالَ رَبُّنَا ٱلَّذِىٓ أَعْطَىٰ كُلَّ شَىْءٍ خَلْقَهُۥ ثُمَّ هَدَىٰ ٥٠

He answered, "Our Lord is the One Who has given everything its ˹distinctive˺ form, then guided ˹it˺."

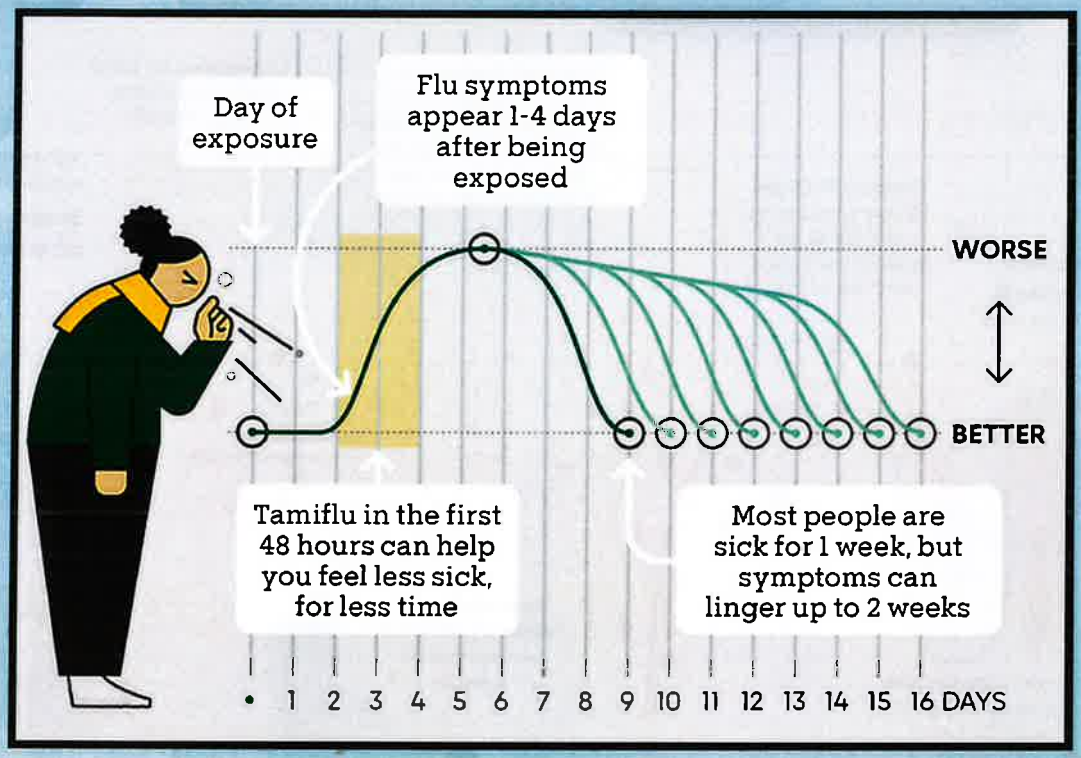
20:50

KEY PROTEINS

Protein	Function / Description
HA (Hemagglutinin)	Viral attachment protein that binds to host cell receptors.Influenza A has 16 antigenically distinct HA subtypes (H1–H16).
NA (Neuraminidase)	Enzyme that removes terminal sialic acids (N-acetyl neuraminic acid) from glycoproteins, allowing viral release from host cells.Influenza A has 9 NA subtypes (N1–N9).
M2 protein	Integral membrane protein forming an ion channel; assists in viral uncoating during replication.
M1 protein	Structural protein that provides rigidity to the virion and assists in viral assembly.
PB1, PB2, PA	Polymerase proteins responsible for viral RNA transcription and replication.



INCUBATION PERIOD

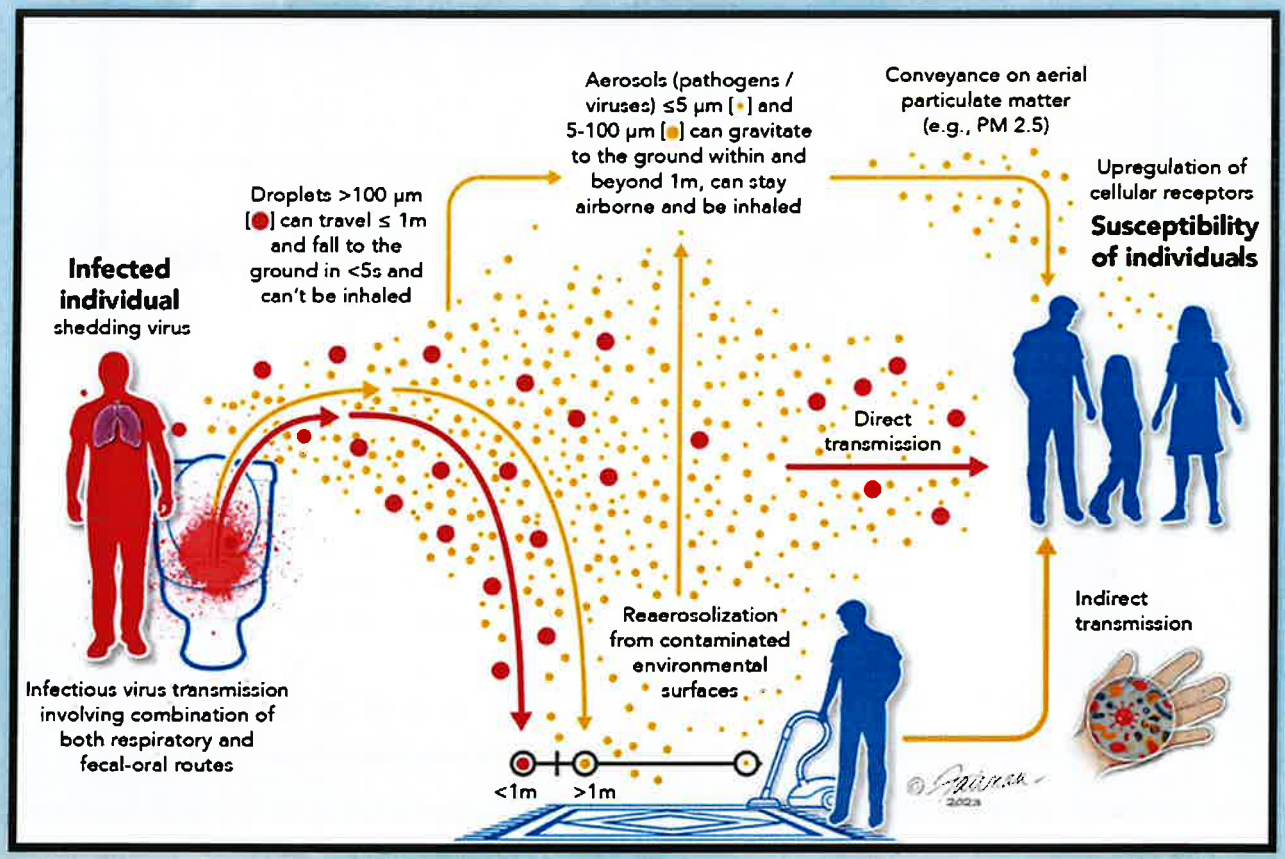


What is the incubation period?
1-4 days (average 2 days)

How long a person can be infectious?
1 day before symproms begin until 5 to 7 days after illness onset.

Reference:
Good Rx

MODE OF TRANSMISSION



Reference:

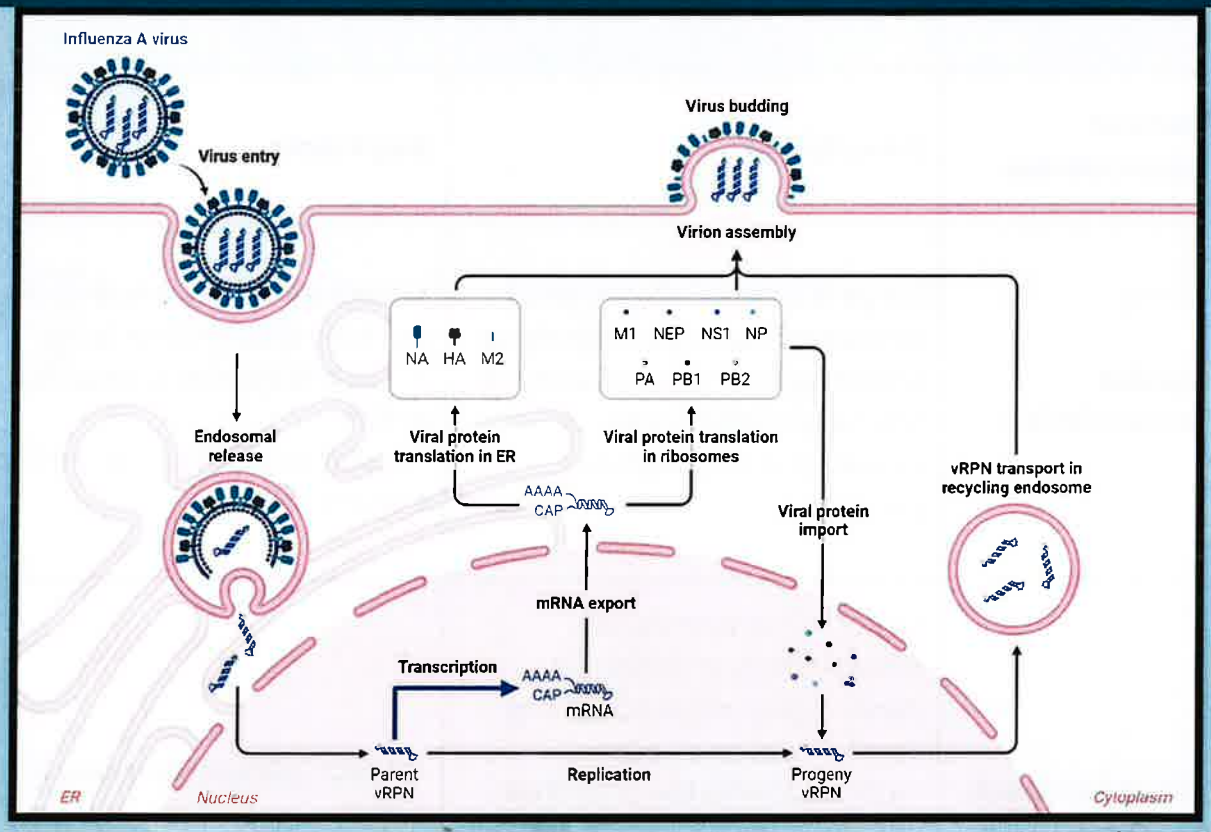
Viruses spread indoors through multiple, interconnected routes, including via fomites and aerosols.

Source: Ijaz, M.K., et al./PeerJ, 2023

MODE OF TRANSMISSION

Mode of Transmission	Description	Key Points
Droplet Transmission	Large droplets (>5 microns) produced during coughing or sneezing may land directly on the conjunctiva, nose, or mouth of a susceptible person.	• Droplets are heavy and do not stay airborne for long. • Travel distance is usually ≤1 metre. • Close contact is required for transmission.
Direct / Indirect Contact Transmission	Direct: Virus transferred directly from an infected person (e.g., after coughing into hands) to another individual who touches their mouth, nose, or eyes.Indirect: Virus transmitted via contaminated surfaces or objects (e.g., bed tables, equipment), then to mucous membranes.	• Direct: person-to-person via hands. • Indirect: via contaminated objects or surfaces.
Airborne Transmission (during/after Aerosol-Generating Procedures, AGPs)	AGPs can generate very small droplets (<5 microns) that remain suspended in the air and travel more than 1 metre.	• Can infect via inhalation or mucous membrane contact. • Examples of AGPs: intubation, suctioning, bronchoscopy, nebulization.

INFLUENZA VIRUS REPLICATION CYCLE



Source: Biorender

1. Entry

- Virus attaches via HA (hemagglutinin) to sialic acid receptors on host cells.
- Virus is taken into the cell by endocytosis.

2. Fusion & Uncoating

- Inside the endosome, acidic pH triggers fusion of the viral envelope with the endosomal membrane.
- M2 ion channel lets H^+ ions in → viral contents released into cytoplasm (uncoating).

3. Replication

- Viral RNA segments move to the nucleus.
- PB1, PB2, and PA polymerase complex makes:
  - mRNA (for protein synthesis)
  - new negative-sense RNA (for new virions).

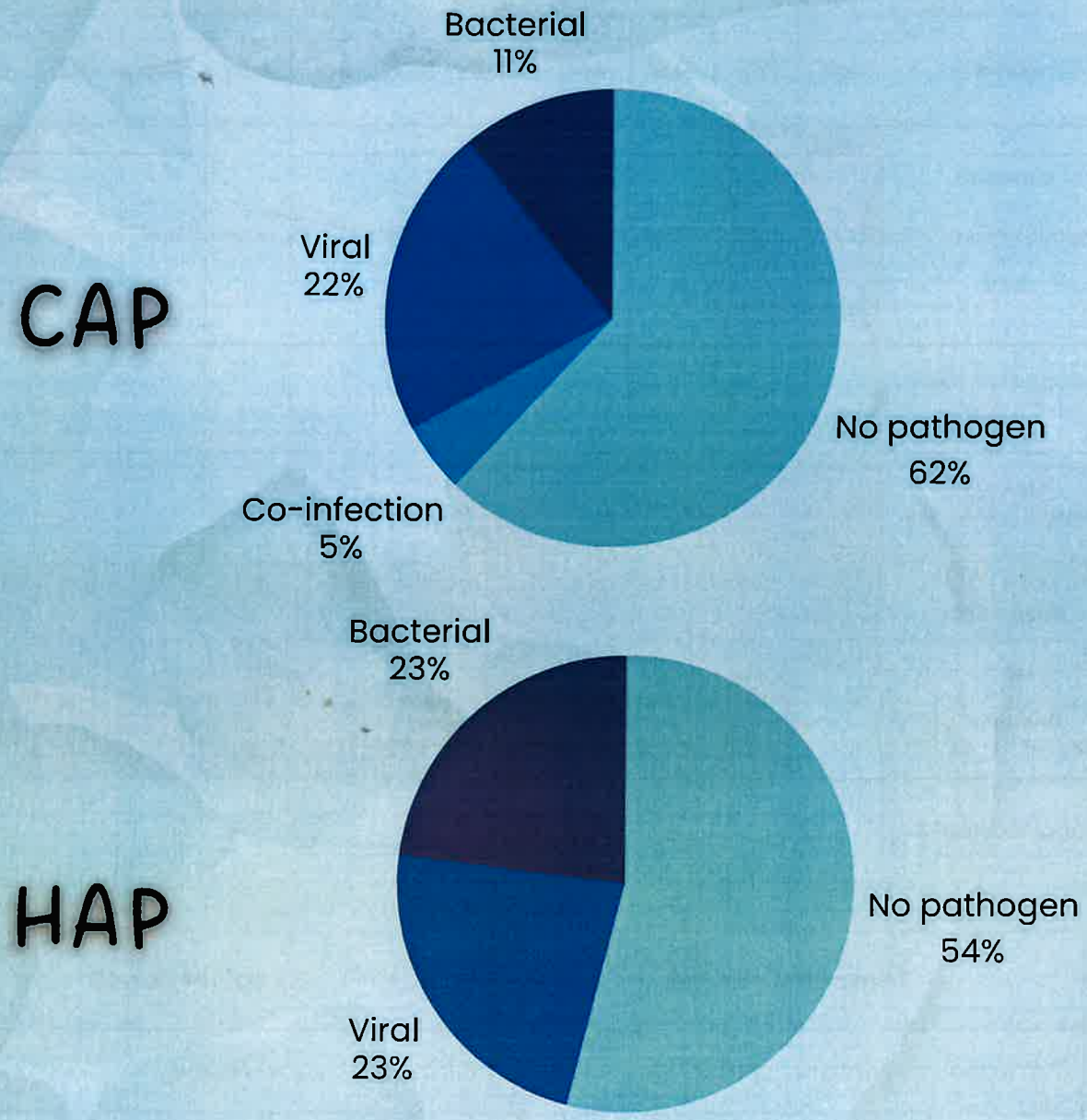
4. Assembly

- New viral RNAs combine with proteins (NP, polymerase complex).
- Envelope proteins (HA, NA, M2) made in the ER → move to cell surface.
- Components come together for assembly at cell membrane.

5. Budding & Release

- Virus buds off from the cell membrane, taking part of the host's lipid membrane as its envelope.

RESPIRATORY VIRUSES ARE COMMON IN CAP & HAP



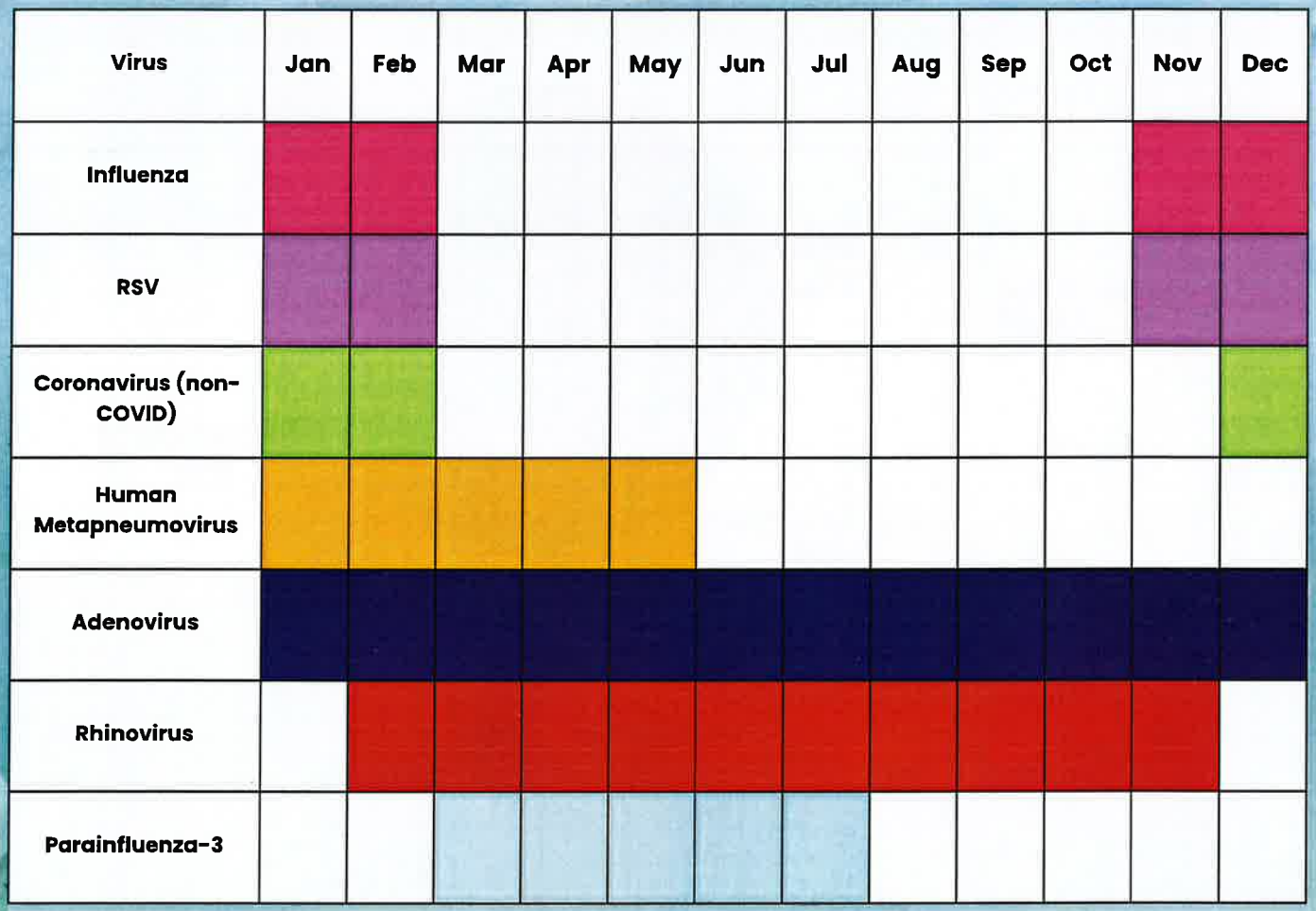
Most common viruses isolated (in order):

- Rhinovirus
- Influenza, parainfluenza, metapneumovirus, RSV, coronavirus
- Adenovirus

Reference:

Jain et al., NEJM 2015; 373:415.
Shorr et al., Resp Med 2017; 122:76.
Micek et al., Chest 2016; 150:1008.

SEASONAL TRENDS OF COMMON RESPIRATORY VIRUSES



Temperate Zones	Tropical Zones
Increases in winter months	Circulates year-round
• Driven by mutations and viral preference for cold, dry weather conditions	• Causes outbreaks more irregularly
• Reason why seasonal epidemics occur mainly during winter	• Fall-winter and rainy season increase has been observed

Note (Malaysia):
No distinct seasonal difference, except for a dramatic increase in the number of cases throughout the year since 2016.

CHARACTERISTICS OF INFLUENZA VIRUSES

Characteristic	Influenza A	Influenza B	Influenza C	Influenza D
Current circulating subtypes / lineages	A(H1N1) and A(H3N2)	B/Yamagata or B/Victoria lineage	Detected less frequently and usually causes mild infections.Not of public health importance	Primarily affects cattle.Not known to infect or cause illness in humans
Capable of infecting humans	✓	✓	✓	
Capable of infecting swine, birds, horses, and other mammals	✓	✗	✗	✓
Cause non-seasonal mild illness in humans	✗	✗	✓	
Responsible for seasonal outbreaks	✓	✓	✗	
Virulent and spread quickly	✓	✗	✗	
Capable of point mutation to avoid host antibodies (antigenic drift → epidemic)	✓	✓	✗	✗
Capable of genetic recombination (antigenic shift → source of pandemics)	✓	✗	✗	✗

CASE DEFINITION

Parameter	Influenza-like Illness (ILI)	Severe Acute Respiratory Infection (SARI)
Clinical Setting	Outpatient / Primary Care	Inpatient / Hospital Setting
Type of Illness	Mild to moderate, managed as outpatient	Moderate to severe, requires hospitalisation
Definition	Acute respiratory infection with:• Measured fever of ≥ 38°C;• and cough;• with onset within the last ten (10) days.	Acute respiratory infection with:• History of fever or measured fever of ≥ 38°C;• and cough;• with onset within the last ten (10) days;• and requires hospitalisation.
Primary Purpose	Early detection and management of influenza in ambulatory settings	Identification of severe cases for inpatient management and surveillance
Proxy Diagnosis for Surveillance	URTI (Upper Respiratory Tract Infection)	Pneumonia, Bronchitis, or Bronchiolitis
Notes	Recommended for mild cases presenting to primary care or outpatient departments.	Recommended for severe or complicated cases requiring inpatient management.

ALGORITHM FOR MANAGEMENT OF INFLUENZA-LIKE ILLNESS (ILI) IN ADULT / PAEDIATRICS PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT OR OUTPATIENT SETTING

Step 1: Case Identification
Patient presents with ILI symptoms
(e.g., fever ≥38°C, cough, sore throat, myalgia, malaise)

Step 2: Clinical Assessment
Assess by healthcare provider:
Does the patient have any signs or symptoms of severe illness?
(Refer to Clinical Assessment Tool**)

Step 3: Determine Severity

Severe Illness
For admission and start Osetalmivir
Refer to ICU if patient meets high-risk or severe criteria.

No Severe Illness
Proceed to assess for co-morbidity or risk factors associated with increased risk of influenza complications.

If Co-Morbidities / Risk Factors Are Present

- Rule out other possible differential diagnoses such as Dengue or COVID-19.
- If the patient is clinically stable and there are no logistic constraints, refer to the nearest primary care facility for confirmatory swab testing and treatment.
- If the patient faces logistic or access issues, consider performing Point-of-Care Testing (POCT) at SASMEC:
  - If POCT is positive, initiate Oseltamivir 75 mg twice daily for 5 days.
  - If POCT is negative but clinical suspicion remains high, obtain a nasopharyngeal/oropharyngeal (NP/OP) sample for a Respiratory PCR Panel and start Oseltamivir empirically while awaiting results.
- Provide the Home Assessment Tool for self-monitoring.
- Give Patient Home Care Advice, including:
  - Adequate hydration
  - Home isolation and infection-control precautions
  - Recognition of warning signs that require immediate reassessment
- Clinical benefit is greatest when Oseltamivir is initiated within 48 hours of symptom onset; however, treatment may still be considered beyond this period in high-risk or severely ill patients.

If No Co-Morbidities / Risk Factors Are Present:

- Rule out other possible differential diagnoses such as Dengue or COVID-19.
- Provide symptomatic treatment (e.g. antipyretics, adequate hydration, rest).
- Manage as home care using the Home Assessment Tool for daily monitoring.
- Give Patient Home Care Advice, including:
  - Warning signs that require reassessment (e.g. shortness of breath, persistent fever, confusion)
  - Infection-control measures and home isolation
  - Hydration and nutritional advice

CLINICAL ASSESSMENT TOOL FOR SEVERE INFLUENZA-LIKE ILLNESS (ILI)

Clinical Parameter	Adults	Paediatrics
1. Respiratory Distress / Impairment	• Respiratory rate >24/min • Inability to complete a sentence in one breath • Use of accessory muscles or supraclavicular retraction • Oxygen saturation ≤95% on pulse oximetry (on air or oxygen) • Respiratory exhaustion or chest pain • Decreased effort tolerance since onset of ILI	• Lower chest wall indrawing, sternal recession, grunting, or noisy breathing when calm • Respiratory rate ≥50/min if <1 year; ≥40/min if ≥1 year (measured over ≥30 s) • Oxygen saturation ≤95% on pulse oximetry (on air or oxygen) • Apnoeic episode ≥20 s or respiratory exhaustion
2. Evidence of Clinical Dehydration / Shock	• Systolic BP <90 mmHg and/or diastolic BP <60 mmHg• Capillary refill time >2 s, reduced skin turgor	• Sternal capillary refill time >2 s• Reduced skin turgor, sunken eyes or fontanelle
3. Altered Conscious Level	• New confusion, striking agitation, or seizures	• Striking agitation, irritability, seizures, or floppy infant
4. Other Clinical Concerns	• Rapidly progressive illness (e.g. high fever >3 days, atypical course)• Severe or persistent vomiting	• Rapidly progressive illness• Severe or persistent vomiting
5. Admission Criteria	Any of the above findings should prompt referral or admission to the nearest hospital for monitoring and further management.	Same — any of the above features warrant urgent assessment and possible admission.

References:

1.KKM (2023). Garis Panduan Pengendalian Influenza Di Klinik Kesihatan.

SEVERITY OF ILLNESS (ADULTS)

Non-severe influenza

- Symptoms including a sudden onset of cough, headache, muscle and joint pain, severe malaise, sore throat and rhinorrhea
- With or without fever
- In absence of any criteria of severe disease
- Resolved with symptomatic treatment within 1 week

Severe influenza

- Sepsis or septic shock
- Severe pneumonia
- Acute respiratory distress syndrome (ARDS)
- Extrapulmonary complications (myocarditis, encephalitis)
- Multi-organ failure
- Exacerbation of chronic medical conditions

*Require hospitalization with provision of oxygen and/or mechanical ventilation (invasive or non-invasive) and/or vasopressor therapy.

*Patients with novel influenza A, associated with high mortality rates, or those at unknown risk for severe disease, should also be considered "severe influenza" patients even if they do not meet the above criteria.

References:

1. Uyeki, Timothy M et al. (CID 2019). Clinical Practice Guidelines by the Infectious Diseases Society of America: 2018 Update on Diagnosis, Treatment, Chemoprophylaxis, and Institutional Outbreak Management of Seasonal Influenza.
2. WHO (2024). Clinical practice guidelines for influenza.

SEVERITY OF ILLNESS (PAEDIATRICS)

Non-severe influenza

- Nonspecific febrile illness
- With or without upper respiratory symptoms, bronchiolitis, croup, or a pertussis-like illness
- Headache
- Myalgia, arthralgia
- Lethargy, malaise
- Gastrointestinal symptoms, including vomiting, diarrhea, and abdominal pain
- Less common : Ocular manifestations such as conjunctivitis

Severe influenza

- Pneumonia
- Secondary bacterial infection such as otitis media, pneumonia, sinusitis, and bloodstream infections (*Staphylococcus aureus and Streptococcus pneumoniae*)
- Respiratory failure
- Neurological complications such as influenza-associated encephalopathy/ encephalitis (IAE), acute necrotizing encephalopathy (ANE), aseptic meningitis, Guillain-Barre Syndrome and cerebellar ataxia
- Myositis and rhabdomyolysis
- Myocarditis and pericarditis
- Reye syndrome (associated with aspirin use)

References:

1. Committee on Infectious Diseases (Pediatrics, 2025). Recommendations for Prevention and Control of Influenza in Children, 2025–2026: Technical Report.
2. The Royal Children's Hospital Melbourne (Sept 2019). Clinical Practice Guidelines: Influenza.

HIGH RISK GROUPS TO DEVELOP COMPLICATIONS OF INFLUENZA

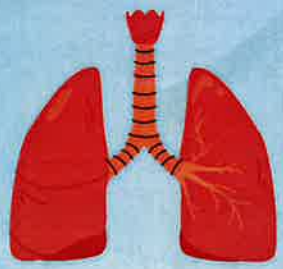
- Children aged 5 years and below
- Elderly patients aged 65 years old and above
- Pregnant women (including up to 2 weeks post-partum)
- Malnourished or morbid obesity (BMI> 40)
- Patients with comorbidities, including diabetes mellitus, chronic lung diseases, heart diseases, chronic kidney diseases, chronic liver diseases, neurological diseases (e.g., cerebral palsy), haemotological diseases (ie. thalassaemia)
- Children receiving treatment with aspirin or salicylate-containing therapies
- Immunocompromised patients, including primary immunodeficiency, malignancy, retroviral disease and patients on immunosuppressive drugs

References:

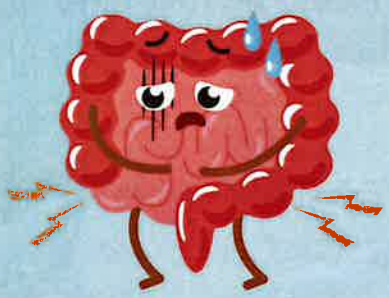
1. Uyeki, Timothy M et al. (CID 2019). Clinical Practice Guidelines by the Infectious Diseases Society of America: 2018 Update on Diagnosis, Treatment, Chemoprophylaxis, and Institutional Outbreak Management of Seasonal Influenza.
2. KKM (2023). Garis Panduan Pengendalian Influenza Di Klinik Kesihatan.
3. WHO (2024). Clinical practice guidelines for influenza.

CLINICAL MANIFESTATION

- Headache
- Congestion/rhinorrhea
- Sore throat/hoarseness
- Altered mental status (encephalopathy, encephalitis)



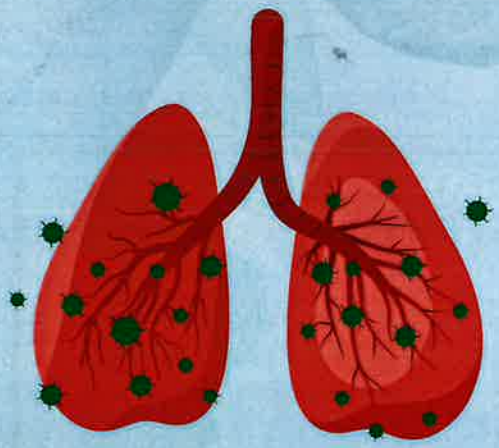
- Nonproductive cough
- Shortness of breath (pneumonia, ARDS)
- Chest pain (myocarditis, pericarditis)



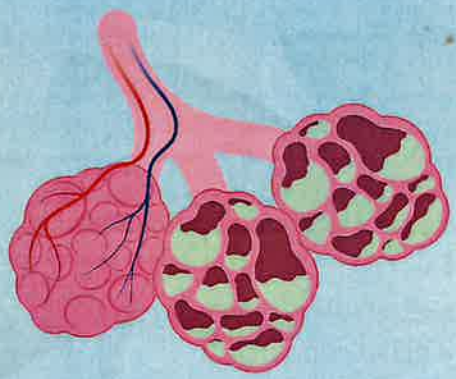
- Abdominal pain
- Vomiting, diarrhea

- Myalgia (rhabdo, myositis)
- Weakness
- Fever, chills
- Malaise/fatigue

PULMONARY COMPLICATIONS



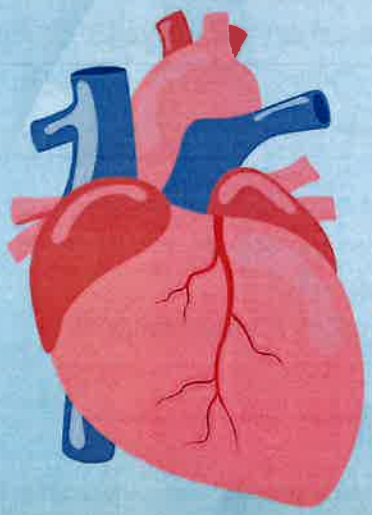
- **Severe pneumonia**
  - Most common complication
  - secondary bacterial pneumonia *(S. aureus, S. pneumoniae)*, mixed bacterial & viral pneumonia or primary influenza pneumonia
  - bacterial pneumonia 0.5% young individuals, 2.5% in elderly & immunocompromised
  - typically occurs within a few days of influenza onset



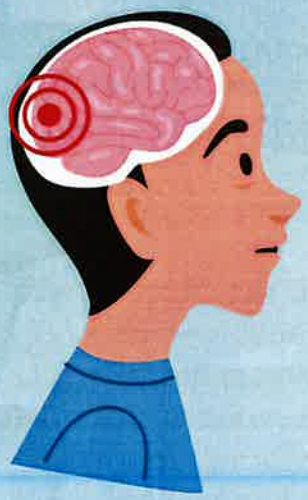
- **ARDS**
  - acute phase: cyanosis, hypoxaemia, pulmonary oedema & increasing respiratory failure
  - => multiorgan failure & high mortality rate (up to 60%)
  - caused by damage to the epithelial–endothelial barrier of the pulmonary alveolus -> flooding of the alveolar lumen with proteinaceous oedema fluid (fibrin, erythrocytes & inflammatory cells) -> reduces alveolar gas exchange
  - multifactorial : viral virulence factors, cytokine production & pathological changes

Reference: *Memoli et al, CID 2014. Metersky et al, IJID 2012. Chertow et al, JAMA 2013. R Short et al, Lancet ID 2014.*

EXTRAPULMONARY COMPLICATIONS



- **Cardiac / VTE**
  - Cardiac injury (trop leak) in 6% (COVID 7–31%)
  - Acute heart failure 6% (COVID ?)
  - Myocarditis in 0.1% (COVID <1%)
  - VTE risk in hospitalized ~1.5% (same or lower than COVID)



- **Neurologic (rare)**
  - Encephalitis, GBS, stroke (stroke in COVID 2%, others only case reports)

Reference: *Chow et al, Annals 2020. Sellers et al, Influenza Other Resp Viruses 2017. Dalager-Pederson et al, CID 2020.*

FREQUENCY OF COMMON INFLUENZA SYMPTOMS BY POPULATION GROUP

Symptom	All Adults	Elderly	Immunocompromised
Fever	75%	35% ● (often afebrile!)	35–70%
Cough	90%	70%	50–90%

The diagnosis of influenza based on symptoms alone can be challenging, as clinical presentation varies significantly between different patient groups.

- **Typical presentation:**
  - Abrupt onset of fever and cough remains a key feature and is generally sensitive for influenza in otherwise healthy adults.

- **Atypical presentations:**
  - Certain populations - particularly the elderly and immunocompromised - may present without fever or with less prominent respiratory symptoms.
    - Fever may be absent in up to two-thirds of elderly patients.
    - Cough and respiratory symptoms may be less specific or delayed.

- **Implication for practice:**
  - In both outpatient and inpatient settings, reliance solely on clinical features may miss a proportion of influenza cases. Clinicians should maintain a high index of suspicion during influenza season and consider confirmatory testing (e.g. RT-PCR) where available.

- **Key takeaway for clinicians:**
    - Not all patients with influenza present with "classic" fever and cough.
    - Elderly and immunocompromised patients often have subtle or atypical symptoms.
    - Diagnostic testing should be guided by clinical judgement, epidemiologic context, and patient risk factors.

Reference: *C Kumar et al., Clin Infect Dis. 2018;67(9). Call et al., JAMA. 2005;293:987. Apewokin et al., Open Forum Infect Dis. 2014. Dugas et al., Am J Emerg Med. 2015;33:770. Miller et al., J Infect Dis. 2015;212:1604.*

NOTES ON VACCINATION

But he got the vaccine!

- Vaccine effectiveness usually 40–50%, based on predominant subtype
  - Influenza B 54%
  - Seasonal H1N1 67%
  - Pandemic H1N1 61%
  - H3N2 33% (good match), 23% (poor match)

CDC/IDSA: A history of vaccination should not be used in decision-making about diagnostics or empiric treatment.

Note on Vaccination:
Although influenza vaccine effectiveness varies by subtype (typically 40–50%), vaccination remains the most effective preventive measure against influenza-related complications, hospitalisation, and mortality.

A prior history of vaccination should not exclude influenza as a possible diagnosis or delay empiric antiviral treatment in symptomatic patients.

In summary: vaccination reduces risk — not eliminates it. Continue to advocate annual vaccination for all eligible patients and healthcare workers.

References:

- CDC, Seasonal Influenza Vaccine Effectiveness, 2005–2017.
- Belongia et al., Lancet ID 2016; 16:942.
- Uyeki et al., Clin Infect Dis 2018.

PRIMARY INFLUENZA VS. BACTERIAL SUPERINFECTION

Feature	Primary Influenza	Bacterial Superinfection
Frequency	~40% of those hospitalized with influenza	<3% of all cases; 10–20% of inpatients; 20–30% of critically ill or deaths (more common than in COVID)
Severity	Can be a severe illness	Often severe; associated with higher mortality
Common Pathogens	Influenza virus (A or B)	Streptococcus pneumoniae, Staphylococcus aureus, Group A Streptococcus
Typical Course	Usually a single-phase viral illness	May occur after initial improvement or without a distinct recovery phase
Clinical Presentation	Similar to bacterial pneumonia (fever, cough, dyspnea)	Clinically similar; may be indistinguishable from primary viral infection
Key Point	Clinical presentation and investigations (symptoms, chest X-ray, labs) may not reliably differentiate viral from bacterial causes	Same as influenza — differentiation often requires microbiological confirmation

📌 **Note for Clinicians:**

- Always maintain suspicion for bacterial superinfection in influenza patients with worsening symptoms, new fever, or leukocytosis after initial improvement.
- Empiric antibiotics may be warranted if bacterial infection cannot be ruled out, especially in critically ill or high-risk patients.

Reference: *CKain et al., Clin Infect Dis 2012; Rice et al., Crit Care Med 2012; MMWR 2009; NEJM 2009; Morens et al., J Infect Dis2008; MacIntyre et al., BMC Infect Dis 2018.*

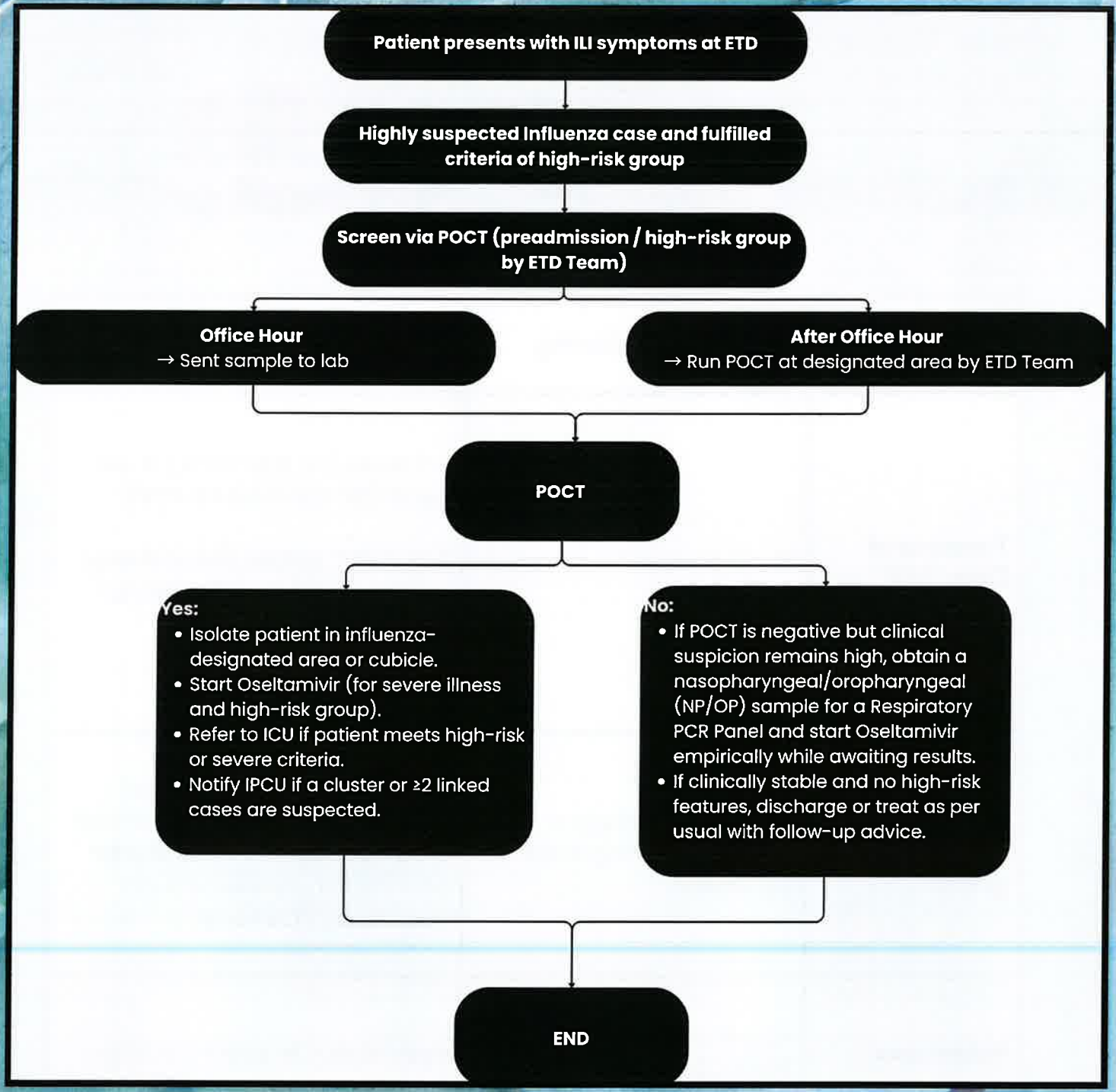
DIAGNOSTIC TESTING

Parameter	Rapid Antigen Testing	Molecular Assays (PCR-based)
Description / Setting	Point-of-care test (POCT) used in clinics and Emergency Departments (ERs). Provides results within minutes.	Includes standard and POCT molecular platforms that detect influenza RNA directly.
Sensitivity / Specificity	Sensitivity: ~50–70% Specificity: >90%	Sensitivity & Specificity: ~95%
Clinical Use	• Useful for rapid bedside screening. • Appropriate when PCR is not immediately available.	• Test of choice for influenza confirmation. • High accuracy and rapid turnaround in newer POCT systems. • Used for confirmation and outbreak investigation (e.g. RPP, POCT PCR, or Reference Lab RT-PCR). • Can also be used to identify or rule out respiratory co-infections (e.g. SARS-CoV-2, RSV, adenovirus, parainfluenza).
Limitations	• Cannot rule out influenza during flu season (false negatives possible).• Should be interpreted in clinical context.	• Higher cost and limited availability in some settings.• Requires equipment and trained personnel.

DIAGNOSTIC TESTING

Parameter	Rapid Antigen Testing	Molecular Assays (PCR-based)
Turnaround Time (TAT)	15–30 minutes	1–2 hours (for POCT PCR); 6–24 hours (for standard RT-PCR). At SASMEC @ IIUM, due to limited resources, the current average TAT for PCR results is approximately 5–7 days.
Recommended Use at SASMEC @ IIUM	Use for initial triage or when molecular testing is not accessible.	Use for confirmation if initial screening is negative but clinical suspicion remains high, and for co-infection assessment via Respiratory PCR Panel.
References	Harper et al., Clin Infect Dis 2009; CDC, 2011.	Uyeki et al., Clin Infect Dis 2018.

POCT FLOWCHART



Note for Testing Procedure:

- During office hours: POCT tests may be sent to the laboratory.
- After office hours: POCT tests are performed only for patients who meet admission criteria and/or require urgent testing, by the ETD team.
- The ETD team is responsible only for testing their own patients. No tests are conducted for other wards (even after office hours).
- Only trained staff are authorised to perform POCT.

POCT

PREPARATION

•Fill up request form (SASMEC-PATH-F023, Virology & Immunology Request Form)
•Billing
•Sterile (dry) swab container
•Labelling of the swab container
•Biohazard plastic

SPECIMEN COLLECTION

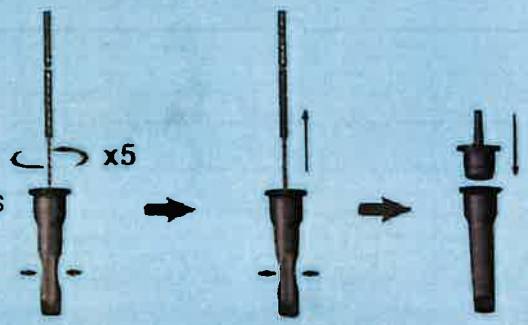
- Identify nasopharynx
  - The nasopharynx is located posterior to the nasal cavity, behind the soft palate.
- Insert the swab
  - Tilt head slightly upward, gently insert the swab horizontally along the nasal floor (not upward).
  - Advance until resistance is felt (usually 6–8 cm in adults). Do not force the swab.
- Collect the sample
  - Rotate the swab gently for 10–15 seconds to absorb secretions.
  - Withdraw the swab slowly while rotating.
- Place the sample in the swab container

POCT

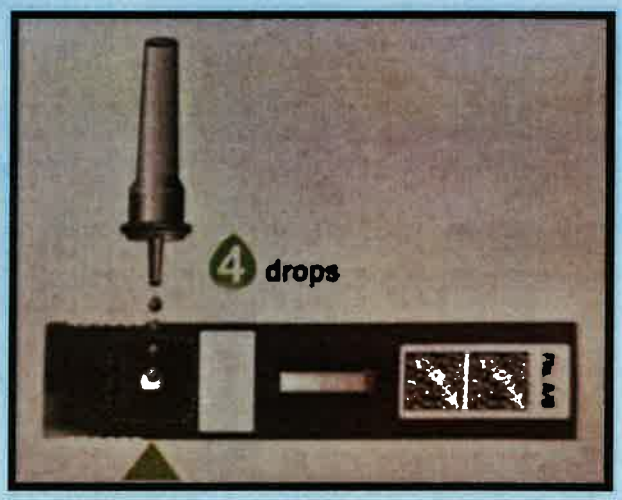
PERFORM THE TEST

[Nasal/Nasopharyngeal Swab]

- Place the swab specimen into the extraction buffer tube. While squeezing the buffer tube, stir the swab more than 5 times.
- Remove the swab while squeezing the sides of the tube to extract the liquid from the swab.
- Press the nozzle cap tightly onto the tube.

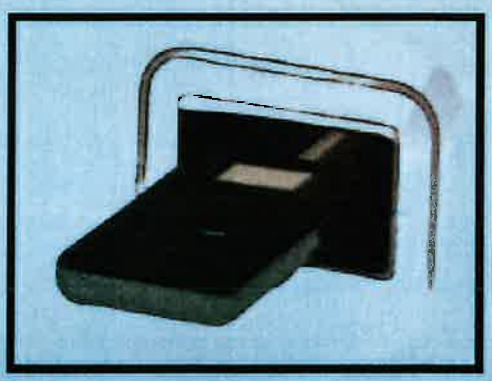


- Take the test device out of the foil pouch and place it on a flat and dry surface. Write specimen information on the label of the test device.
- Apply 4 drops of mixed specimen to the specimen well in the test device.



- Incubate the test device for 10 minutes outside of the analyzer. Incubation must not be more than 20 minutes.

- Prepare a STANDARD F Analyzer and select the 'Read Only' mode according to the analyzer's manual. Insert the test device to the test slot of the analyzer.
- When inserting the test device to the analyzer, the analyzer will automatically scan and display the test results.



INTERPRETATION OF TEST RESULTS

Result	COI (Cutoff Index) Value	Interpretation
Positive	Influenza A: COI ≥ 1.0 Influenza B: COI < 1.0	Positive for Influenza A
Positive	Influenza A: COI < 1.0 Influenza B: COI ≥ 1.0	Positive for Influenza B
Positive	Influenza A: COI ≥ 1.0 Influenza B: COI ≥ 1.0	Positive for Influenza A/B
Negative	Influenza A: COI < 1.0 Influenza B: COI < 1.0	Negative for Influenza A/B
Invalid	COI value is not displayed	Retest should be performed

Note:
The test result of a sample is given either as Positive (+/Pos) or Negative (-/Neg) with a COI (cutoff index) value.
The COI is a numerical representation of the measured fluorescence signal.

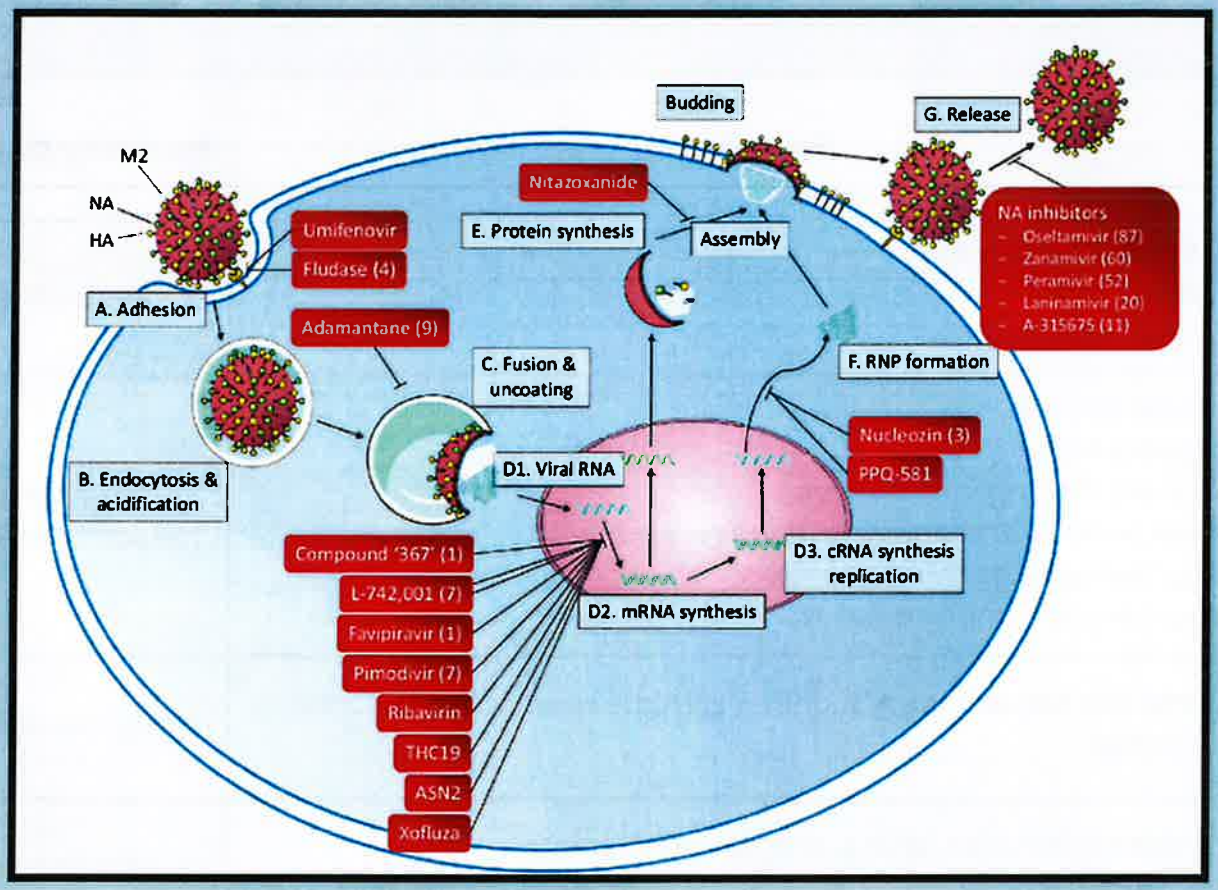
RESULT DOCUMENTATION & RECORD

- Print the test result
- Attach the result to the request form
- Document test in the logbook
  - Patient's name/ RN
  - Date/ time of test
  - Control result (valid/ invalid)
  - Test result, e.g.
    - Flu A Pos, COI: 5.24
    - Flu B COI: 0
  - Name & stamp of staff who run the test
- Send the request form + used test cassette in biohazard plastic to the lab

PERSON IN CHARGE

Procedure	Person in-charge
•Fill up request form •Billing •Sample collection	Requestor
•Sample processing •Labelling of test cassette •Cassette loading into analyzer •Result printing and attach it to the request form •Relay the result to the requester •Document test in the logbook	Competent personnel at ETD
•Submit the request form, together with the used cassette to the microb lab	MHA/ nurse ETD
•Sample registration, billing, and record keeping •QC/ calibration/ troubleshooting	Microb lab

TREATMENT OF INFLUENZA



Drug Class	Examples
M2 Ion Channel Inhibitors	Amantadine, Rimantadine
Neuraminidase Inhibitors	Laninamivir, Oseltamivir, Peramivir, Zanamivir
Polymerase Inhibitors	Baloxavir, Ribavirin

Reference: Hayden et al. Clin Infect Dis. 2022 Feb 11; 74(3):532–540; Next-Generation Sequencing: An Eye-Opener for the Surveillance of Antiviral Resistance in Influenza, December 2019, Trends in Biotechnology 38(4)

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TREATMENT OF INFLUENZA

- In Malaysia, only Oseltamivir, a neuraminidase inhibitor is available.

Duration of treatment

- 5 days in non-severe and severe influenza.
- Longer duration can be considered for patients with a documented or suspected immunocompromising condition or patients requiring hospitalization for severe lower respiratory tract disease (severe pneumonia or ARDS), as influenza viral replication is often protracted.

Symptomatic Treatment

- fluids, bed rest, paracetamol for fever and analgesia

Adjunct therapy

No corticosteroids
No immunoglobulin

References:

1. Uyeki, Timothy M et al. (CID 2019). Clinical Practice Guidelines by the Infectious Diseases Society of America: 2018 Update on Diagnosis, Treatment, Chemoprophylaxis, and Institutional Outbreak Management of Seasonal Influenza.
2. WHO (2024). Clinical practice guidelines for influenza.

INDICATION FOR ANTIVIRAL (ADULTS)

In resource-limited setting (limited antivirals), treatment with Oseltamivir are indicated in :

- Hospitalised patients with confirmed/suspected severe influenza, regardless of risk factors and illness duration prior to hospitalization.
- Hospitalised patients with confirmed/suspected non-severe influenza but are at high risk of complications from influenza (refer page 11 for high risk criteria).
- Pregnant women and those within 2 weeks postpartum with confirmed/suspected influenza.

In resource-rich setting (no limited antivirals), treatment with Oseltamivir can also be considered in :

- Hospitalised patients who are not at high risk of influenza complications.
- Outpatients with non-severe influenza but are at high risk of complications from influenza (refer page 11 for high risk criteria).
- Outpatients with illness onset ≤2 days before presentation.
- Symptomatic outpatients who are household contacts of persons who are at high risk of developing complications from influenza, particularly those who are severely immunocompromised.
- Symptomatic healthcare providers who care for patients who are at high risk of developing complications from influenza, particularly those who are severely immunocompromised.

References:

1. Uyeki, Timothy M et al. (CID 2019). Clinical Practice Guidelines by the Infectious Diseases Society of America: 2018 Update on Diagnosis, Treatment, Chemoprophylaxis, and Institutional Outbreak Management of Seasonal Influenza.
2. WHO (2024). Clinical practice guidelines for influenza.

INDICATION FOR ANTIVIRAL (PAEDIATRICS)

Applicable Subpopulation	Who Would Receive Antiviral Medications	Time Since Symptoms or Exposure	Medication Plan
Hospitalized children	Child with symptoms and known or suspected Influenza and clinically stable	No time limit on starting, although treatment should ideally begin within 48 hours after symptom onset	**Consider treatment with Oseltamivir (Recommend treatment if under 5 years old)**
Children with severe or progressive or complicated illness	Child with symptoms and known or suspected Influenza	No time limit on starting	**Recommend treatment with Oseltamivir**
Children at higher risk for complications (refer page 11 high risk criteria)	Child with symptoms and known or suspected Influenza	No time limit on starting	**Recommend treatment with Oseltamivir**

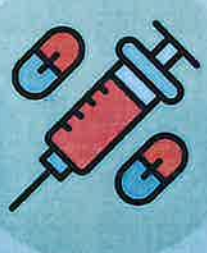
Reference: Adapted from "Committee on Infectious Diseases; Recommendations for Prevention and Control of Influenza in Children, 2025–2026: Technical Report. Pediatrics 2025; e2025073622. 10.1542/peds.2025-073622"

DOSAGE OF OSELTAMIVIR

Population	Dose & Frequency	Mode of administration
Adult	75 mg twice daily	orally or by feeding tube
Children ≥ 12 months	≤15 kg : 30 mg twice daily 16-23 kg : 45 mg twice daily 24-40 kg : 60 mg twice daily >40 kg : 75 mg twice daily	orally or by feeding tube
Infants 9-11 months	3.5 mg/kg per dose, twice daily	orally or by feeding tube
Term infants 0–8 months	3 mg/kg per dose, twice daily	orally or by feeding tube
Preterm infants	<38 weeks' PMA : 1 mg/kg twice daily 38–40 weeks' PMA : 1.5 mg/kg twice daily >40 weeks' PMA : 3 mg/kg twice daily	orally or by feeding tube

References:

1. Uyeki, Timothy M et al. (CID 2019). Clinical Practice Guidelines by the Infectious Diseases Society of America: 2018 Update on Diagnosis, Treatment, Chemoprophylaxis, and Institutional Outbreak Management of Seasonal Influenza.
2. Committee on Infectious Diseases. (Pediatrics 2025). Recommendations for Prevention and Control of Influenza in Children, 2025–2026: Technical Report.



SPECIAL POPULATION – PREGNANCY

Clinical vigilance:

- During influenza season, consider influenza, RSV, and SARS-CoV-2 as differential diagnoses in pregnant patients presenting with respiratory illness.

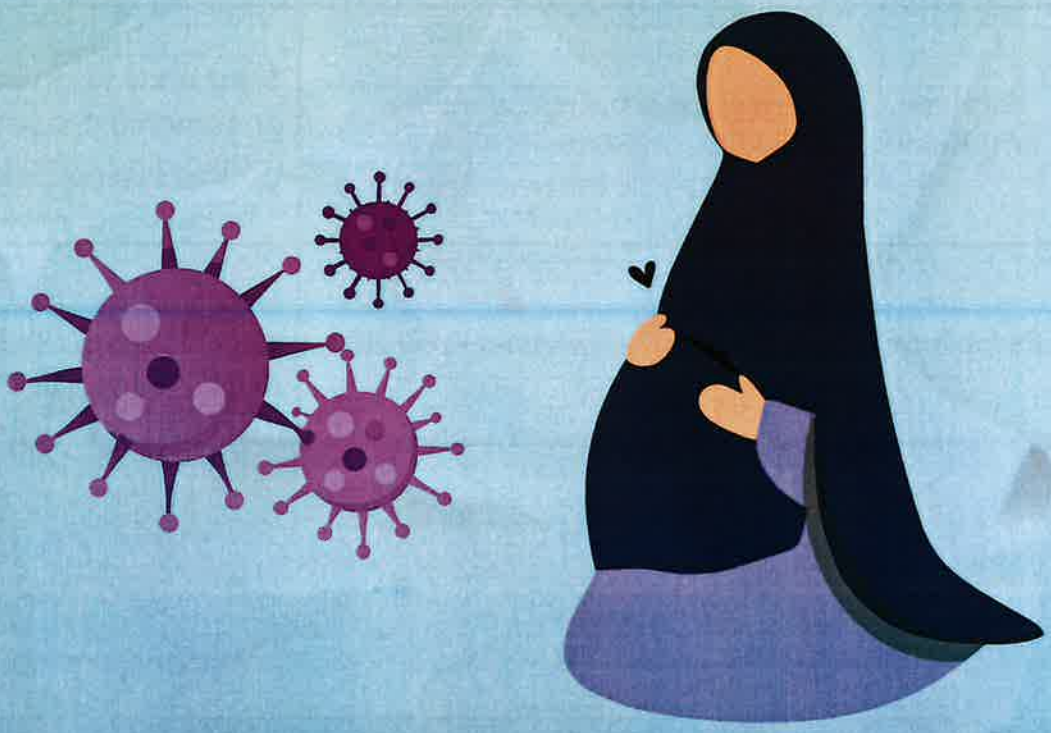
Treatment:

- Start empiric antiviral therapy (oseltamivir) as soon as possible, ideally within 48 hours of symptom onset.
- Do not delay while awaiting test results.
- Vaccination status should not affect the decision to treat.

Reference:

Replaces Committee Statement Number 7, February 2024

This Practice Advisory was developed by the American College of Obstetricians and Gynecologists' Immunization, Infectious Disease, and Public Health Preparedness Expert Work Group in collaboration with Neil S. Silverman, MD, FACOG, Flor M. Munoz, MD, Rhoda Sperling, MD, FACOG, and Linda Eckert, MD, FACOG.



WHEN TO TREAT FOR BACTERIAL SUPERINFECTION?

	Influenza IDSA Guidelines	CAP IDSA Guidelines
Indication for Empiric Antibiotics	Start empirically in suspected or confirmed influenza if: • Severe disease• Deterioration after initial improvement (especially if on antivirals) • Failure to improve after 3–5 days of antiviral therapy	Treat all patients with confirmed influenza and radiographic pneumonia using community-acquired pneumonia (CAP) antibiotic regimen
Rationale	Focuses on secondary bacterial pneumonia and delayed response despite antivirals	1. Bacterial superinfection is common 2. Procalcitonin (PCT) poorly distinguishes viral vs bacterial (≥0.1 only ~80% sensitive) 3. Poor outcomes if antibiotics are withheld in severe CAP
Clinical Emphasis	Reassess if patient worsens despite antivirals	Treat early when influenza + pneumonia coexist; avoid withholding antibiotics
Reference	*Uyeki et al., Clin Infect Dis 2018*	*Metlay et al., Am J Respir Crit Care Med 2019; Self et al., Clin Infect Dis 2018*

INFECTION CONTROL MEASURES

GENERAL PRINCIPLES

The key infection prevention measures include early identification, isolation, droplet precautions, hand hygiene, and vaccination.

All staff and patients should adhere to standard precautions at all times, with additional measures during influenza season or outbreaks.

PATIENT-FOCUSED MEASURES

a. Early Detection and Isolation

- Screen all patients with fever and ILI symptoms (cough, sore throat, runny nose) at triage.
- Place suspected or confirmed influenza cases in single rooms or cohort in designated cubicles.
- Ensure patients wear surgical masks when outside isolation rooms or during transport.

b. Transmission-Based Precautions

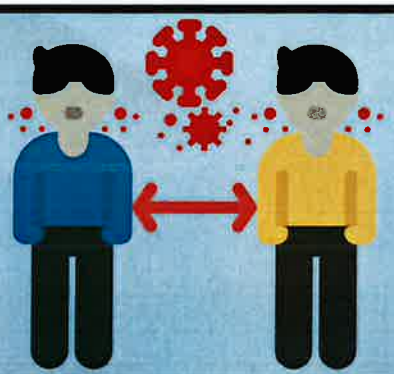
- Implement droplet precautions for all suspected or confirmed cases.
- Maintain at least 1-metre distance between patients where single rooms are not available.

c. Environmental and Equipment Hygiene

- Frequently disinfect high-touch surfaces (bed rails, doorknobs, call bells, etc.) with approved hospital-grade disinfectants.
- Use dedicated medical equipment (e.g., stethoscope, thermometer) for influenza patients when possible.

d. Patient Education

- Educate patients, caregivers and relatives on cough etiquette, hand hygiene, and wearing surgical masks.



INFECTION CONTROL MEASURES

STAFF-FOCUSED MEASURES

a. Personal Protective Equipment (PPE)

- Staff should wear surgical mask and perform hand hygiene before and after all patient contact.
- If there is risk of potential splash, staff should also wear eye protection, gloves and gown.
- N95 mask, eye protection and gown should be used for aerosol-generating procedures (AGP e.g., intubation, suctioning, bronchoscopy).

b. Work Restriction and Sick Leave

- Healthcare workers with influenza-like illness (ILI) should not report to work until at least 24 hours after fever subsides without antipyretics.
- Supervisors should ensure prompt reporting of staff illness and support temporary reassignment to non-patient care duties if needed.

c. Staff Education and Awareness

- Reinforce compliance with droplet precautions, hand hygiene, and respiratory etiquette through CME/CNE and posters.

d. Vaccination

- Annual influenza vaccination is strongly recommended for all healthcare workers, especially those in high-risk areas (Emergency Department, ICU, Paediatrics, Medical Wards).

References:

1. CDC (2025). *Infection Prevention and Control Strategies for Seasonal Influenza in Healthcare Settings.*
2. KKM (2019). *Policies and Procedures on Infection Prevention and Control.*

FLOWCHART OUTBREAK MANAGEMENT

Confirmed Influenza Case Identified in SASMEC @ IIUM via Point of Care Testing/ Respiratory PCR Panel (patient or staff)

↓

Monitoring by ward supervisor (staff) / clinician (patient)

↓

Suspected Outbreak
Defined as >2 confirmed cases with epidemiological link (same ward/unit or source) within 72 hours

↓

Case Surveillance and Monitoring

Ward supervisor/link nurse to:
Maintain and update the case list
Monitor for trends/clusters in real time

↓

Inpatients
Report to IPCU

Staff / Non Clinical area
Report to PHU

↓

Outbreak Assessment by IPCU
IPCU to confirm if criteria for outbreak are met

↓

Outbreak Declaration
Outbreak Management Team (OMT) activated

↓

Control Measures Implementation

↓

Communication
Alert hospital staff regarding the outbreak.
Provide education on symptoms and prevention.

↓

Workforce Management
Ward supervisor to monitor impact on staffing/workload

↓

Outbreak Closure

OUTBREAK MANAGEMENT

Stakeholder / Unit	Key Actions
Emergency / Clinical Departments (ETD, Wards)	• Screen high-risk symptomatic patients requiring admission. • Isolate confirmed or suspected cases with droplet precautions. • Alert IPCU team. • Ensure Oseltamivir is prescribed for high-risk patients. • Educate patients on hand hygiene and transmission risk.
Infection Prevention & Control Unit (IPCU)	• Monitor case numbers hospital-wide. • Coordinate with PHU for outbreak identification. • Ensure infection control measures are followed and monitored. • Conduct outbreak investigations.
Public Health Unit (PHU)	• Manage influenza-positive staff. • Maintain a database of affected staff for trend monitoring. • Circulate internal memos on preventive measures. • Advise staff to receive the seasonal influenza vaccine. • Coordinate Outbreak Management Team (OMT) if activated.
Human Resource (HR)	• Monitor manpower impact. • Deploy backup staff if a cluster occurs within a single ward/unit.
Pharmacy Department	• Monitor Oseltamivir stock and update ID physicians. • Alert Head of Department (HOD) if usage exceeds threshold. • Ensure timely dispensing of Oseltamivir to eligible high-risk cases.

DISCHARGE CRITERIA

Outpatient

Symptomatic patient with no comorbidities/risk factors

- Provided able to be isolated at home for 7 days after the symptom onset AND until 24 hours after resolution of fever (without the use of antipyretics).

Inpatient

1. Isolation with droplet precautions for 7 days after the symptom onset AND until 24 hours after resolution of fever (without the use of antipyretics)and respiratory symptoms.
2. When fever continues for more than 5 days, isolation and droplet precautions can be discontinued ONLY after there has been no fever for 24 hours (without the use of antipyretics) with resolution of respiratory symptoms.
3. Isolation and droplet precautions can be prolonged in children and immunocompromised patients due to prolonged viral shedding.

References :

1. Baek, Ji Hyeon et al. (KJIM, 2014). Guideline on the prevention and control of seasonal influenza in healthcare setting.
2. CDC (2025). Infection Prevention and Control Strategies for Seasonal Influenza in Healthcare Settings.

HOME SELF CARE INSTRUCTIONS

Patients and caregivers should be advised to:

- Take paracetamol at standard recommended doses for fever or discomfort.
- Understand that reducing fever will not shorten illness but may improve comfort.
- Rest adequately and maintain hydration (water, juice, broth, sports drinks, soup).
- Be alert for warning signs as stated in the Home Assessment Tool.
- Keep home areas well ventilated (e.g. open windows in restrooms and kitchens).
- Follow product labels and consult a healthcare provider if unsure about medication use.

Documentation

- Clinician must record in the electronic medical record (EMR):
  - Patient suitability for home care.
  - Home advice and materials provided.
  - Contact details for follow-up if symptoms worsen.

References:

1.KKM (2023). Garis Panduan Pengendalian Influenza Di Klinik Kesihatan.

INFECTION CONTROL MEASURES AT HOME

Cough Etiquette

- Cover mouth and nose with a tissue when coughing or sneezing.
- Dispose of tissues properly in bins and wash hands with soap and water or alcohol-based hand rub immediately after.

Personal Hygiene

- All household members should wash hands frequently with soap and water or use alcohol-based hand rub.
- Use paper towels or designated cloth towels for each individual.
- Regularly clean frequently touched surfaces and utensils with household detergents.

Avoid Sharing Personal Items

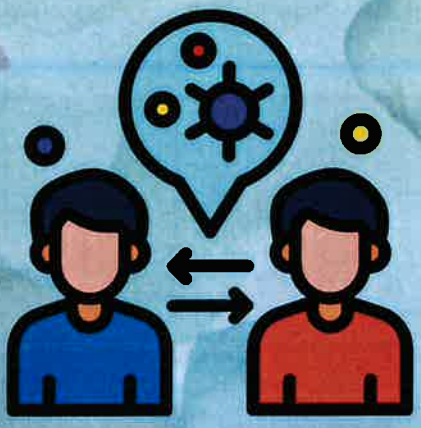
- Do not share utensils, towels, or linens without thorough washing.
- Wash all used items with soap and water before reuse.

Social Distancing

- Patients should remain at home while febrile or symptomatic.
- Preferably isolate in a separate room from other household members.
- Vulnerable contacts (elderly, pregnant, or with comorbidities) should maintain at least 1-meter distance.
- If leaving the house (e.g. for medical care), wear a surgical mask and maintain hand hygiene.

References:

1.KKM (2023). Garis Panduan Pengendalian Influenza Di Klinik Kesihatan.



HOME ASSESSMENT AND MONITORING

Adults

Patients should seek immediate medical care if any of the following moderate or severe warning signs occur:

1. Difficulty breathing, rapid breathing, or bluish lips.
2. Coughing up blood or blood-streaked sputum.
3. Persistent chest pain.
4. Persistent vomiting or diarrhoea.
5. Fever lasting more than 3 days or recurring after initial recovery.
6. Abnormal behaviour, confusion, or seizures.
7. Dizziness when standing or reduced urine output.

Paediatrics (Children)

Parents or caregivers should bring the child to the nearest hospital for further assessment if any of the following symptoms or signs are observed:

1. Lethargy or poor oral intake.
2. Change in mental status or behaviour, e.g. drowsiness, irritability.
3. Signs of dehydration – sunken eyes, dry tongue, absence of tears when crying, or poor urine output.
4. Increasing respiratory rate – fast or noisy breathing, presence of chest recession (chest in-drawing).
5. Fits / seizures.
6. Cyanosis (bluish lips or face).
7. Persistent fever or worsening symptoms.

Note:

Children, elderly patients, pregnant women, and individuals with comorbidities should be monitored closely. Caregivers should use the Home Assessment Tool provided at discharge and contact healthcare providers if warning signs develop.

References:

1. KKM (2023). Garis Panduan Pengendalian Influenza Di Klinik Kesihatan.

GOVERNANCE & SHARIAH COMPLIANCE

- Uphold Shariah principles: ikhtiyar (autonomy), amanah (trust), and rahmah (compassion).
- Ensure informed consent for vaccination and antiviral therapy.

الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
يونيورسيتي إسلام أنتارابغسا ملايسيا
Garden of Knowledge and Virtue

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MEDICAL CENTRE @IIUM

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Asst. Prof. Dr. Wan Nurliyana Wan Ramli (Clinical Coordinator IPCU, ID Physician)
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Asst. Prof. Dr. Mohd Helmie Bin Ismail (Emergency Physician)
Asst. Prof. Dr. Norhidayah Binti Kamarudin (Clinical Microbiologist)
Assoc. Prof. Dr. Nor Zamzila Abdullah (Chemical Pathologist)
Asst. Prof. Dr. Wan Zurainah Sazali (Chemical Pathologist)
Dr. Amira Saidin (Public Health Unit)