Influenza information

September 21, 2009

Topics

- Basic Virology and Pathophysiology of H1N1
- Isolation policies
- Management issues

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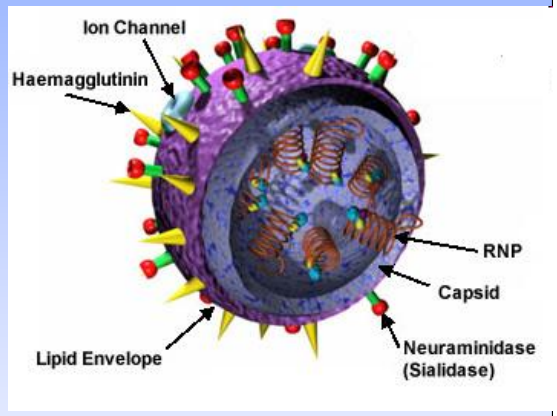
Influenza A Viruses

- Single strand segmented RNA virus
- Sub-typed by surface proteins
  - Haemagglutinin (H)
  - Neuraminidase (N)
- 16 H types, 9 N types
- Humans: 3 H types and 2 N types
  - H1,H2,H3
  - N1,N2



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Antigenic Shift

Pandemics:

- Spanish Flu (1918-20)
- Asian Flu (1957-8)
- Hong Kong flu (1968-9)

Pandemic scares:

- Manchester flu
- Swine flu 1976
- Avian flu 2005-?

Swine Flu (2009 - ?)

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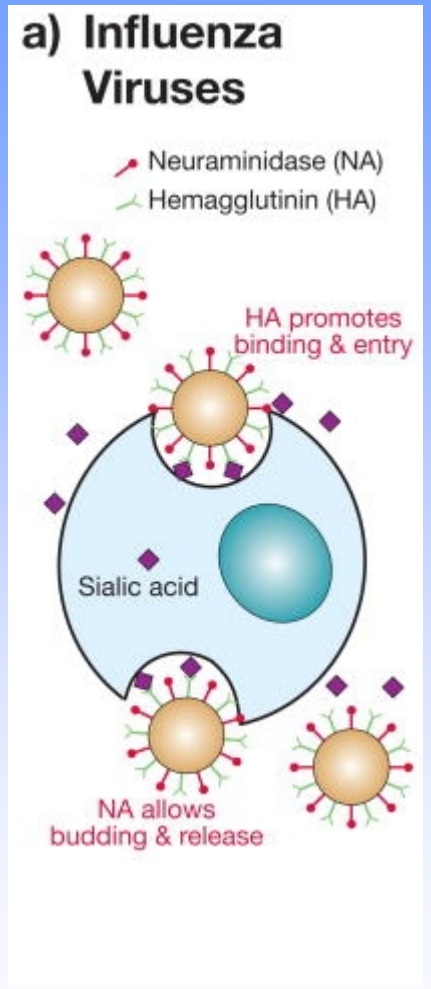
Infection

- Virus enters nose (NA)
- Attaches to respiratory tract;
- Replicates in host;
- Released from cells (HA)
- Degree of severity:
  - Underlying host factors
  - Receptor binding affinity



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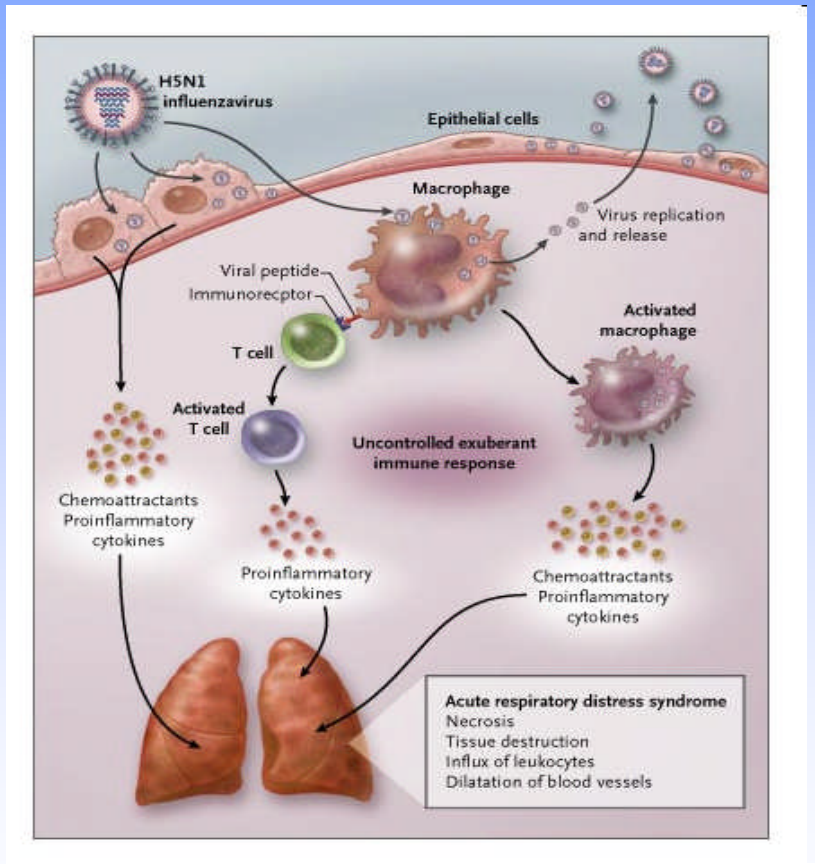
Pathophysiology of influenza

- Most cases mild
- Viral entry
- Replication
- Release
- Cytokine cascade
- Direct viral attack



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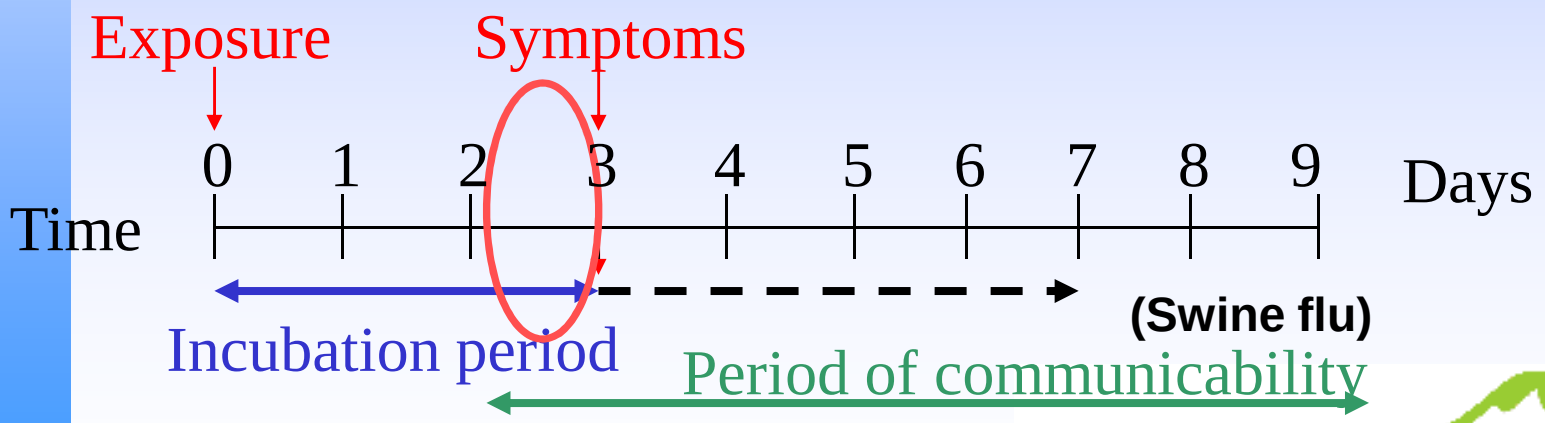
Influenza Transmission

- Incubation period = exposure until symptoms
- Period of communicability = Time a case is infectious to others
- One day before symptom onset to 7 days after
- Prolonged viral shedding possible



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Diagnosis

- Outpatients: testing discouraged
- Inpatients: testing until volume too high
- Samples:
  - NP swab, Baylor wash, TA
  - Nasal swab, BAL
- PCR influenza v. not influenza (BCCDC)
- Further testing

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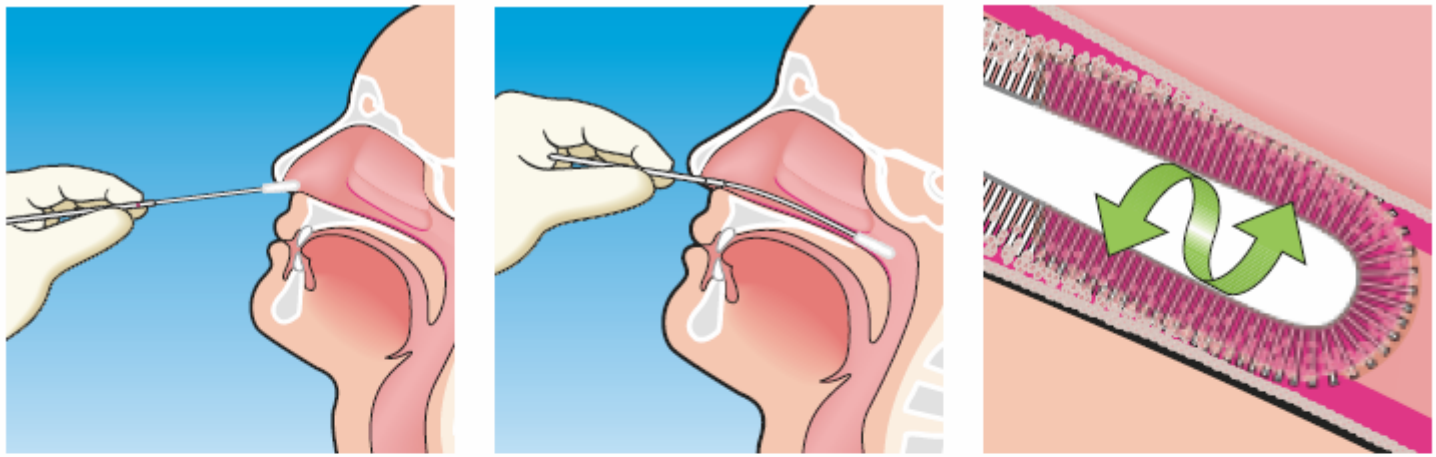
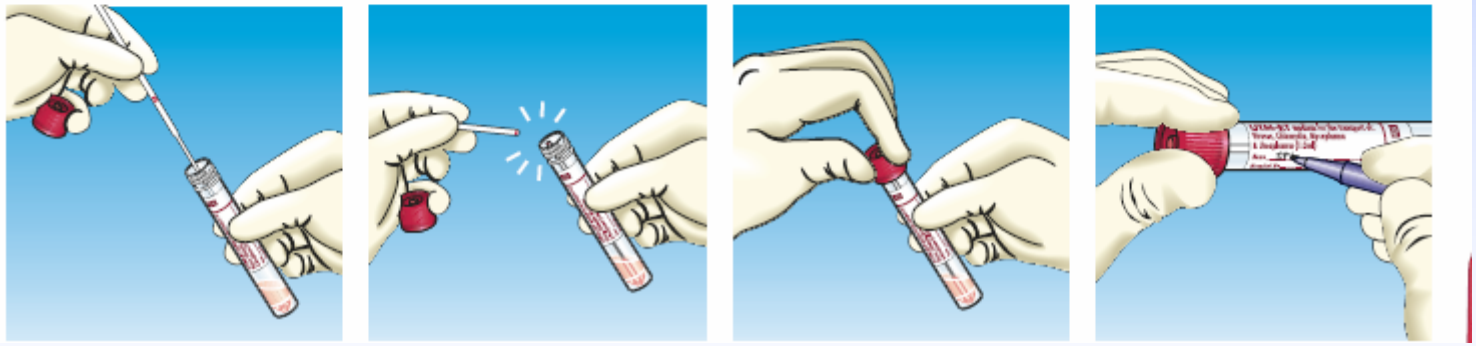
Paired samples in ventilated patients suggested



1. Gently insert the swab along the nasal septum just above the floor of the passage to the nasopharynx until resistance is met
2. Rotate the swab gently against the nasopharyngeal mucosa for 10 - 15 seconds then gently remove swab



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Prophylaxis

- Single Case exposure – not recommended
- PHAC guidelines
  - Case by Case basis for HCWs who have medical conditions that place that at high risk for severe disease or complication
  - Exceptional circumstances such as staff shortages or exposure in high risk settings (e.g. exposure on high risk maternity units, BMT)

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Vaccine

- Inactivated vaccine (adjuvant)
- Being produced by GSK in Quebec. Trials underway now through October
- ?release in November
- Two doses 21 days apart ?one dose likely?
- Can use in pregnancy (nonadjuvant available)

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Infection Control

- Obviously: Hand Hygiene and Respriatory Cough Etiquette
- Algorithm for management of patients on first contact
- Surveillance for outcome (federally using standardized approach)

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Assessing the risk of aerosols versus droplets

Difficult….

- Uncertainty about concentration and particle size reaching airways of recipients
- No occupational exposure limits or guidelines for microorganisms
- Infectious inhalational doses largely unknown
- Host factors (immunity, risk) vary

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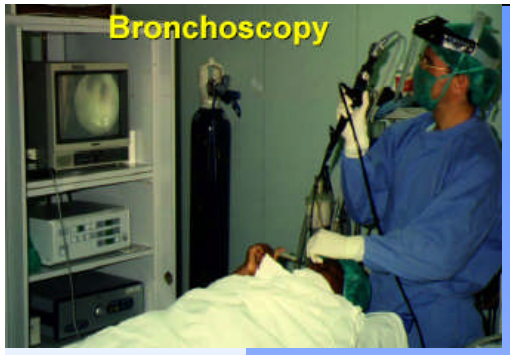

Knowledge Gaps/Controversies

- Relative benefit of Risk Reduction through PPE and engineering controls
- Methods to decrease aerosols at source
- Potential for droplets to become aerosols
- Survival of microorganisms on PPE
- Importance of trans-ocular route for transmission
- Factors affecting compliance/behaviour

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Educate yourself!

- Influenza transmission and the role of PPE: an assessment of the evidence January 2008 Council of Canadian Academies
- Transmission of Influenza: implications for control in health care settings Bridges CB CI 2003;37:1094-1101
- Review of Aerosol transmission of influenza A virus. Tellier R Emerg Infect Dis 2006;12:1657-62 Rebuttal letter Lemieus C 2007;13 173-174
- Measurement of airborne influenza virus in a hospital emergency department Blachere FM CID 2009;45:438-40
- Influenza virus in human exhaled breath: an observational study Fabian P Open Access PLoS ONE 3(7):e2691.doi:10.1371/journal.pone.0002691
- Trial of surgical masks versus fit and non-fit tested N95 masks in the prevention of respiratory virus infection in hospital workers in China Raina MacIntyre ICAAC San Francisco Sep 17, 2009
- Institute of Medicine National Academy of Science Respiratory protection for healthcare workers in the workplace against novel H1N1 influenza A A letter report
- Nurses contacts and potential for infectious disease transmission Bernard H Emerg Infect Dis 2009:15:1438-1444 (Modelling study)

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Conclusions?

- Efficacy of surgical masks to block penetration of respirable particles highly variable and masks have no “sealed fit”
- N95s protect against inhalation of NP, tracheobroncial and alveolar sized particles
- Current evidence is suggestive for spread by aerosols - relative contribution to transmission is unknown
- Separation of droplet and airborne transmission at close range very difficult
- Engineering and Administrative Controls very important as is individual risk assessment

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ACUTE CARE ALGORITHM FOR IMMEDIATE MANAGEMENT OF RESPIRATORY AND/OR FEBRILE ILLNESS IN ADULTS – NOT YET DIAGNOSED

Infection Control

Updated as of: 28-Aug-09

Please see the Infection Control Manual for further details

http://vchconnect.vch.ca/programs_services/infection_control/page_10149.htm

Recent or worsening respiratory illness with any of the following:

- Cough and/or
- Shortness of breath, difficulty breathing and/or
- Abnormal chest X-ray?

AND INFECTION SUSPECTED

OR

Fever > 38° AND Rash
AND INFECTION SUSPECTED

H1N1 may also have diarrhea and/or vomiting

YES

NO → ROUTINE PRACTICES

Establish Precautions.

- Patient wears surgical mask
- Isolate patient (negative pressure room /single room /cubicle & curtain pulled)
- Staff wears N95 until differential diagnosis determined

ATTENDING PHYSICIAN EVALUATION

Influenza Suspected

Airborne Precautions:

if confirmed or suspected:

- Chicken Pox, disseminated Herpes Zoster
- TB
- Measles
- SARS
- Viral hemorrhagic fever

Staff:

- Must wear N95 respirator
- Flag on health record

Patient:

- Negative pressure room if possible, otherwise single room
- Surgical mask when out of room

Droplet Precautions:

if confirmed or suspected:

- Meningitis
- Mumps, Rubella
- Pertussis (Whooping Cough)
- Viral respiratory infections

Staff:

- Surgical mask
- Gloves
- Gown
- Eye protection
- Flag on health record

Patient:

- Single room
- Surgical mask when out of room

Influenza Enhanced Droplet Precautions:

if confirmed or suspected:

- *H1N1*
- *Influenza*

Staff:

- Surgical mask
- N95 respirator if aerosol generating procedures Eg. Nebuliser tx, bronchoscopy, ventilation
- Eye protection
- Gown and Glove
- Flag on health record

Patient:

- Single room or cohort
- Surgical mask when out of room

ALL CASES

- Strict hand hygiene
- Cough etiquette

Aerosol-generating Medical Procedures (AGMP)

Any procedure that produces aerosols

- Intubation, bronchoscopy, Trach care
- Mechanical Ventilation, BIPAP, CPAP
- Suctioning, chest physio, sputum induction
- nebulized medication administration
- autopsy of lung tissue

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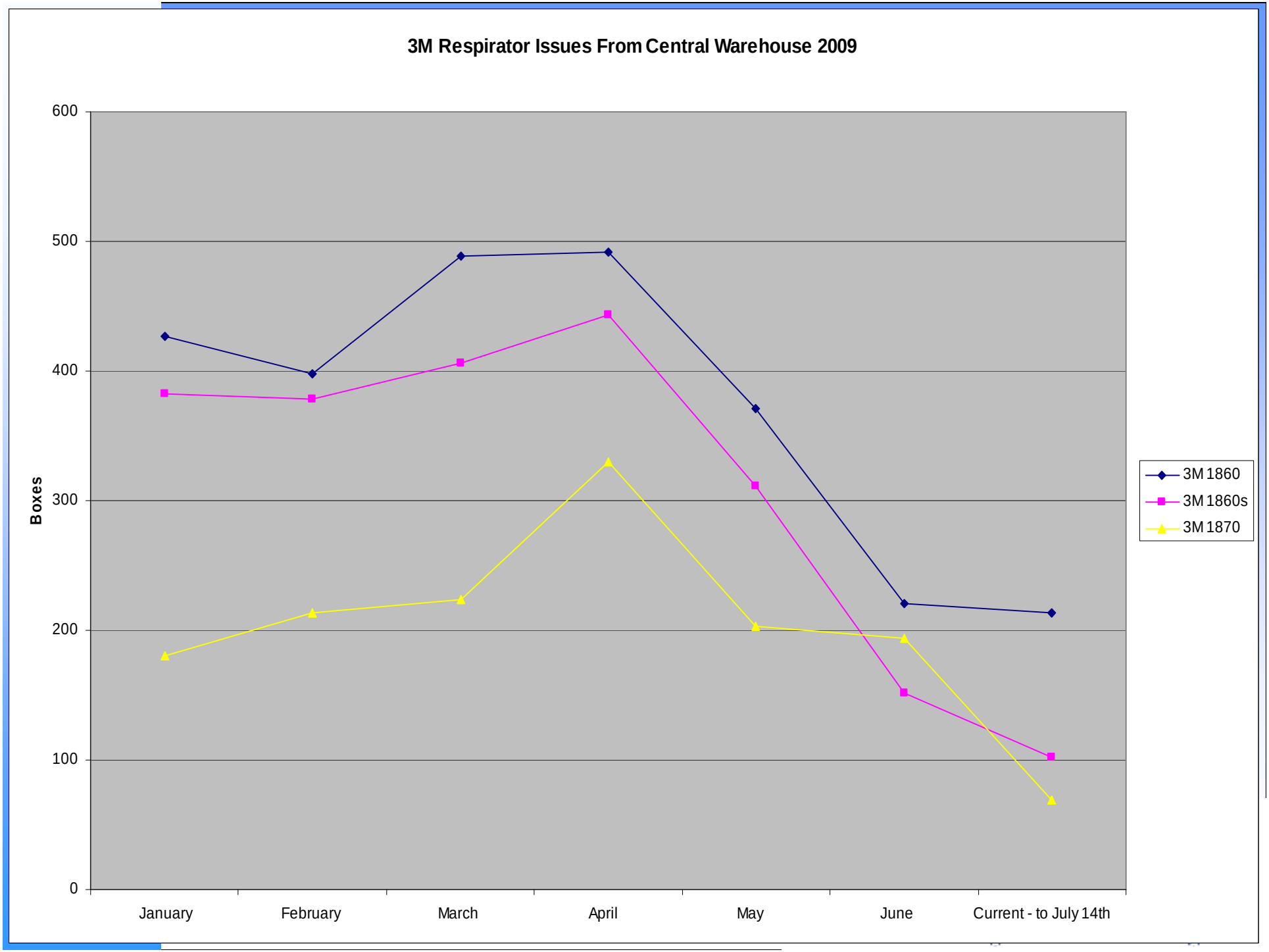
3M Respirator Issues From Central Warehouse 2009
Boxes
600
500
400
300
200
100
0
January
February
March
April
May
June
Current - to July 14th
3M 1860
3M 1860s
3M 1870

What should you do

- Get vaccinated
- Practice hand hygiene and respiratory cough etiquette
- Wear the correct PPE
- Don’t come into work if ill
- Stay at home until seven days post symptom – subject of debate currently
- Don’t need to be treated if mild disease

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Thank you!

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