Optimising Influenza Management in a Tertiary Obstetric Hospital

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A Multidisciplinary approach to optimising influenza management

- In 2018 , a trial rapid on site testing was instituted at King Edward Memorial Hospital for women (KEMH)
- Test was integrated into a clinical and infection prevention management plan
- Collaborators
  - PathWest Laboratory Services
  - KEMH Infection Prevention
  - KEMH Executive
  - KEMH Antimicrobial Stewardship and pharmacy

Optimising Influenza Management

- 1.Background to the problem
- 2. Trial intervention influenza season 2018
- 3. Evaluation
- 4. Implementation
- 5. Influenza in an obstetric hospital: summary

Background to the Problem

- Clinical severity of influenza in pregnancy
- Vulnerable patient population of King Edward Memorial Hospital
- Infection Prevention for influenza in a tertiary maternity hospital
- Recent epidemiology of Influenza in Perth
- Limitations of vaccination for prevention
- Barriers to optimal diagnosis and treatment of influenza at KEMH prior to 2018

Influenza in pregnancy

- H1N1 influenza pandemic 2009 pregnant women proved a high risk group
- higher morbidity, hospitalization, and mortality rates
- Risk peaking in the late 2nd trimester and 3rd trimester
- Risk continues into the early postpartum period
- Likely contributers:
  - relative immunocompromise
  - anatomic factors: compression chest cavity
  - Physiologic alterations (i.e., respiratory and cardiovascular)

Lessons from 2009

- H1N1 infected pregnant women compared to non pregnant:
  - 4x more likely to be hospitalised
  - 13x greater chance of admission to the intensive care unit
  - Preterm delivery rates up to 30.2 % (national average of 12.7%)
- During the first months of the pandemic, only 0.62% of the cases were composed of pregnant women, yet they accounted for 13% of the entire mortality rate
- Am J Obstet Gynecol. 2011 June ; 204(6 Suppl 1): S58–S63

Influenza in high risk obstetric patients

- Medically complex population
- Compounding risks may be present for severe influenza in addition to pregnancy
  - Asthma, chronic lung disease
  - Obesity (BMI>40)
  - Chronic medical conditions eg diabetes

What about the baby?

- Influenza during pregnancy:
  - higher rates of pre-term birth
  - Lower birth weight
- Association is most evident with *clinically severe* H1N1 infection

Early Rx pregnant patients with influenza reduces adverse outcomes

- Rx ASAP, preferable within 48h of symptom onset
- Examples of data:
  - pregnant patients in New York City with influenza
    - Severe illness in 3% if Rx started <48 h after symptom onset
    - Severe illness 44% if Rx started >5 days after symptom onset (p = 0.002)
      - Obstet Gynecol. 2010 Apr;115(4):717-26
  - 788 US pregnant women with 2009 H1N1
    - RR 6.0 (95% C.I.: 3.5–10.6) for admission to the intensive care unit (ICU) for women Rx > 4 days after symptom onset (compared to < 48 h)
      - JAMA, April 21, 2010—Vol 303, No. 15

Treatment of influenza

- Neuraminidase Inhibitors
  - Oseltamivir (oral) : most commonly used
  - Zanamivir (inhaled)
- Oseltamivir
  - GI side effects- less with food
  - Safe to use in pregnancy and breastfeeding
  - Also 70-90 % efficacy when used for prevention for exposed individuals (used once daily)
- Resistance still uncommon

Antiviral resistance

- A total of 13672 viruses, collected by World Health Organization recognised National Influenza Centres between May 2016 and May 2017, were assessed for neuraminidase inhibitor susceptibility

- Reduced inhibition (RI) by neuraminidase inhibitors 0.2% of viruses tested
- “neuraminidase inhibitors remain suitable for treatment and prophylaxis of influenza virus infections, but continued monitoring is important”.
- Volume 157, September 2018, Pages 38-46

Barriers to early treatment with oseltamivir in pregnant women

- Empiric treatment requires prescribing oseltamivir without having a known influenza status
- Many women reluctant to take medications in pregnancy unless there is a proven need
- Standard testing generates a result outside the time window for maximum effectiveness (48h)
- Outpatient management requires a non PBS script
  - Logistics of obtaining a script : GP visit or via hospital
  - Cost up to $75 in the community
  - Significant equity issue in disadvantaged population

KEMH

- Stand alone obstetric/ gynaecological hospital
- High risk pregnancy tertiary referral centre
- 254 adult beds
- 6000 deliveries per year
- No on site adult ICU or adult subspecialty support
- 90 bed NICU
  - Admits from 23 weeks GA

Infection prevention and Influenza at KEMH

- High risk population for severe adverse clinical outcome
- Active antenatal and staff vaccination programmes
- Both adult and neonatal Infection prevention policies

Droplet precautions policy

Table 1: Summary of PPE Requirements

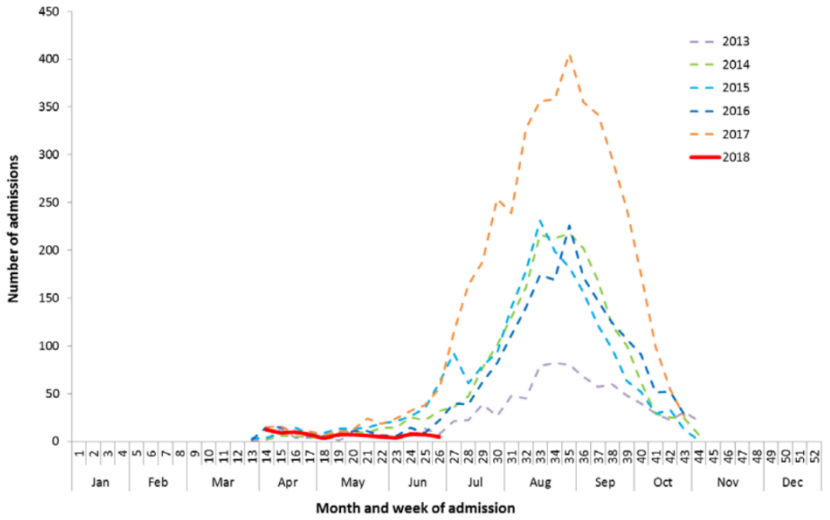
Criteria	Mask	Protective Eyewear	Gown*	Gloves
No direct patient contact (>1 metre from patient)	No	No	No	No
On entering patient room or ward cohort	Surgical**	Yes	If required as per standard precautions	
Performing respiratory sampling	Surgical**	Yes		
Aerosol generating procedures	P2 or N95	Yes		

(* and plastic apron if fluid repellent gown not available; ** fluid repellent)

NB Put surgical mask on the patient if patient outside the room

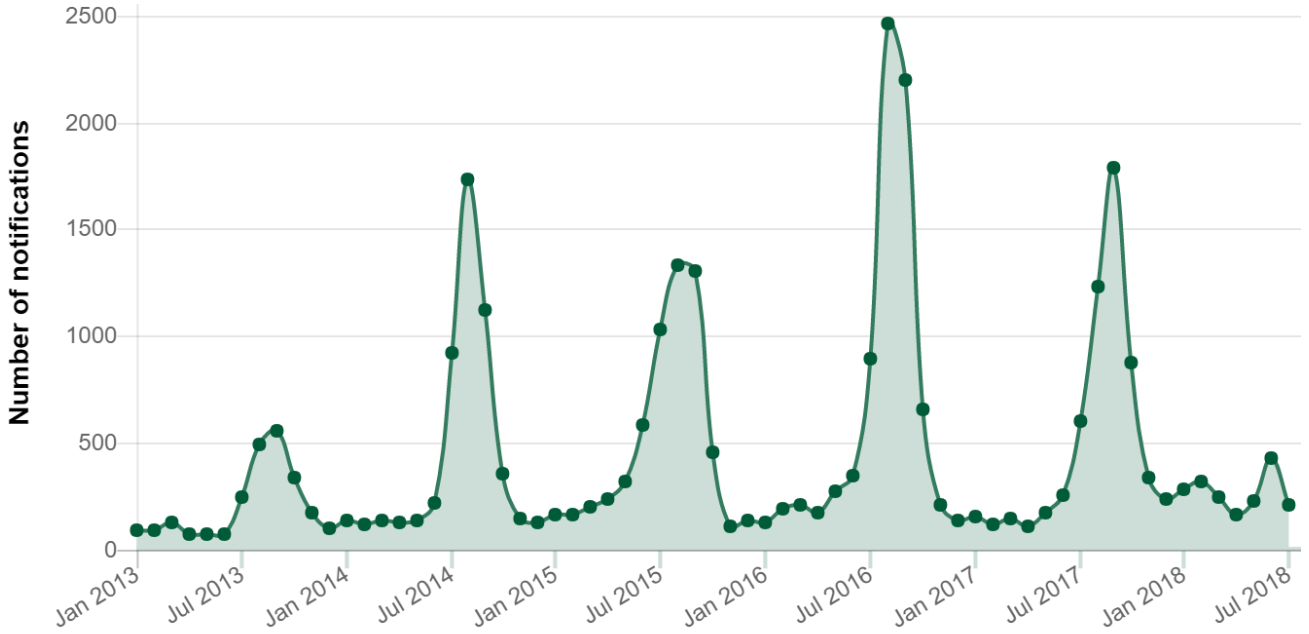
Australian influenza notifications: severe 2017 season

Figure 6. Number of influenza hospitalisations at sentinel hospitals, between March and October, 2013 to 2018 by month and week.



Source: FluCAN

Influenza epidemiology in Perth pre 2018 influenza season



Influenza Vaccination: benefits and limitations

- Recommended for antenatal patients and staff
  - Inactivated vaccine, combination 3-4 strains
  - Safe in pregnancy
- Prevent infection
- Modify severity
- Peak antibody in 2-4 months but levels fall rapidly
- Despite best intentions, vaccine uptake not 100%
- Vaccine efficacy also not 100%
  - commonly 60% Efficacy , less in 2017 in Australia

Situation pre-influenza season at KEMH 2018

- Very high risk patient population
- Not all influenza cases preventable with vaccination
- “bad” flu year 2017 for Eastern states and not WA, concerns WA season 2018 could have been severe
- Off site influenza test with long TAT
- Audit showed prescribing oseltamivir delayed until diagnosis proven often 4 days

The trial Intervention. Flu season 2018.

- Multidisciplinary collaboration
  - Improve clinical assessment and awareness of influenza risks in pregnancy
  - Improve laboratory Diagnosis and TAT
  - Promote early treatment
  - Optimise Infection prevention
- Business case
  - rapid on site testing
  - treatment of discharged patients
- Evaluation with a view to formal implementation

Laboratory role

- Very small on site microbiology lab at KEMH , open office hours and limited hours on weekends
- Lab had a GeneXpert on site
- GeneXpert rapid influenza/RSV test therefore possible on site
- 30 min test (total TAT approx. 50 min from time of receipt in lab)

Laboratory role

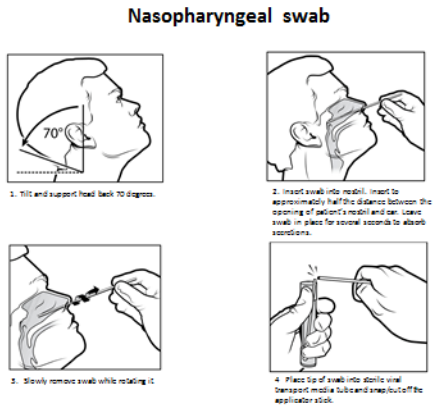
- Business case to the KEMH executive to pay for the test
- Training of staff
- Test logistics
- Rapid electronic result transfer
- Protocol for urgent result phoning
- Obtaining the appropriate flocked nasopharyngeal swabs
  - Min 3 month wait via normal hospital precurement(!)

Infection Prevention role

- Updated influenza policy to ensure new specimen collection included
- Staff education re taking n-p swabs
- Infection prevention reinforcement and education
- Staff education forum

Specimen collection training

- Use the flocked nasopharyngeal swab
- Use personal protective equipment when taking the swab
  - Including eye protection
- Nasopharyngeal OR deep nasal specimen appropriate
- Snap off into the viral transport medium supplied at snap point shaft
- Ensure cap screwed on tightly



Pharmacy role

- Process for dispensing oseltamivir directly from the Emergency centre or the maternofetal assessment unit at no up front cost
- Reduce cost barriers to treatment (cost is up to $75 in community as non PBS)
- Trialled some cost recovery by sending invoices at reduced price to affected women
  - Social work exemption available for hardship
  - $6.40 for concession patients or $31.60 for general patients

Pharmacy role

- Oseltamivir product information was unhelpful and non reassuring as to safety in pregnancy
- A new patient information sheet had to be written
- An accelerated process of consumer feedback was required to allow the information sheet to be used

Medical and Midwifery Education role

- Staff forum on diagnosis and management of influenza in pregnancy
  - New swabs
  - New test
  - Treatment pathways
  - Reinforcement of infection prevention
- Powerpoint available on the intranet

Patient pathways: office Hours on site testing

Take / send Swab	• 8.30-4pm can be processed on site • Call microbiology scientist
Patient waits for result	• Approximately 50 min wait • Scientist to ring result
Decision re antiviral Rx	• Can be accessed in EC/MFAU • Bill will be sent to patient later (lower cost than outside pharmacy)

After hours patient testing and management

Take/send swab	• Use pilot test form to access quicker test • Test may be done at KEMH the next morning or at QE2
Patient goes home if well enough	• If high pre-test probability of influenza can give oseltamivir pack • Patient to commence antivirals
Test result available	• Contact patient with result • Advise on whether to continue antivirals • NB small risk false negative so consider clinical features

Executive role

- Support for the project based on optimising patient care + a business case
- Early treatment reduces risk of progression to severe disease
- Cost of rapid test + supply oseltamivir = $112
- Cost of one bed day stay
  - KEMH Adult Special Care Unit =$3,584.67
  - KEMH NICU = $9,630.88
  - SCGH ICU = $6,597.22 for a ventilated patient.

What happened in 2018 influenza season

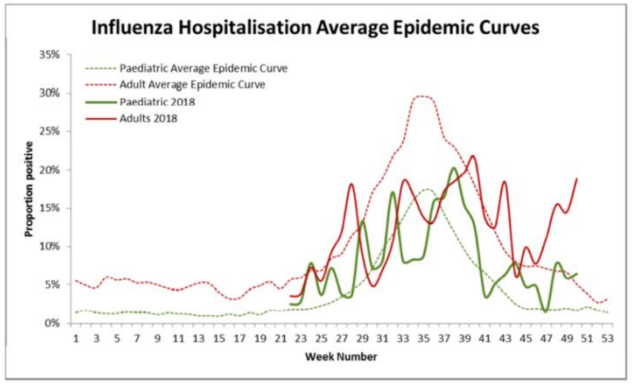


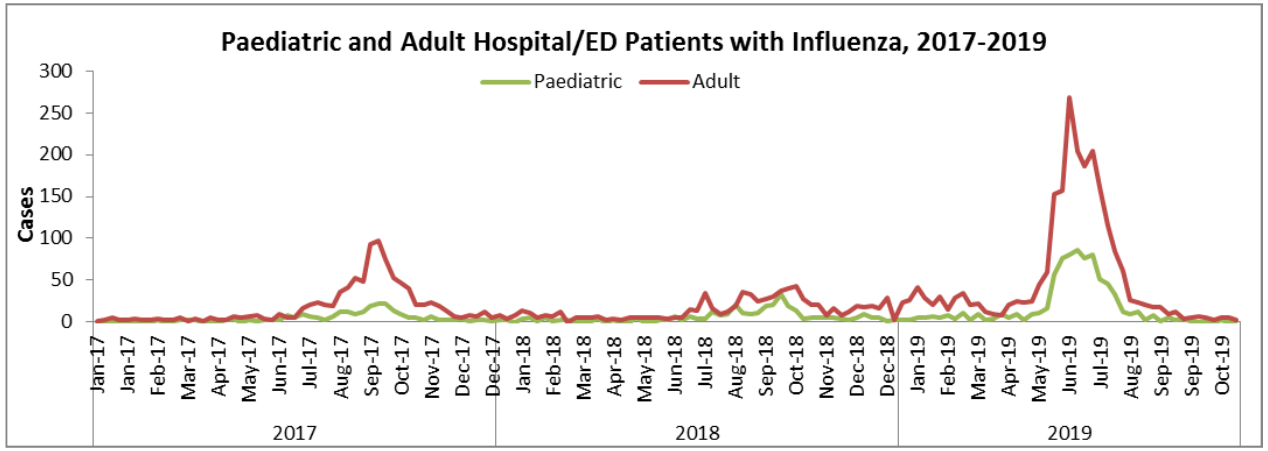
Figure 7: Proportion positive of adult and paediatric influenza patients with average epidemic curves. Average epidemic curves were constructed by averaging all seasons measured at PathWest QE2 from 2007-2017. Data excludes cases from the Kimberley/Pilbara region.

- Fairly mild late influenza season
- Audit of 31 tested patients
  - TAT of under 1.5h achievable during office hours from time specimen obtained
  - Only 3 influenza and one RSV case
  - 6 received oseltamivir
- Avoidance of unnecessary oseltamivir was the main benefit with low prevalence

2019 Influenza Season

- KEMH executive approved formal implementation
- Laboratory testing extended to Sat and Sun, not yet 24h
- Attempts at cost recovery for Oseltamivir dropped , decision made to dispense for free
- Restriction of testing to pregnant women only dropped, gynaecology patients and neonates eligible
- Implementation just in time for an early dramatic start to the influenza season 2019

Hospitalised Patients with Influenza in WA: PathWest data



Audit influenza tests done on site KEMH Jan- June2019

- 89 Rapid Influenza/RSV tests performed
- 23 Pos influenza A or B
- 2 Pos RSV
- 23 Oseltamivir courses dispensed

Lessons learnt

- Introduction of rapid influenza test required a 360° approach to maximise success
  - Laboratory
  - Infection prevention
  - Clinical staff education
  - Pharmacy/AMS processes for oseltamivir dispensing
  - Executive support

What next?

- Work towards 24/7 test availability
- Explore vaccination prevention opportunities among non obstetric patients
  - Especially gynaecological cancers
- Testing and treatment of staff

Summary: Influenza in Pregnant women

- Pregnant women are at risk of more severe clinical disease
- Influenza in pregnancy may cause adverse pregnancy outcomes
- Influenza epidemiology is unpredictable, preparedness is important
- Influenza prevention: vaccination and common sense precautions
- Not all influenza is preventable
- Early treatment of influenza infection is beneficial in preventing severe adverse outcomes in pregnant women
- We should try to optimise prevention, diagnosis and treatment of influenza in pregnant women
- Rapid on site influenza testing and a multidisciplinary approach assisted us in improving influenza management in a high risk obstetric hospital

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