NCIRS National Centre for Immunisation Research and Surveillance

THE UNIVERSITY OF SYDNEY

Respiratory Syncytial Virus (RSV) hospitalisations in Australia, 2006-2015

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RSV disease

Major cause of acute lower respiratory infection
- Number 1 cause in children <5 years [1]
- Immunocompromised persons & older adults [2]

Prevention & treatment
- Currently limited
- Clinical trials: 14 vaccines & 2 mAb [3]
- Novavax: Phase III study (maternal vaccination)

Australian disease data
- RSV not notifiable
- NSW population-level data (<5 years) [4]
- Lack of current, national data

[1] Shi, T., et al., *Global, regional, and national disease burden estimates of acute lower respiratory infections due to respiratory syncytial virus in young children in 2015: a systematic review and modelling study.* Lancet, 2017. **390**(10098): p. 946-958.1.
[2] Branche, A.R. and A.R. Falsey, *Respiratory syncytial virus infection in older adults: an under-recognized problem.* Drugs Aging, 2015. **32**(4): p. 261-9.
[3] Villafana, T., et al., *Passive and active immunization against respiratory syncytial virus for the young and old.* Expert Rev Vaccines, 2017. **16**(7): p. 1-13.
[4] Homaira, N., et al., *High burden of RSV hospitalization in very young children: a data linkage study.* Epidemiol Infect, 2016. **144**(8): p. 1612-21.

Aims

Describe RSV-associated hospitalisation retrospectively in Australia over a ten year period

Focus on age-based high risk groups to inform on future immunisation strategies
- Infants aged <6 months
- Adults aged ≥65 years

Methods

Data sources

1. AIHW[1] National Hospital Morbidity Database
- ICD-10-AM coded hospitalisations
  - RSV organism (B97.8), RSV pneumonia (J12.1), RSV bronchitis (J20.5), RSV bronchiolitis (J21.0)

2. Mid-year population estimates
- Australian Bureau of Statistics

Descriptive analysis, 2006-2015
- RSV-associated hospitalisation rate
- Length of stay (LOS)
- In-hospital deaths

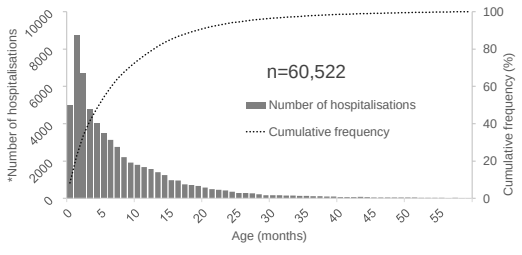
[1]Australian Institute of Health and Welfare (AIHW)

RSV hospitalisations, 2006-2015

86,687 (any diagnosis)
→ **63,814** (principal diagnosis)

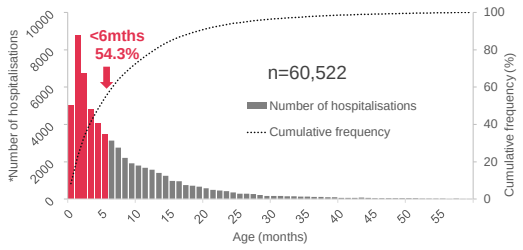
- Annual hospitalisation rate 28.8 per 100,000 population
- Seasonality (autumn-winter peak)
  - Northern Territory - no distinct pattern
- RSV bronchiolitis most common (85.4%)
- Median LOS 3 days
  - IQR: 2-4 days
- 138 in-hospital deaths recorded

RSV hospitalisation in children aged <5 years, 2006-2015



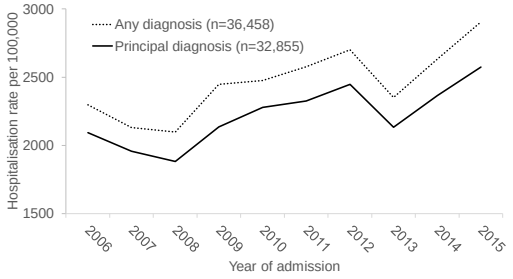
*hospitalisations listing an RSV-specific principal ICD-10-AM code

RSV hospitalisation in children aged <5 years, 2006-2015



*hospitalisations listing an RSV-specific principal ICD-10-AM code

RSV hospitalisation rates in infants aged <6 months, 2006-2015



RSV hospitalisations in infants aged <6 months, 2006-2015

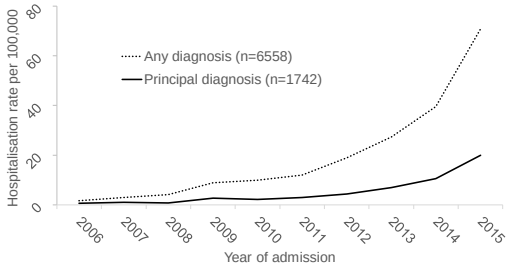
32,855 hospitalisations over ten years

- Rate: 2333.8 per 100,000
  Higher in males vs females
  – 2455.2 vs 1979.8
  Higher in Indigenous infants
  – 4310.2 vs 2252.7
- RSV bronchiolitis (98.2%)
- Median LOS 3 days
  – IQR 2-5 days
- Seven in-hospital deaths

[5]

[5] Alamy Stock Photo accessed April 2018 from http://www.alamy.com/stock-photo-child-hospital-patient-49280218.html

RSV hospitalisation rates in adults aged ≥65 years, 2006-2015



RSV hospitalisations in adults aged ≥65 years, 2006-2015

1742 hospitalisations over ten years

- Rate: 5.7 per 100,000
  – Lower in males vs females
  – 5.0 vs 6.2
- RSV pneumonia (82.0%)
- Median LOS six days
  – IQR 4-9 days
- 82 (59.4%) in-hospital deaths

FIGURE 1: Chest X-ray of a mechanically ventilated patient showing diffuse alveolar infiltrates and ground-glass opacification.

[6]

[6] Robert, D., et al., A series of five adult cases of respiratory syncytial virus-related acute respiratory distress syndrome. Anaesth Intensive Care, 2008. 36(2): p. 230-4.

Conclusions

National, baseline data to inform practice & policy
Substantial RSV-associated hospitalisation
- Highest rates in young infants and Indigenous infants
- High rates in older adults

Effective vaccination strategies could reduce a large number of RSV-associated hospitalisations

Limitations
- Sensitivity/specificity of method?
  - Over ascertainment e.g. potential re-admissions
  - Under ascertainment e.g. under diagnosis, coding limitations
- Comorbidities & other risk factors?
- Disease burden?

Future work

- Assess validity of ICD-10-AM coded data in predicting RSV hospitalisation
- Describe RSV disease burden
  - Impact on individuals & communities
  - RSV mortality
- Identify modifiable & non-modifiable risk factors
  - Inform vaccination strategies
- Future RSV surveillance strategies
  - Measure impact of interventions

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References

[1] Shi, T., et al., *Global, regional, and national disease burden estimates of acute lower respiratory infections due to respiratory syncytial virus in young children in 2015: a systematic review and modelling study.* Lancet, 2017. **390**(10098): p. 946-958.1.
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