

Pneumonia and Respiratory Infection in Down Syndrome

A 10-year cohort analysis of inpatient and outpatient encounters across the lifespan

Jasmine M. Blake, MD MSPH^{1,2*}, Daniela Estrada Gomez³, BS Brian G. Skotko, MD MPP^{4,5}, Amy Torres⁵, BS Stephanie L. Santoro, MD^{4,5}

¹Department of Pediatrics, Icahn School of Medicine at Mount Sinai, New York, NY, ²University of Maryland School of Medicine, Baltimore, MD, ³Universidad de Antioquia, Antioquia, Colombia, ⁴Department of Pediatrics, Harvard Medical School, Boston, MA, ⁵Down Syndrome Program, Division of Genetics and Metabolism, Department of Pediatrics, Massachusetts General Hospital, Boston, MA *presenting author

Background

Several studies have shown that respiratory infections are significant contributors of morbidity and mortality in the Down syndrome (DS) population¹. In young children, pneumonia/respiratory infections have been noted as the number one cause of hospital and ICU admissions². In adults, a few studies have shown that respiratory failure and pneumonia increase the risk for in hospital mortality.³ Large reviews describing pulmonary complications have been conducted in children with DS yet few have been conducted for the adult population. Additionally, a recent literature review found that there are critical knowledge gaps in the prevention and screening of risk factors for pneumonia in the DS population⁴.

Aims/Objectives

1. What proportion of clinical encounters and subsequent admissions are due to respiratory illnesses?
2. What differences or similarities exist between those who were admitted for respiratory illnesses compared to those seen in the outpatient setting?
3. Among those who are admitted for respiratory illnesses, are there lessons we can learn from their clinical care?

Design/Methods

Study Population

- Established patients in the Massachusetts General Hospital Down Syndrome Program (MGH DSP)



Study Design

- Retrospective chart review from January 2011-January 2020 across three settings: Urgent Care, Emergency Department, and Inpatient Admissions

Data Analysis

- Fisher's exact test between each variable of interest and the three settings was completed to make comparisons across settings
- To determine exactly where differences were, additional Fisher's exact tests were completed for variables with results of statistical significance (p value <0.05) (inpatient vs emergency department, inpatient vs urgent care, and emergency department vs urgent care)

Results

Table 1: Comparisons of baseline characteristics of emergency department visits, inpatient admissions, and urgent care visits for pneumonia or respiratory infections in patients with Down syndrome followed by the Massachusetts General Hospital Down Syndrome Program.

| | Urgent Care visits (N = 21) | Inpatient admissions (N = 88) | Emergency department visits (N = 120) | Fisher's exact test p value |
|---|-----------------------------|-------------------------------|---------------------------------------|-----------------------------|
| Patient Demographics | N (%) | N (%) | N (%) | |
| Patient Age | | | | |
| <22 yr | 13 (62) | 73 (83) | 109 (91) | 0.004** |
| Race | | | | |
| White or Caucasian | 11 (52) | 61 (69) | 63 (53) | 0.051 |
| Black or African | 3 (14) | 5 (6) | 7 (6) | 0.33 |
| American | | | | |
| Hispanic/Latino | 4 (19) | 15 (17) | 25 (21) | 0.77 |
| Asian | 0 (0) | 1 (1.1) | 0 (0) | 0.48 |
| Other | 3 (14) | 6 (7) | 17 (14) | 0.20 |
| Past or Present Medical History | | | | |
| Congenital Heart Disease | | | | |
| Congenital Heart Disease requiring Repair | | | | |
| Chronic Lung Disease | 0 (0) | 13 (15) | 33 (3) | 0.003** |
| Asthma or RAD | 4 (19) | 35 (40) | 32 (27) | 0.07 |
| Dysphagia/Feeding Difficulties | 9 (43) | 51 (58) | 51 (43) | 0.22 |
| Dementia | 1 (5) | 9 (10) | 4 (3) | 0.19 |
| Previous diagnosis of pneumonia | 7 (33) | 34 (39) | 22 (18) | 0.003** |
| Social History | | | | |
| Lives in Group Home | 4 (19) | 11 (13) | 6 (5) | 0.04* |
| Clinical Details | | | | |
| Supplemental Oxygen requirement | 0 (0) | 68 (77) | 16 (13) | < 0.001*** |
| Chest X-Ray Obtained | 11 (52) | 75 (85) | 48 (40) | < 0.001*** |
| Evidence of pneumonia on x-ray | 2 (18) | 38 (51) | 17 (35) | 0.053 |
| Viral panel obtained | 5 (24) | 74 (84) | 35 (29) | < 0.001*** |
| Complete Blood Count Obtained | 1 (5) | 52 (60) | 27 (23) | < 0.001*** |
| ICU Admission | 0 (0) | 40 (46) | 0 (0) | < 0.001*** |
| Immunization history | | | | |
| Received Flu Shot | 20 (95) | 73 (83) | 86 (72) | 0.04* |
| Received Palivizumab | 2 (10) | 15 (17) | 10 (8) | 0.62 |
| Received Pneumococcal Vaccine | 20 (95) | 73 (83) | 105 (88) | 0.16 |

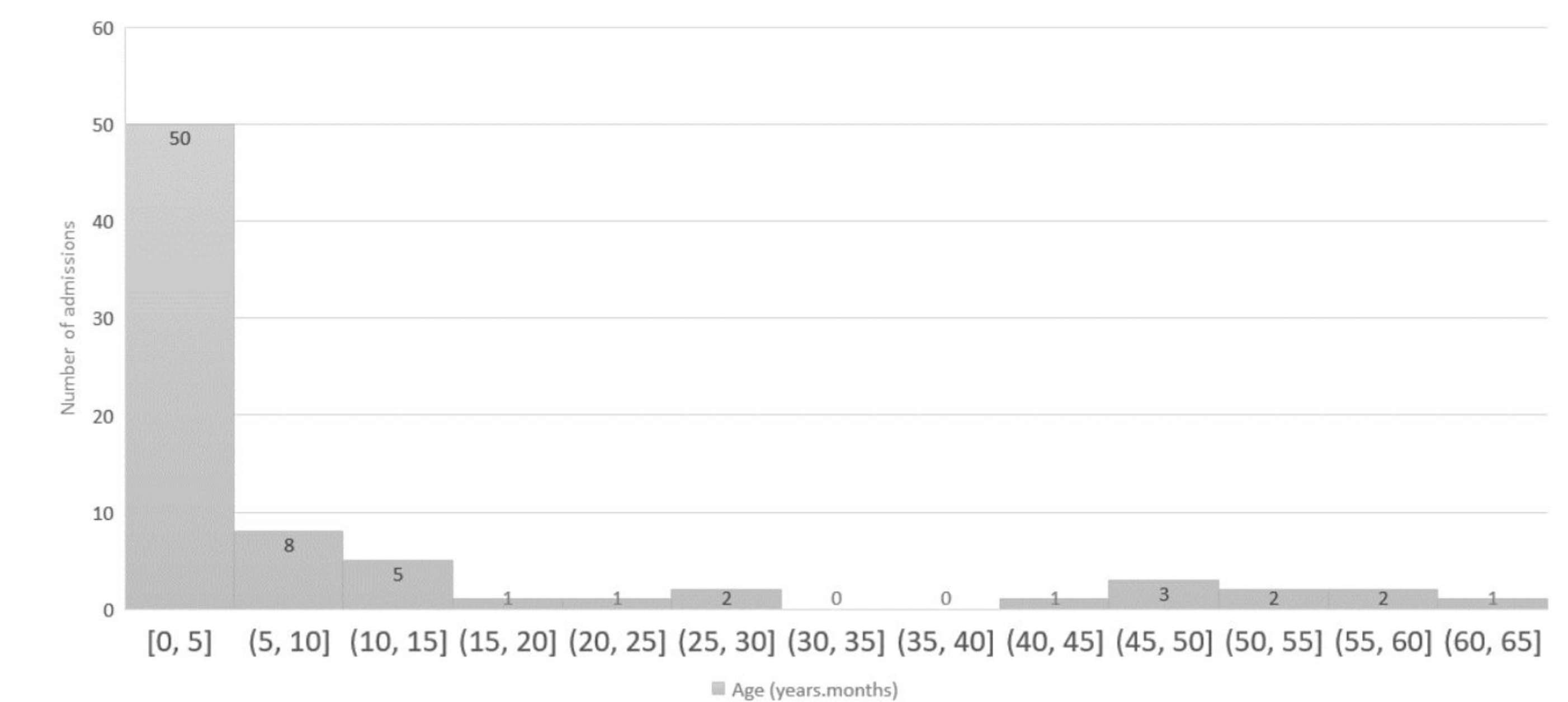


Figure 1: Number of hospital admissions for pneumonia and/or respiratory infections in patients with DS by age at the MGH DSP from Jan 2011-Jan 2020

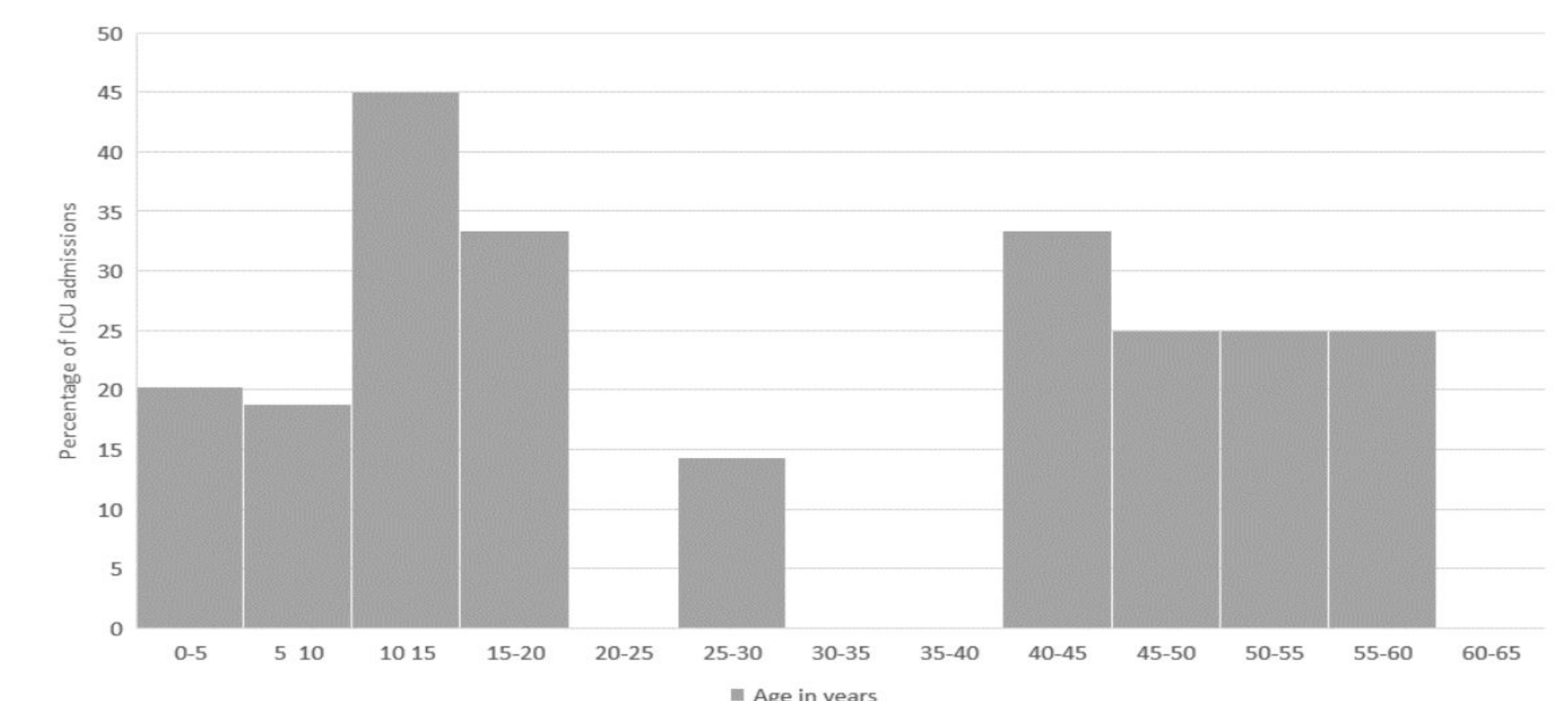


Figure 2: Percentage of ICU admissions for pneumonia and/or respiratory infections in patients with DS by age at the MGH DSP from Jan 2011-Jan 2020

Conclusions and Next Steps

- Respiratory infections encompass the majority of medical encounters for our patients with DS.
- Most of our patients with respiratory infections will be seen in the outpatient setting (ED or Urgent Care)
- CHD, dysphagia/feeding difficulties, and history of prior pneumonia or lung disease were the most common co-morbidities seen across all three settings.
- Across settings of care: older and younger patients were more frequently seen in Urgent Care centers or ED respectively. Immunization rates were increased in patients seen in outpatient settings.
- Hospitalization was a frequent occurrence amongst patients 0-5 years of age and those older than 45 years of age.
- Among hospitalized patients, most required ICU level admission and/or supplemental oxygen. This indicates that patients with DS often require higher levels of care.
- Compared to children who were hospitalized, adult patients had higher frequencies of co-morbidities and longer length of stays.
- Next Steps: further research regarding etiology of respiratory infections in DS, additional research focusing on respiratory infections in adulthood, methods of prevention of respiratory illnesses

References

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Supplemental materials of further analysis available by request