JOURNAL CLUB SUMMARIES

What's hot that the other lot got

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AMBIENT AIR QUALITY AND ASTHMA DEVELOPMENT IN CHILDREN

The link between poor air quality and paediatric asthma exacerbations is well-established. Surprisingly, this is less clear for ambient air pollutants and asthma incidence. Garcia *et al* (JAMA 2019;321:1906) undertook a longitudinal epidemiological study and found that as air quality improved, the incidence of childhood asthma reduced. Using data from three cohorts of school children, recruited between 1993 and 2014 from California, USA, they analysed trends in incidence of asthma, exploring the influence of air pollution (estimated using community-level data). Children in the cohort were followed-up annually, and the primary outcome was when the parents/guardians answered yes to the question 'Has a doctor ever diagnosed this child with asthma?'. Air pollution decreased over time, and in parallel, asthma incidence decreased. In the fully adjusted model, the incidence risk ratio (IRR) for each 4.3ppb drop in nitrogen dioxide was 0.80 (95% CI 0.71 to 0.90), and for a drop of 8.1 µg/m^3 in the levels of $PM_{2.5}$ (particulate matter less than or equal to 2.5 diameter) , the IRR was 0.81 (95% CI 0.67 to 0.98). Relationships with PM_{10} (particulate matter unde 10μm diameteand ozone were not statistically significant. Whether the pollutants are causal, or are markers for other factors, is, of course, difficult to say. The analysis employed for these data was complex and the sensitivity analysis testing indicated that while the nitrogen dioxide results were robust to changes in the model used, the $PM_{2.5}$ outcome was not and the null hypothesis could not be rejected with some iterations. However, even with that caveat, it would appear logical that reducing pollutants reduces incident asthma. The challenge remains how to best advocate for policies reducing air pollutants to achieve population health benefits.

DESPITE STANDARDISATION, VARIABILITY IN RADIATION DOSE IN PAEDIATRIC CHEST X-RAYS IN THE UK

Chest X-rays are a common investigation in both inpatient and outpatient paediatric medicine, and we routinely counsel parents that the dosage of radiation from a single chest X-ray is low. Al-Murshedi *et al* (Eur J Radiol 2019;113:198) investigated the potential radiation exposure of paediatric X-rays for different aged children in eight northern England National Health Service hospitals. There was a wide variability between the radiation dosage for the same procedure within and between hospitals, with up to nearly an order of magnitude difference in exposure dose. Using a radiological phantom and solid-state radiation detector, the investigators simulated radiation exposed to neonates, 1-year, 5-year and 10-year olds. Exposure, expressed as incident air kerma (kinetic energy release per unit mass, IAK; a measure of the energy released during ionising radiation), varied most for 1-year olds, where it was between 10.97 and 82.82 µGy. Importantly, IAK does not directly measure the exposure of the patient, and the authors also point out that identical IAK values are associated with different effective doses, depending on the equipment, the X-ray tube potential and technique of filtration. The authors recommend utilising additional filtration in paediatric chest X-ray, thereby reducing the dose without decreasing image sensitivity. Although chest X-rays, in general, are safe, there remains room for improvement in reducing the dosage of the most frequently requested imaging test in paediatrics to 'as low as reasonably practicable'.

NASAL HIGH FLOW FOR MODERATELY PRETERM INFANTS IS WORSE THAN CONTINUOUS POSITIVE AIRWAY PRESSURE

Many moderately preterm infants will not require respiratory support after birth. For those that do, nasal high flow (NHF) has been suggested as an alternative to continuous positive airway pressure (CPAP). Manley *et al* (NEJM 2019;380:2031) conducted a non-inferiority randomised trial of NHF versus CPAP, in infants less than 24 hours old, who were 31 weeks gestation or older. As blinding was not possible, the primary outcome of 'treatment failure' consisted of a range of predefined objective categories: high inspired oxygen (FiO_2>0.4 for >1 hour), hypercapnic respiratory failure (pH<7.2 and PaCO2>60 mm Hg for >1 hour), apnoeas requiring intervention (>2 in 24 hours if severe or >6 in 6 hours if moderately severe), need for invasive ventilation, transfer to a Neonatal Intensive Care Unit (NICU) or clinician-determined treatment escalation occurring within the first 72 hours of therapy. There were 768 infants randomised, and treatment failure occurred twice as commonly in NHF versus CPAP (risk difference 10.3%, 95% CI 5.2% to 15.4%), and therefore NHF was worse than CPAP (although in the technical language NHF was 'not non-inferior'). That said, intubation (arguably the most important real-world outcome) was similar between the two groups (NHF 5.5% and CPAP 5.9%). NHF was successful for around 80% of the infants commenced on it, with the remaining infants transferring over to CPAP on treatment failure. The study can be interpreted variably by clinicians as although the primary outcome did not demonstrate non-inferiority of NHF, the similar incidence of hard clinical outcomes, ease of the NHF technique and ability to use CPAP as rescue therapy means the study may be used to justify ongoing use of NHF in this group by some.

ULTRASOUND SCORE ASSOCIATED WITH INTUBATION IN BRONCHIOLITIS, BUT NOT PREDICTIVE

Bronchiolitis is the most common cause of admission for infants aged under 1 year, and consequently is a common indication for respiratory support, including NHF, CPAP and invasive ventilation. It would be useful to be able to predict which infants will go on to require respiratory support, as most hospitals in the UK do not have paediatric intensive care facilities. Supino *et al* (Eur J Paeds 2019;178:623) assessed the ability of point-of-care ultrasound (US) in the emergency department to predict the future requirement of respiratory

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support in children aged 1–12 months with a clinical diagnosis of bronchiolitis. Using protocol-driven criteria for the initiation of respiratory support, they found that a point-of-care US score measured in the emergency department was statistically associated with the need for future respiratory support (p=0.006). However, out of a maximum score of 24, the score was on average 2 (1–4) for those who required respiratory support versus 1 (0–3) for those who did not. Lung US has less discriminatory ability than the established clinical scoring system and so, unfortunately, does not appear to be likely to enter routine clinical practice to predict respiratory support in bronchiolitis. The search for a crystal ball continues.

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