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Association of use of the neonatal early-onset sepsis calculator with reduction in antibiotic therapy and safety

Authors: Achten N et al.

Summary: This meta-analysis evaluated the impact of the EOS calculator on antibiotic use in newborns. A search of MEDLINE, Embase, Web of Science, and Google Scholar from 2011 (when the EOS calculator was introduced) through January 2019 identified 13 studies that compared management guided by the EOS calculator with conventional management strategies for allocating antibiotic therapy to newborns (n=175,752) with suspected EOS. All studies found a substantially lower relative risk (range 5–60%) of empirical antibiotic therapy, in favour of the EOS calculator. Safety evidence was limited, but proportions of missed cases of EOS were comparable between management guided by the EOS calculator (28%) and conventional management strategies (29%).

Comment: Neonates with signs and symptoms of sepsis require prompt evaluation and initiation of antibiotic therapy. Because the signs and symptoms of sepsis are subtle and nonspecific, multivariate predictive models for the risk of EOS have been developed and validated in clinical use, including the EOS calculator. These tools can be used to estimate the risk of EOS in individual patients based on risk factors (e.g., newborn clinical condition, highest intrapartum maternal temperature, maternal group B Streptococcus status, administration of maternal intrapartum antibiotics, gestational age and duration of rupture of membranes) and guide decision-making regarding appropriate treatment. EOS risk calculators are not valid for preterm infants (<34 weeks’ gestation), and they do not apply to late-onset sepsis.


Association between screen media use and academic performance among children and adolescents

Authors: Adelantado-Renau M et al.

Summary: This meta-analysis determined the association between screen media use and academic performance in children and adolescents. A search of MEDLINE, Scopus, Web of Science, Cochrane Database of Systematic Reviews, and ERIC identified 30 cross-sectional studies that were suitable for inclusion. Across all studies, the amount of time spent on overall screen media use was not associated with academic performance. Individually, television viewing was inversely associated with composite academic performance scores, language, and mathematics, and video game playing was inversely associated with composite scores. Subgroup analyses found that television viewing was inversely associated with language in children only, and both television viewing and video game playing were inversely associated with composite scores in adolescents only.

Comment: Children older than 7 years and adolescents in the US spend an average of 6 hours per day watching television, playing video games, or using computers. Excessive screen time can impact on sleep quality and therefore alertness and ability to learn during the day. Avoiding use of light-emitting screens before bedtime is often advised to improve sleep. In a study of more than 300 Swiss students between the ages of 12 and 19 years, screen time during the evening was associated with shorter sleep duration and later hour of dim-light melatonin onset, while off-screen activity was not. In a subset of over 180 participants who agreed to avoid screen time after 9pm, sleep duration increased by 17 minutes and daytime vigilance improved. The limitation of screen time before bedtime is an important intervention to improve sleep hygiene in children and adolescents.


Abbreviations used in this issue:

ADHD = attention-deficit/hyperactivity disorder
CNS = central nervous system
ED = emergency department
EOS = early-onset sepsis

Welcome to the latest issue of Paediatrics Research Review.

In this issue, we report that use of the neonatal EOS calculator can substantially reduce the use of empirical antibiotics in newborns with suspected EOS, and we discuss the impact of screen time on academic performance in children and adolescents. We also report the influence of e-cigarette marketing and flavourings on e-cigarette use in adolescents and young adults, review the prevalence of safe sleep practices for newborns in the US, and finish with a study of the impact of CNS stimulants on growth in children with ADHD (and the varying success of different weight recovery interventions).

We hope you find these and the other selected studies interesting, and look forward to receiving any feedback you may have.

Kind Regards,

Prof Nicholas Freezer

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Flavored e-cigarette use and progression of vaping in adolescents

Authors: Leventhal A et al.

Summary: This US study evaluated whether use of e-cigarettes in nontraditional flavours predicts continuation of vaping and progression to more frequent vaping in adolescents. High school students in Los Angeles, California, completed 5 semiannual surveys from 10th grade to 12th grade (2014–2017). Among 476 past-6-month e-cigarette users at survey waves 1 to 4, e-cigarette flavour used was coded into 2 categories: nontraditional flavours (fruit, candy, sweet or dessert, buttery, blends or other) or traditional flavours (tobacco, menthol or mint, or flavourless). Across waves 1 to 4, there were 739 reports of non-traditional flavour use and 49 reports of traditional flavour use. Use of e-cigarettes in nontraditional flavours was positively associated with vaping continuation (adjusted odds ratio, 3.76) and past-30-day number of puffs per nicotine vaping episode (adjusted rate ratio, 2.41) 6 months later.

Comment: Unlike conventional cigarettes, which burn tobacco and generate smoke, e-cigarettes have a cartridge containing a liquid (sometimes referred to as “e-liquid”). The liquid is heated to produce a vapour the user inhales. E-cigarettes may have added characterising flavours and more than 7000 flavours are available, including candy, fruit, soda, and alcohol. Flavourings may increase the attractiveness of e-cigarettes to youths, especially those who are not already smokers. Nicotine e-cigarettes contain nicotine and other constituents, some with carcinogenic potential. Common nicotine concentrations of e-cigarette liquids are 6 mg/mL, 12 mg/mL, 18 mg/mL, or 24 mg/mL. However, cartridges labelled nicotine-free have been found to contain nicotine. The ingestion of liquid nicotine by children can be lethal. Propylene glycol or glycerol are the main components of most e-cigarette liquids and some products may use ethylene glycol. Other compounds detected include tobacco-specific nitrosamines, carbonyl compounds, metals, volatile organic compounds, and phenolic compounds. Tetrahydrocannabinol or cannabionid oils are sometimes used in e-liquids.


E-cigarette marketing exposure and subsequent experimentation among youth and young adults

Authors: Chen-Sankey J et al.

Summary: This US study evaluated the impact of e-cigarette marketing exposure on e-cigarette experimentation among youth and young adult never tobacco users. Nationally representative samples of 8121 youth aged 12–17 years and 1683 young adults aged 18–24 years from wave 2 (2014–2015) and wave 3 (2015–2016) of the Population Assessment of Tobacco and Health Study were included. At wave 2, 70.7% of youth and 73.9% of young adult never tobacco users had been exposed to e-cigarette marketing in the past month; at wave 3, 4.9% of youth and 4.5% of young adults had experimented with e-cigarettes. Youth and young adults exposed to e-cigarette marketing at wave 2 were more likely to have experimented with e-cigarettes at wave 3 than those not exposed (adjusted odds ratios, 1.53 and 2.73, respectively).

Comment: Although the concept of an electronic cigarette was first patented in the US in 1965, it was not until 2003 that the first commercialised e-cigarette product was developed in China. Almost all (90%) e-cigarette products sold globally are made in China and it is estimated that 30–50% of sales of global e-cigarettes are conducted online. A study estimated 35 million people were regular dual or sole users of e-cigarettes and vapour products in 2016, projected to grow to 55 billion by 2021. In all states and territories in Australia, it is illegal to sell, possess or use e-cigarettes that contain nicotine, but this does not guarantee all e-cigarettes sold legally are nicotine-free. There is uncertainty about the long-term health effects of e-cigarettes and whether they will help individual tobacco users stop smoking. There are also public health concerns about the effect of e-cigarettes on smoking prevalence and their potential use by children as a gateway to subsequent use of combustible tobacco products.


Prevalence and factors associated with safe infant sleep practices

Authors: Hirai A et al.

Summary: This study determined the prevalence of safe infant sleep practices in the US. Analysis of Pregnancy Risk Assessment Monitoring System data (2016) from 29 US states found that 78.0% of mothers usually placed their infants to sleep on their backs, and 57.1% reported room-sharing without bed-sharing. 42.4% avoided soft bedding and 31.8% used a separate approved sleep surface. Receiving provider advice ranged from 48.8% (room-sharing without bed-sharing) to 92.6% (back sleep position) and was associated with increased use of safe sleep practices.

Comment: The prone sleeping position is the strongest modifiable risk factor for sudden infant death syndrome (SIDS). In case-control studies, the odds ratio for the risk of prone sleeping ranges between 2.3 and 13.1. Following recommendations in the 1990s to place infants on their back to sleep, there has been a significant (about 50%) decrease in the rate of SIDS in various countries, including Australia. Some aspects of the sleep environment, including soft sleep surfaces, loose bedding and toys, crib bumper pads, and co-sleeping with a parent also appear to be risk factors. The issue of bed-sharing is however controversial. This is in part because the risk of bed-sharing may be relatively low if none of the additional risk factors outlined above are present and because of the potentially beneficial effects of bed-sharing on breastfeeding and parental sleep.


Assocation of pediatric obesity treatment, including a dietary component, with change in depression and anxiety

Authors: Jebeile H et al.

Summary: This meta-analysis investigated the impact of obesity treatment interventions on symptoms of depression and anxiety in overweight/obese children and adolescents. A search of MEDLINE, Embase, Cochrane Library, and PsychINFO identified 44 studies that were suitable for inclusion. Participants (n=3702) were aged 5.6–16.6 years, and intervention duration ranged from 2 weeks to 15 months. The studies reported either no change or a significant reduction in symptoms of depression or anxiety. Meta-analysis of the data found a reduction in depressive symptoms post-intervention that was maintained at follow up (6–16 months). Anxiety was also reduced post-intervention and at follow-up. Longer intervention duration was associated with a greater reduction in anxiety, and a higher body mass index z-score at baseline was associated with a greater reduction in depression.

Comment: Psychosocial consequences of childhood obesity are widespread. These include social isolation, distorted peer relationships, poor self-esteem, distorted body image, anxiety, and depression. The risk of psychosocial morbidity increases with increasing age and is greater among girls than boys. Adolescents with obesity also experience bias and bullying from their peers with many, particularly girls, developing a negative self-image that persists into adulthood. Data from the National Longitudinal Survey of Youth indicate that women, but not men, who were obese in late adolescence and early adulthood completed fewer years of advanced education and had decreased family income, lower rates of marriage, and higher rates of poverty compared with their non-obese peers.


Independent commentary by Professor Nick Freezer, who is a Paediatric Respiratory Physician and the Medical Director of the Monash Children’s Hospital, Melbourne at Monash Health. He is also a Professor of Paediatrics at Monash University, and until recently the Leader of the Children’s Health research theme of Monash Partners Academic Health Science Centre and Monash Health Translation Precinct. A practicing respiratory and sleep physician for over 20 years and with over 100 papers and abstracts published in peer review journals, Prof Freezer was among the first researchers to alert the world to the dangers of overdosing asthmatic children with inhaled corticosteroids and the benefits of using steroids to treat croup. Previous roles include the Director of Respiratory Medicine at Royal Children’s Hospital, Melbourne (2000-2005) and Monash Medical Centre (1995-2006).
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PDE4= phosphodiesterase 4.

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Behavior and quality of life at 6 years for children with hypoplastic left heart syndrome

Authors: Goldberg C et al., for the PHN Investigators

Summary: This analysis of the Single Ventricle Reconstruction trial evaluated the behaviour, quality of life (QoL), and functional status of 6-year-old children with hypoplastic left heart syndrome. Parent-response instruments included the Vineland Adaptive Behavior Scales, Second Edition (Vineland-II; primary outcome), Behavior Assessment System for Children 2, Pediatric Quality of Life Inventory 4.0, and other measures of QoL and functional status. 250 children with hypoplastic left heart syndrome were assessed and were found to have difficulty in areas of adaptive behaviour, QoL, and functional status at 6 years of age compared with population norms. The main risks for adverse outcomes included sociodemographic factors and measures of greater course complexity.

Comment: Children with congenital heart disease are at increased risk for neurodevelopmental disorders, disabilities, or developmental delay and abnormalities in executive function. Following a Fontan operation, functional and developmental status can range from normal to severely limited. Limitations may be due to genetic or developmental issues, or to operable biventricular physiology. Developmental limitations warrant genetic and neurological assessment to identify and address treatable causes. In a study comparing 156 adolescents after Fontan operation with 111 healthy controls, the Fontan patients had a higher rate of any lifetime psychiatric diagnosis (65% vs 22%). Fontan patients also had higher rates of any lifetime disruptive behaviour disorder (DBD), and scored lower on the 4-12 Children’s Global Assessment scale, a common measure of psychosocial function. Concerns for any psychiatric illness in a Fontan patient warrant full assessment by psychology or psychiatry specialists.


Abstract

Management and outcomes of patients presenting to the emergency department with croup: can we identify which patients can safely be discharged from the emergency department?

Authors: Elder A & Rau A

Summary: This retrospective cohort study described the clinical characteristics, management and outcomes of children presenting to the ED with croup to help identify characteristics associated with a need for further intervention. 112 children aged 6 months to 6 years who presented to an ED with croup and received nebulised adrenaline were included. Half of them were subsequently discharged home and half were admitted to hospital. None of the discharged patients required further intervention, but 19% of admitted patients did. Heart rate, fever and stridor were symptoms associated with a need for further intervention, as were younger age and history of a chronic medical condition.

Comment: Treatment with oral, intravenous or intramuscular steroids is now common place in the management of croup. In addition, nebulised adrenaline may be required for moderate to severe croup. Patients who have a good response to initial treatment should be observed for 3–4 hours after pharmacological intervention. Croup symptoms usually improve within 30 minutes of the administration of nebulised adrenaline, but may recur as the effects wear off, usually by 2 hours. After 3–4 hours of observation, children who remain comfortable may be discharged home if they meet the following criteria: no stridor at rest, normal pulse oximetry, good air exchange, normal colour, normal level of consciousness and demonstrated ability to tolerate fluids by mouth. Caregivers must understand the indications for return to care and, before discharge, follow-up with the primary care provider should be arranged within the next 24 hours. Instructions regarding home treatment should be provided. Approximately 5% of children well enough for discharge from the ED after receiving corticosteroids and nebulised adrenaline are expected to return for care.


Abstract

Visual cognitive impairments in children at risk of prenatal alcohol exposure

Authors: Castillo Castejón O et al.

Summary: This Spanish study evaluated visual cognitive impairments in children at risk for prenatal alcohol exposure. Two cohorts of children aged 5–18 years were included: 79 children adopted from Eastern Europe, and age-and gender-matched children born in Spain (controls). Adoptees had worse visual motor and visual perceptual skills than controls, and worse face recognition. 21 adopted children (26.6%) were assessed as having foetal alcohol spectrum disorder (FASD). The main facial features related to FASD correlated with visual cognitive outcomes. Children with FASD had incrementally worse visual perceptual and visual motor outcomes than those without FASD.

Comment: Alcohol is a teratogen with irreversible CNS effects. Prenatal exposure to alcohol is a leading preventable cause of birth defects and developmental disabilities. CNS involvement with clear evidence of brain involvement or neurobehavioural impairment is a characteristic feature of FASD and is required for a diagnosis. FASD is a term that is used to describe the range of physical, behavioural, and neurodevelopmental effects that can occur in an individual after prenatal exposure to alcohol and may have lifelong implications. In children, manifestations may include hyperactivity, inattention, cognitive impairment, emotional reactivity, learning disabilities, hypotonia, auditory and visual impairment, seizures, and deficits in memory and reasoning.


Abstract

A randomized controlled trial of interventions for growth suppression in children with attention-deficit/hyperactivity disorder treated with central nervous system stimulants

Authors: Waxmonsky J et al.

Summary: This study evaluated the effects of CNS stimulants on growth in children with ADHD, and the efficacy of weight recovery interventions. 230 children aged 5–12 years with ADHD and no history of chronic CNS stimulant use were randomised to receive daily CNS stimulants (controlled release oral methylphenidate) or behavioural treatment for 30 months. After 6 months, 71 children with a decline in body mass index of >0.5 z-units were randomised to 1 of 3 weight recovery interventions: monthly monitoring of height/weight plus continued daily medication; drug holidays with medication only on school days; or daily caloric supplementation plus daily medication. CNS stimulants were associated with significant reductions in standardised weight and height compared with behavioural treatment. In children assigned to weight recovery, caloric supplementation and drug holidays increased weight velocity more than monthly monitoring. None of the weight recovery interventions increased height velocity.

Comment: When children or adolescents who are being treated with stimulant medications develop adverse effects, it is important to determine the timing of the effect in relation to medication administration and whether the effect is related to a coexisting disorder or environmental stressor. Mild adverse effects may resolve with time or can be addressed by adjusting the dose, time of administration, or formulation of the stimulant. Common side effects include a decreased appetite, which can be addressed by giving the medication with or after a meal, and poor growth. Drug holidays may be beneficial for children in whom stimulant therapy is associated with a growth trajectory that crosses two percentiles. Drug holidays should only be undertaken if they can be tolerated without marked impairment in functioning. Poor growth that does not respond to drug holidays should be discussed with families to determine preferences for continued treatment. Nutritional supplementation to facilitate growth while taking medications may also be warranted.

Reference: J Am Acad Child Adolesc Psychiatry 2019; published online Aug 29

Abstract

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