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NEWS
Cerebral Palsy Research

Monday 1 February 2016

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Professor Nadia Badawi AM
Macquarie Group Foundation Chair of Cerebral Palsy

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Interventions and Management

1. Pediatr Phys Ther. 2016 Jan 20. [Epub ahead of print]

Modified Constraint-Induced Movement Therapy as a Home-Based Intervention for Children With Cerebral Palsy.

Psychouli P, Kennedy CR.

PURPOSE: This study was designed to investigate the benefit to upper limb function of a home-based version of pediatric constraint-induced movement therapy, which was delivered across 2 months. METHODS: Nine children (mean age: 6 years, 9 months) with hemiplegic cerebral palsy participated in this A1-B-C-A2 design, where A1 and A2 were nonintervention phases. In phases B and C, participants wore a splint on the unaffected hand. In phase C, motivating feedback through a computer game was added. RESULTS: The Melbourne Assessment of Unilateral Upper Limb Function and the Quality of Upper Extremity Skills Test scores were significantly higher at the end of phases B (P = .037 and P = .006, respectively) and C (P = .001 and P = .001, respectively). Melbourne scores remained higher at the end of phase A2 (P = .001). CONCLUSIONS: A nonintensive form of home-based constraint-induced movement therapy was found to be effective. Improvements were larger after the second month of intervention.

PMID: 26808960

2. Hum Mov Sci. 2016 Apr;46:239-50. doi: 10.1016/j.humov.2016.01.010.

Kinematic parameters of hand movement during a disparate bimanual movement task in children with unilateral Cerebral Palsy.

Rudisch J, Butler J, Izadi H, Zielinski IM, Aarts P, Birtles D, Green D.

Children with unilateral Cerebral Palsy (uCP) experience problems performing tasks requiring the coordinated use of both hands (bimanual coordination; BC). Additionally, some children with uCP display involuntary symmetrical activation of the opposing hand (mirrored movements). Measures, used to investigate therapy-related improvements focus on the functionality of the affected hand during unimanual or bimanual tasks. None however specifically address spatiotemporal integration of both hands. We explored the kinematics of hand movements during a bimanual task to identify parameters of BC. Thirty-seven children (aged 10.9±2.6years, 20 male) diagnosed with uCP participated. 3D kinematic motion analysis was performed during the task requiring opening of a box with their affected- (AH) or less-affected hand (LAH), and pressing a button inside with the opposite hand. Temporal and spatial components of data were extracted and related to measures of hand function and level of impairment. Total task duration was correlated with the Jebsen-Taylor Test of Hand Function in both conditions

(either hand leading with the lid-opening). Spatial accuracy of the LAH when the box was opened with their AH was correlated with outcomes on the Children's Hand Use Experience Questionnaire. Additionally, we found a subgroup of children displaying non-symmetrical movement interference associated with greater movement overlap when their affected hand opened the box. This subgroup also demonstrated decreased use of the affected hand during bimanual tasks. Further investigation of bimanual interference, which goes beyond small scaled symmetrical mirrored movements, is needed to consider its impact on bimanual task performance following early unilateral brain injury.

PMID: 26803675

3. Indian J Pediatr. 2016 Jan 23. [Epub ahead of print]

Musculoskeletal Evaluation of Children with Cerebral Palsy.

Johari R, Maheshwari S, Thomason P, Khot A.

Cerebral Palsy (CP) is the most common chronic disability of childhood. The problems involved are complex; not only do these children have problems of mobility, but a plethora of associated problems [1]. A recent definition of CP includes secondary musculoskeletal problems [2]. The inclusion of this in the definition recognises the significance of musculoskeletal problems and the impact these problems have on the lives of children with CP and their families. Orthopedic management of the child with CP aims to reduce the impact of these musculoskeletal problems to help the child with CP to reach his maximum potential [3]. To accurately assess children and prepare management plans, a combination of medical history, physical examination, functional assessment, medical imaging, observational and instrumented gait analysis, and assessment of patient and family goals must be interpreted [4]. A detailed annual orthopedic assessment for all children with CP is recommended [5]. For an ambulant child, more frequent assessments are required during periods of rapid growth, observed deterioration in physical examination measures, and after interventions, including gait correction surgery. For a non-ambulant child, more frequent assessments are indicated according to hip surveillance guidelines [6, 7], during periods of observed deterioration, and following interventions such as hip or spine surgery. A systematic and practiced routine is conducive to efficiency and accuracy [5]. This paper discusses the Physical Examination Protocol used by the Hugh Williamson Gait Analysis Laboratory, in Melbourne, Australia.

PMID: 26801500

4. Pediatrics. 2016 Jan 26. pii: peds.2015-2830. [Epub ahead of print]

AbobotulinumtoxinA for Equinus Foot Deformity in Cerebral Palsy: A Randomized Controlled Trial.

Delgado MR, Tilton A, Russman B, Benavides O, Bonikowski M, Carranza J, Dabrowski E, Dursun N, Gormley M, Jozwiak M, Matthews D, Maciag-Tymecka I, Unlu E, Pham E, Tse A, Picaut P.

BACKGROUND: Although botulinum toxin is a well-established treatment of focal spasticity in cerebral palsy, most trials have been small, and few have simultaneously assessed measures of muscle tone and clinical benefit. METHODS: Global, randomized, controlled study to assess the efficacy and safety of abobotulinumtoxinA versus placebo in cerebral palsy children with dynamic equinus foot deformity. Patients were randomized (1:1:1) to abobotulinumtoxinA 10 U/kg/leg, 15 U/kg/leg, or placebo injections into the gastrocnemius-soleus complex (1 or both legs injected). In the primary hierarchical analysis, demonstration of benefit for each dose required superiority to placebo on the primary (change in Modified Ashworth Scale from baseline to week 4) and first key secondary (Physician's Global Assessment at week 4) end points. RESULTS: Two hundred and forty-one patients were randomized, and 226 completed the study; the intention to treat population included 235 patients (98%). At week 4, Modified Ashworth Scale scores significantly improved with abobotulinumtoxinA; mean (95% confidence interval) treatment differences versus placebo were -0.49 (-0.75 to -0.23; P = .0002) for 15 U/kg/leg and -0.38 (-0.64 to -0.13; P = .003) for 10 U/kg/leg. The Physician's Global Assessment treatment differences versus placebo of 0.77 (0.45 to 1.10) for 15 U/kg/leg and 0.82 (0.50 to 1.14) for 10 U/kg/leg were also significant (both Ps < .0001). The most common treatment-related adverse event was muscular weakness (10 U/Kg/leg = 2; placebo = 1). CONCLUSIONS: AbobotulinumtoxinA improves muscle tone in children with dynamic equinus resulting in an improved overall clinical impression and is well tolerated.

PMID: 26812925

5. Pediatr Phys Ther. 2016 Jan 20. [Epub ahead of print]

Six-Minute Walk Test in Children With Spastic Cerebral Palsy and Children Developing Typically.

Fitzgerald D, Hickey C, Delahunt E, Walsh M, O'Brien T.

PURPOSE: To quantify the 6-minute walk test (6MWT) in children with spastic cerebral palsy (CP) functioning at Gross Motor Function Classification System (GMFCS) levels I to III and to compare with a sample of children with typical development (TD). METHODS: A total of 145 children with CP and 137 children with TD completed the 6MWT.
RESULTS: Mean 6MWT scores were 439.57 ± 49.81 m for children functioning at GMFCS level I (n = 74), 386.74 ± 66.47 m for GMFCS level II (n = 53), 305.28 ± 66.95 m for GMFCS level III (n = 18), and 528.42 ± 67.77 m for children with TD (n = 137). Results of a pair-wise comparison showed significant differences (P < .001) between 6MWT scores of children with CP across GMFCS levels I to III and children with TD. CONCLUSION: A range of 6-minute walk distance reference values for children with spastic CP and children with TD were established.

PMID: 26808959

6. Exp Brain Res. 2016 Jan 28. [Epub ahead of print]

Motor imagery training promotes motor learning in adolescents with cerebral palsy: comparison between left and right hemiparesis.

Cabral-Sequeira AS, Coelho DB, Teixeira LA.

This experiment was designed to evaluate the effects of pure motor imagery training (MIT) and its combination with physical practice on learning an aiming task with the more affected arm in adolescents suffering from cerebral palsy. Effect of MIT was evaluated as a function of side of hemiparesis. The experiment was accomplished by 11- to 16-year-old participants (M = 13.58 years), who suffered left (n = 16) or right (n = 15) mild hemiparesis. They were exposed to pure MIT (day 1) followed by physical practice (day 2) on an aiming task demanding movement accuracy and speed. Posttraining movement kinematics of the group receiving MIT were compared with movement kinematics of the control group after receiving recreational activities (day 1) and physical practice (day 2). Kinematic analysis showed that MIT led to decreased movement time and straighter hand displacements to the target. Performance achievements from MIT were increased with further physical practice, leading to enhanced effects on motor learning. Retention evaluation indicated that performance improvement from pure MIT and its combination with physical practice were stable over time. Performance achievements were equivalent between adolescents with either right or left hemiparesis, suggesting similar capacity between these groups to achieve performance improvement from pure imagery training and from its association with physical practice. Our results suggest that motor imagery training is a procedure potentially useful to increase motor learning achievements in individuals suffering from cerebral palsy.

PMID: 26821314

Prevention and Cure

7. PLoS One. 2016 Jan 28;11(1):e0148122. doi: 10.1371/journal.pone.0148122. eCollection 2016.

Relevant Obstetric Factors for Cerebral Palsy: From the Nationwide Obstetric Compensation System in Japan.

Hasegawa J, Toyokawa S, Ikenoue T, Asano Y, Satoh S, Ikeda T, Ichizuka K, Tamiya N, Nakai A, Fujimori K, Maeda T, Masuzaki H, Suzuki H, Ueda S; Prevention Recurrence Committee, Japan Obstetric Compensation System for Cerebral Palsy.

OBJECTIVE: The aim of this study was to identify the relevant obstetric factors for cerebral palsy (CP) after 33

weeks' gestation in Japan. STUDY DESIGN: This retrospective case cohort study (1:100 cases and controls) used a Japanese national CP registry. Obstetric characteristics and clinical course were compared between CP cases in the Japan Obstetric Compensation System for Cerebral Palsy database and controls in the perinatal database of the Japan Society of Obstetrics and Gynecology born as live singleton infants between 2009 and 2011 with a birth weight ≥ 2,000 g and gestation ≥ 33 weeks. RESULTS: One hundred and seventy-five CP cases and 17,475 controls were assessed. Major relevant single factors for CP were placental abnormalities (31%), umbilical cord abnormalities (15%), maternal complications (10%), and neonatal complications (1%). A multivariate regression model demonstrated that obstetric variables associated with CP were acute delivery due to non-reassuring fetal status (relative risk [RR]: 37.182, 95% confidence interval [CI]: 20.028-69.032), uterine rupture (RR: 24.770, 95% CI: 6.006-102.160), placental abruption (RR: 20.891, 95% CI: 11.817-36.934), and preterm labor (RR: 3.153, 95% CI: 2.024-4.911), whereas protective factors were head presentation (RR: 0.199, 95% CI: 0.088-0.450) and elective cesarean section (RR: 0.236, 95% CI: 0.067-0.828). CONCLUSION: CP after 33 weeks' gestation in the recently reported cases in Japan was strongly associated with acute delivery due to non-reassuring fetal status, uterine rupture, and placental abruption.

PMID: 26821386

Special Edition – Part publication of the Australian Cerebral Palsy Register Supplement

1. Foreword
Article first published online: 19 JAN 2016 | DOI: 10.1111/dmcn.13006
Christine Cans and Nicole Gerrand

Wiley Online: http://onlinelibrary.wiley.com/doi/10.1111/dmcn.13006/abstract

2. Acknowledgements
Article first published online: 19 JAN 2016 | DOI: 10.1111/dmcn.13003

Wiley Online: http://onlinelibrary.wiley.com/doi/10.1111/dmcn.13003/abstract

3. Dev Med Child Neurol. 2016 Jan 24. doi: 10.1111/dmcn.13002. [Epub ahead of print]

Australia and the Australian Cerebral Palsy Register for the birth cohort 1993 to 2006.

Australian Cerebral Palsy Register Group.

This is a brief background paper for a supplementary issue of Developmental Medicine & Child Neurology by the Australian Cerebral Palsy Register Group. It provides context for the reader of the supplement including a description of the establishment and development of state and territory cerebral palsy registers in Australia.

PMID: 26806361

4. Dev Med Child Neurol. 2016 Jan 13. doi: 10.1111/dmcn.13026. [Epub ahead of print]

A special supplement: findings from the Australian Cerebral Palsy Register, birth years 1993 to 2006.

Smithers-Sheedy H, McIntyre S, Gibson C, Meehan E, Scott H, Goldsmith S, Watson L, Badawi N, Walker K, Novak I, Blair E; Australian Cerebral Palsy Register Group.

AIM: To briefly outline the strengths and limitations of cerebral palsy (CP) registers, and to report on findings of the Australian Cerebral Palsy Register (ACPR) pertaining to a population cohort of children with CP. METHOD: De-

identified data were extracted from the ACPR for people with CP in birth years 1993 to 2006, from South Australia, Victoria, and Western Australia. Live birth prevalence of CP was estimated and risk factors described. RESULTS: The overall birth prevalence of CP (including those whose CP was postneonatally acquired) for the 1993 to 2006 birth cohort was 2.1 per 1000 live births (95% confidence interval [CI] 2.0-2.2). Excluding cases with a known postneonatal cause, the birth prevalence for pre/perinatally acquired CP was 2.0 per 1000 live births (95% CI 1.9-2.1). A downward trend in rates of CP in those born extremely preterm was evident over at least three consecutive periods across all three regions. Most (58.6%) children were born at term (≥37wks). Male sex, early gestational age, low birthweight, and multiple birth were risk factors for CP. INTERPRETATION: Overall rates of CP did not change during this period. The proportion of those with CP born extremely preterm decreased. The ACPR Group will investigate whether this pattern continues when data pertaining to the next birth cohort for all three regions becomes available.

PMID: 26762930

5. Dev Med Child Neurol. 2016 Jan 19. doi: 10.1111/dmcn.12999. [Epub ahead of print]

An international survey of cerebral palsy registers and surveillance systems.

Goldsmith S, McIntyre S, Smithers-Sheedy H, Blair E, Cans C, Watson L, Yeargin-Allsopp M, Australian Cerebral Palsy Register Group.

AIM: To describe cerebral palsy (CP) surveillance programmes and identify similarities and differences in governance and funding, aims and scope, definition, inclusion/exclusion criteria, ascertainment and data collection, to enhance the potential for research collaboration. METHOD: Representatives from 38 CP surveillance programmes were invited to participate in an online survey and submit their data collection forms. Descriptive statistics were used to summarize information submitted. RESULTS: Twenty-seven surveillance programmes participated (25 functioning registers, two closed owing to lack of funding). Their aims spanned five domains: resource for CP research, surveillance, aetiology/prevention, service planning, and information provision (in descending order of frequency). Published definitions guided decision making for the definition of CP and case eligibility for most programmes. Consent, case identification, and data collection methods varied widely. Ten key data items were collected by all programmes and a further seven by at least 80% of programmes. All programmes reported an interest in research collaboration.
INTERPRETATION: Despite variability in methodologies, similarities exist across programmes in terms of their aims, definitions, and data collected. These findings will facilitate harmonization of data and collaborative research efforts, which are so necessary on account of the heterogeneity and relatively low prevalence of CP.

PMID: 26781543

6. Dev Med Child Neurol. 2016 Jan 14. doi: 10.1111/dmcn.13000. [Epub ahead of print]

Interobserver reliability of the Australian Spasticity Assessment Scale (ASAS).

Love S, Gibson N, Smith N, Bear N, Blair E; Australian Cerebral Palsy Register Group.

AIM: The aim of this paper is to present the Australian Spasticity Assessment Scale (ASAS) and to report studies of its interrater reliability. The ASAS identifies the presence of spasticity by confirming a velocity-dependent increased response to rapid passive movement and quantifies it using an ordinal scale. METHOD: The rationale and procedure for the ASAS is described. Twenty-two participants with spastic CP (16 males; age range 1y 11mo-15y 3mo) who had not had botulinum neurotoxin-A within 4 months, or bony or soft tissue surgery within 12 months, were recruited from the spasticity management clinic of a tertiary paediatric teaching hospital. Fourteen muscles in each child were assessed by each of three experienced independent raters. ASAS was recorded for all muscles. Interrater reliability was calculated using the weighted kappa statistic (quadratic weighting; κqw) for individual muscles, for upper limbs, for lower limbs, and between raters. RESULTS: The weighted kappa ranged between 0.75 and 0.92 for individual muscle groups and was 0.87 between raters. INTERPRETATION: The ASAS complies with the definition of spasticity and is clinically feasible in paediatric settings. Our estimates of interrater reliability for the ASAS exceed that of the most commonly used spasticity scoring systems.

PMID: 26762706

7. Dev Med Child Neurol. 2016 Jan 13. doi: 10.1111/dmcn.13001. [Epub ahead of print]

Temporal trends in cerebral palsy by impairment severity and birth gestation.

Reid SM, Meehan E, McIntyre S, Goldsmith S, Badawi N, Reddihough DS; Australian Cerebral Palsy Register Group.

AIM: Our aim was to build on previous research indicating that rates of cerebral palsy (CP) in the Australian state of Victoria are declining, and examine whether severity of impairments is also decreasing. METHOD: Data on individuals with CP were extracted from the Victorian Cerebral Palsy Register for birth years 1983 to 2009. The yearly rates of dichotomized categories for gross motor function, motor laterality, intellectual impairment, and epilepsy per 1000 neonatal survivors and proportions in the CP cohort were tabulated and plotted by birth gestation. Linear regression modelling was used to fit prediction curves; likelihood ratio tests were used to test for differences in trends between impairment severity groups. RESULTS: Since the mid-1990s, CP rates declined in neonatal survivors of birth at all gestations. Our data suggest that the decreasing CP rates were associated with relatively greater decreases in the rates of Gross Motor Function Classification System levels III to V, bilateral CP, epilepsy, and intellectual impairment (all $p<0.005$). Some variation was seen between birth gestation groups. INTERPRETATION: Declines in rates of CP of all levels of severity and complexity from the mid-1990s provides 'real-world' support for the effectiveness of concurrent neuroprotective strategies and continual innovation in perinatal practices.

PMID: 26762733

8. Dev Med Child Neurol. 2016 Jan 19. doi: 10.1111/dmcn.13005. [Epub ahead of print]

Comparing risks of cerebral palsy in births between Australian Indigenous and non-Indigenous mothers.

Blair E, Watson L, Okearney E, Dantoine H, Delacy M; Australian Cerebral Palsy Register Group.

AIM: To compare proportions of live births subsequently described as having cerebral palsy (CP), the distributions of associated impairments, and the causes of postneonatal CP between Aboriginal and Torres Strait Islander (Indigenous) and non-Indigenous populations in Australia. METHOD: Data from statutory birth records and CP registers for the 1996 to 2005 birth cohort in Queensland, Western Australia, and the Northern Territory were stratified by Indigenous status and whether the CP was acquired pre/perinatally or postneonatally. Relative risks associated with Indigenous status were estimated and the distributions of causes of postneonatal CP compared. RESULTS:
Indigenous births had a relative risk of 4.9 (95% confidence interval [CI] 3.0-7.9) for postneonatal CP but only of 1.42 (95% CI 1.2-1.7) for pre/perinatal CP. Almost half of postneonatal CP in Indigenous infants resulted from infection, whereas for non-Indigenous infants the most frequent cause was cerebrovascular accident. The impairments of Indigenous CP and of postneonatally acquired CP tended to be more numerous and more severe. INTERPRETATION: Indigenous children are at significantly greater risk of CP, particularly postneonatal CP. The predominant cause of postneonatal CP in non-Indigenous children has shifted to cerebrovascular accident over time; however, infections followed by head injury are still the most frequent causes in Indigenous infants.

PMID: 26781773

9. Dev Med Child Neurol. 2016 Jan 14. doi: 10.1111/dmcn.13021. [Epub ahead of print]

Biological sex and the risk of cerebral palsy in Victoria, Australia.

Reid SM, Meehan E, Gibson CS, Scott H, Delacy M; Australian Cerebral Palsy Register Group.

AIM: Males typically outnumber females in cerebral palsy (CP) cohorts. To better understand this 'male disadvantage' and provide insight into causal pathways to CP, this study used 1983 to 2009 Australian CP and population birth cohorts to identify associations and trends with respect to biological sex and CP. METHOD: Within birth gestation groups, sex ratios were calculated to evaluate any male excess in the CP cohort compared with livebirths, neonatal deaths, neonatal mortality and survival rates, neonatal survivors, and CP rates in survivors. Sex

- and gestation-specific trends in neonatal mortality, CP rates, and CP sex ratios were assessed by plotting their annual frequencies and fitting quadratic curves. RESULTS: Over-representation of males in preterm live births partly explained the male excess in the CP cohort after preterm birth, especially at 28 to 31 weeks. Higher CP rates in male neonatal survivors also contributed to the male excess in CP, particularly at <28 and 37+ weeks. Higher neonatal mortality rates in males at all gestations had little impact on the CP sex ratio. There was no clearly discernible change over time in the CP sex ratio. INTERPRETATION: Gestation-specific associations between sex and CP provide insight into causal pathways to CP and suggest sex-specific differences in response to neuroprotective strategies.

PMID: 26762863

10. Dev Med Child Neurol. 2016 Jan 17. doi: 10.1111/dmcn.13012. [Epub ahead of print]

Profile of associated impairments at age 5 years in Australia by cerebral palsy subtype and Gross Motor Function Classification System level for birth years 1996 to 2005.

deLacy MJ, Reid SM; Australian cerebral palsy register group.

AIM: To describe the distribution of impairments among persons with cerebral palsy (CP) in a large Australian cohort.
METHOD: Records of persons on the Australian Cerebral Palsy Register (ACPR) (n=3466) born from 1996 to 2005 were reviewed to extract year of birth, sex, CP subtype, Gross Motor Function Classification System (GMFCS) level, and impairments in vision, hearing, speech, intellect, and epilepsy. The distributions of GMFCS levels and CP subtype were plotted, and the proportions of each level of impairment were tabulated and presented as stacked graphs within the GMFCS and CP subtype distributions. RESULTS: The proportions of persons with CP with each associated impairment increased with increasing GMFCS level. Compared with other spastic CP subtypes, individuals with spastic quadriplegia had higher frequencies of all associated impairments. Other than epilepsy, which was most prevalent in persons with spastic quadriplegia (53%), all impairments were most frequent in non-spastic CP subtypes. Hearing impairment was recorded for 21% of persons with dyskinesia whereas the hypotonic subtype had the highest prevalence of visual impairment (57%), intellectual impairment (90%), and speech impairment (95%). INTERPRETATION: Distributions of associated impairments across all GMFCS levels and CP subtypes in a large cohort are presented in formats suitable for clinical use and discussion with families.

PMID: 26777873

11. Dev Med Child Neurol. 2016 Jan 14. doi: 10.1111/dmcn.13020. [Epub ahead of print]

Strabismus, a preventable barrier to social participation: a short report.

Blair E, Smithers-Sheedy H; Australian Cerebral Palsy Register Group.

Isolated strabismus does not significantly impair visual functionality and has traditionally been considered a primarily cosmetic defect of little importance. However, even in the absence of strabismus amblyopia, manifest strabismus and its non-surgical treatments can render the person less socially acceptable, creating a barrier to participation and resulting in psychosocial disadvantage that has been documented in the typically developing population. The Australian Cerebral Palsy Register traditionally recorded strabismus only if it were not accompanied by visual impairment; however, even these data indicate that the proportion of cerebral palsy registrants with strabismus is many times higher than in comparable population samples, compounding their challenges to achieve participation. It is therefore inappropriate to continue to consider strabismus as merely a cosmetic defect, but one that deserves surgical correction early in life.

PMID: 26762817

12. Dev Med Child Neurol. 2016

Change in residential remoteness during the first 5 years of life in an Australian cerebral palsy cohort

Michael J DeLacy, Christalla Louca, Hayley Smithers-Sheedy, Sarah McIntyre and on behalf of the Australian Cerebral Palsy Register Group

Aim: To determine if families of children with cerebral palsy living in Australia move to less remote areas between birth and 5 years. Method: Children on the Australian Cerebral Palsy Register (n=3399) born 1996 to 2005, were assigned a remoteness value for family residence at birth and 5 years using a modification of the Australian Statistical Geography Standard. Each value at birth was subtracted from the value at 5 years yielding a positive difference if they moved more remotely, negative difference if they moved less remotely and a value of zero if they did not move or moved to an equally remote residence. Results: The small net increase in remoteness across this cohort was non-significant (p=0.43). Fifty-seven per cent of families changed postcode but only 20% changed remoteness, 11% more remotely, and 9% less remotely. There was a small trend for families with a child with more impaired gross motor function (Gross Motor Function Classification System levels IV and V) to move to a less remote area. Interpretation:
This cohort of families with children with cerebral palsy did not appear to move to less remote areas by age 5 years. Remoteness at birth and level of gross motor function seem to have little effect.

Wiley Online: http://onlinelibrary.wiley.com/doi/10.1111/dmcn.13013/abstract
PMID: Not yet available

13. Dev Med Child Neurol. 2016 Jan 19. doi: 10.1111/dmcn.13007. [Epub ahead of print]

The National Disability Insurance Scheme: a time for real change in Australia.

Reddihough DS, Meehan EM, Stott NS, Delacy M; Australian Cerebral Palsy Register Group.

In Australia, the supports and services for persons with disabilities have long been underfunded and fragmented. Often, individuals did not receive the services they needed, but rather the services they were entitled to based on how or when they acquired their disability. As a result, there was an increasing reliance on ageing carers, a lack of permanent and respite accommodation, and reduced employment and educational opportunities. Individuals with disabilities and their families were often isolated and financially disadvantaged. In March 2013, legislation was passed in Australia to establish a National Disability Insurance Scheme, a radical new way of funding disability services. No longer would funding be directed to agencies, but rather to individuals who would make their own plan and select their preferred services and service providers, giving them more control over the services and supports they receive. The hope is that this change from a welfare-driven to an insurance-based model will improve equity of service delivery, levels of participation, and overall quality of life among Australians with disabilities and their families.

PMID: 26782069

14. Dev Med Child Neurol. 2016 Jan 14. doi: 10.1111/dmcn.13015. [Epub ahead of print]

Congenital anomalies in cerebral palsy: where to from here?

McIntyre S, Blair E, Goldsmith S, Badawi N, Gibson C, Scott H, Smithers-Sheedy H; Australian Cerebral Palsy Register Group.

Proportions of cases of cerebral palsy (CP) with congenital anomalies recorded in Australian CP registers range from 15% to 40%. The anomalies seen in CP are extremely variable. We have identified that CP registers often do not have quality data on congenital anomalies, necessitating linkage with congenital anomaly registers. However, a lack of unified processes and definitions in congenital anomaly registers and data collections means that linkages are complex, need to be carefully planned, and limitations acknowledged. Historically in CP research, congenital anomalies have been classified by International Classification of Disease codes, then combined into brain and other major and minor anomalies. Systems have been developed to classify congenital anomalies into aetiologically

related groups, but such a classification has yet to be trialled in CP. It is anticipated that primary prevention of a small proportion of cases of CP is possible through the primary prevention of congenital anomalies, especially those due to teratogens. Owing to the anticipated low prevalence of each subgroup, global collaboration will be required to further these lines of enquiry.

PMID: 26762782

15. Dev Med Child Neurol. 2016 Jan 14. doi: 10.1111/dmcn.13014. [Epub ahead of print]

Cerebral palsy and perinatal mortality after pregnancy-induced hypertension across the gestational age spectrum: observations of a reconstructed total population cohort.

Blair E, Watson L; Australian Cerebral Palsy Register Group.

AIM: Pregnancy-induced hypertension/pre-eclampsia (PIH/PE) is associated with cerebral palsy (CP) in term births but if sufficiently severe to necessitate preterm delivery predicts a lower risk of CP than observed in gestational peers. We investigated whether this apparent 'protection' was attributable to inappropriately chosen comparison groups and/or an increased risk of perinatal death. METHOD: Perinatal information was collected from medical records of children with CP, individually matched neonatal survivors without CP, and representative samples of perinatal deaths of Western Australian birth cohorts from 1980 to 1995. Compared with these data, the sensitivity of statutorily collected PIH/PE data was assessed for each outcome group. Using these sensitivities, the estimated risks of death and CP in births to all women with and without PIH/PE were compared. RESULTS: Sensitivity of statutory PIH/PE data decreased with increasingly poor outcome. Reconstructed cohorts showed that PIH/PE increased the risks both of CP and of perinatal death in births at lower gestations except in births <27 weeks, where the risk of perinatal death only increased greatly. INTERPRETATION: PIH/PE does not protect against poor outcome at any gestational age. Previously reported protective effects originate from inappropriate control for gestational age and not from higher gestation-specific perinatal mortality.

PMID: 26762763