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THE BURDEN OF BRONCHOPULMONARY DYSPLASIA AND PULMONARY VASCULAR DISEASE IN PREMATURE INFANTS

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PRIMARY SUBJECT AREA: Neonatal-Perinatal Medicine

BACKGROUND: Extremely premature infants are at a high risk of bronchopulmonary dysplasia (BPD) and BPD-associated pulmonary hypertension (PH). Prolonged patency of the ductus arteriosus (PDA) may worsen PH; however, due to the lack of evidence supporting improvement in outcomes after strategies to promote ductal closure, our center has adopted a strict non-intervention policy since 2013.

OBJECTIVES: Assess PH prevalence and severity, as well as the impact of BPD on echocardiographic parameters of cardiac performance.

DESIGN/METHODS: Retrospective cohort of infants <29 weeks gestational age at birth, admitted between 2015 and 2019, and without genetic/congenital anomalies. Measurements from the echocardiography acquired closest to 36 weeks were done by masked experts. Severe BPD was defined as positive pressure support at 36 weeks. PH was defined as an estimated systolic pulmonary pressure (SPAP) ≥ 40 mmHg or an abnormal septal curvature by eccentricity index (EI) (>1.3).

RESULTS: Out of 387 infants, 222 were included, of which 27 (12%) were categorized as severe BPD and 78 (35%) had PH. Severe BPD was associated with lower birth weight (704 ± 214 vs 842 ± 229 g, $p < 0.01$), longer hospitalization (median 138 [IQR 108-167] vs 103 [IQR 86-125] days, $p < 0.01$) and longer mechanical ventilation duration (median 82 [IQR 33-107] vs 17 [IQR 2-32] days, $p < 0.01$), with no difference in gestational age at birth. Severe BPD was associated with PH (70% vs 43%, $p < 0.01$). The combined outcome of death (after the 36 weeks echocardiography) or severe BPD was associated with PH (68% vs 30%, $p < 0.01$), smaller left ventricle length in diastole (2.8 ± 0.5 vs 3.0 ± 0.5 cm, $p = 0.03$), decrease in the tricuspid annular plane systolic excursion (0.7 ± 0.2 vs 0.9 ± 0.2 cm, $p < 0.01$), abnormal EI (1.31 ± 0.25 vs 1.17 ± 0.18 , $p < 0.01$) and smaller right ventricle fraction area change (41.3 ± 5.8 vs $47.8 \pm 7.6\%$, $p < 0.01$), without a significant increase on SPAP (35 ± 21 vs 35 ± 14 , $p = 0.15$). Other echocardiographic markers were similar.

CONCLUSION: In the context of a PDA non-intervention policy, a third of our population was affected by PH at 36 weeks. Furthermore, those with severe BPD or death had signs of RV dysfunction (despite similar SPAP estimate), indicating that the effect of BPD on pulmonary vascular remodeling and cardiac function may be underestimated.

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HIGH SPONTANEOUS DUCTAL CLOSURE EVEN AT THE EXTREME OF PREMATURITY

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PRIMARY SUBJECT AREA: Neonatal-Perinatal Medicine

BACKGROUND: Extremely preterm newborns are at risk of prolonged patency of the ductus arteriosus (PDA). Current literature has failed to indicate improvement in outcomes after exposure to strategies promoting ductal closure. As such, our center abandoned these practices in 2013.

OBJECTIVES: Describe the spontaneous PDA closure in premature infants, including those infants born at the extreme of gestational age (< 26 weeks).

DESIGN/METHODS: Retrospective study of newborns < 29 weeks, admitted within 24 hours after birth between 2015 and 2019 and without genetic or congenital anomalies. Newborns who were last known to be alive, with an available echocardiography, and who were not exposed to any intervention to accelerate PDA closure were included. Images were reviewed by experts blinded to the outcomes.

RESULTS: 296 infants were analyzed. 37 (12%) did not survive their hospitalization, and 16 were exposed to interventions to accelerate ductal closure at some point during their lifetime (4 ligations, 4 catheter-closure, 5 ibuprofen and 3 acetaminophen). Out of the 243 remaining newborns, 214 had at least one echocardiography to ascertain ductal patency or closure (100% of those <26 weeks). The average gestational age was 26.3 ± 1.5 weeks, with 84 (39%) being <26 weeks. PDA closed spontaneously in 194 (91%), with 60 having closure ascertainment after discharge (average age at closure ascertainment of 36.4 [IQR: 34.4 - 40.1] weeks). Of the 84 <26 weeks, 76 (90%) had confirmation of ductal closure. The 20 infants with an open PDA at the last evaluation were followed in an outpatient setting and considered small/restrictive. In our cohort, 92/243 (38%) were exposed to post-natal steroids. In the <26 weeks group, 74% were exposed to steroids, at a cumulative dose of 1.64 [0.89 - 2.44] mg/kg. BPD was found in 57% of the overall cohort and in 79% of <26 weeks.

CONCLUSION: The majority of newborns < 29 weeks, and even those at the extreme of gestational age (< 26 weeks) spontaneously closed their PDA before term-corrected age. While BPD rate was similar to previous cohorts, post-natal steroids use was high.

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EXPLORING THE IMPACT OF COVID-19 ON FAMILIES OF CHILDREN WITH DEVELOPMENTAL DISABILITIES: A COMMUNITY-BASED FORMATIVE STUDY

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PRIMARY SUBJECT AREA: Developmental Paediatrics

BACKGROUND: The COVID-19 pandemic has impacted every facet of society but has been particularly disastrous for families of children with developmental disabilities (DD) living on the margins. The unprecedented repercussions of COVID-19, including quarantine, social distancing, and service restrictions, continue to disproportionately impact these families. This is a pattern observed in previous humanitarian crises, where there has been a lack of response for children with DD. There is an urgent need to understand the experiences of families of children with DD in order to develop a community-driven model of service provision.

OBJECTIVES: This study aims to identify the experienced impact of COVID-19 on families of children with DD who have significant needs and social barriers.

DESIGN/METHODS: This was a community-based participatory study using a formative research framework in accordance with COREQ

guidelines. In-depth interviews (IDIs) were conducted with caregivers and care providers of children with DD. Data were recorded, transcribed, and coded using deductive and inductive coding methods by three independent coders. A peer debriefing strategy was used to verify the coding approach and interpretation of findings in accordance with the RATS (relevance, appropriateness, transparency, and soundness) guidelines for qualitative research. Perceived parental stress and social support were explored using the Perceived Stress Scale (PSS-10) and Multidimensional Scale of Perceived Social Support (MSPSS).

RESULTS: A total of 25 IDIs were conducted. Of the 15 caregivers interviewed, five were new to Canada. Results suggested both newcomer and non-newcomer families of children with DD are in crisis, reporting high stress and low social support, with increased difficulties navigating and accessing therapies and programs, including those offered virtually. Participants reported behavioural regressions and increased anxiety among their children with DD, as well as caregiver mental health challenges. Providers reported having to change their service delivery model in accordance with public health recommendations, but caregivers said that they were not included in these decisions.

CONCLUSION: Families of children with DD face extraordinary barriers to care, which may be further compounded by the COVID-19 pandemic. Our study demonstrates the value of community-informed design, particularly in the setting of the COVID-19 pandemic. To deliver truly patient-centred services during the pandemic, there is an urgent need for responsive programming that is built with patients, for patients.

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A QUALITATIVE STUDY OF FACTORS THAT HELPED PREPARE ATHLETES FOR SPECIAL OLYMPICS SPORT PROGRAMS

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PRIMARY SUBJECT AREA: Developmental Paediatrics

BACKGROUND: Special Olympics (SO) is working to introduce more child and youth programs provincially and improve currently available programs. To date, there is little research published surrounding the experiences of SO athletes. Given the aim of SO to improve and grow the experience and health of youth, the present study explores the experiences of SO athletes and caregivers to understand what prepares athletes for SO programs and competition.

OBJECTIVES: 1. To describe the experience of SO athletes and caregivers and understand what best prepared them for their involvement in organized sport and physical activity. 2. To offer evidence-based strategies for creating an inclusive and encouraging environment for sports and physical activity for healthy active living and/or preparation for SO involvement.

DESIGN/METHODS: Both athletes and caregivers participated in semi-structured, conversation-based interviews. Eight English-speaking athletes involved in a variety of sports from around the province were interviewed, and four of these interviews included caregivers. Interviews were transcribed and coded using thematic analysis.

RESULTS: Five themes were identified throughout these interviews. The importance of a supportive environment emerged as a strong theme. Athletes valued the support of caregivers, coaches, and other players and felt this helped them improve and garner more enjoyment from their sport. Many athletes and caregivers discussed what motivated them to get involved and stay involved in SO. Common motivators included: a healthy, active lifestyle, friendships, and social skills. Barriers to involvement also were commonly discussed and included parental support, transportation, dissemination of information, and health concerns. Additionally, many athletes and caregivers felt that early involvement, starting with the basics, was important for developing skills to help transition to sports and

competition. Finally, types of programming, including non-specialized vs. specialized activities, were discussed. Advantages of non-specialized activities included more time for practice and integration into society.

CONCLUSION: It is important that programs create a supportive environment, as this helps athletes improve and leads to further enjoyment. There is benefit to participation in non-specialized activities. Future programs could consider the addition of inclusive activities, or promotion of these activities. The motivators for involvement should be encouraged, including friendships/social skills and a healthy/active lifestyle. The barriers identified should be addressed when developing programming. Early involvement and learning basic motor skills play an important role in preparing athletes for sports, and competition and may lead to further involvement in sports. Early participation should be encouraged, and programs should find ways to reach more of this population, possibly through schools or physicians.

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IMPACT OF CATHETER CHOICE ON PROCEDURAL SUCCESS OF MINIMALLY INVASIVE SURFACTANT THERAPY

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BACKGROUND: Surfactant delivery via a thin endotracheal catheter during spontaneous breathing, a technique called minimally invasive surfactant therapy (MIST), is an alternative to intubation and surfactant administration. Procedural details among different centres vary, with marked differences in the choice of catheter to instill surfactant. Studies report use of feeding catheters, multi-access catheters, vascular catheters and, recently, custom-designed catheters for this purpose. The impact of choice of catheter on procedural success and adverse effects has not been reported.

OBJECTIVES: The objective of the present study was to compare the procedural success and adverse effects of MIST, using a semi-rigid vascular catheter (16G Angiocath-Hobart Method) versus a flexible multi-access catheter (MAC).

DESIGN/METHODS: This was a retrospective review of prospectively collected data at a tertiary care neonatal intensive care unit in southwestern Ontario. All neonates who received surfactant via MIST between May 1, 2016 and September 30, 2020 were included in the study. Relevant baseline characteristics, data on procedural details (premedication, type of catheter) were collected. The procedural success, number of attempts, and adverse effects between neonates who received MIST via MAC and 16G Angiocath were compared using a Chi Square test or Fisher's test, as appropriate. A P value of less than 0.05 was considered significant.

RESULTS: A total of 139 neonates received surfactant via MIST method during the study period. 93 neonates received the surfactant via MAC, while 46 received it via Angiocath. The baseline demographic characteristics in the two groups were similar (Table 1). A higher proportion of neonates in the Angiocath group received atropine (100% vs. 76%, $P = .002$) and fentanyl (98% vs. 36%; $p < 0.001$) than the MAC group.

The procedural success was 91% in the Angiocath group and 89% in the MAC group ($p > .99$). Multiple attempts were needed in 24% of neonates in the Angiocath group, and 37% in the MAC group ($p = 0.158$). More episodes of desaturations were noted in the Angiocath group (89%) than the MAC group (69%) ($P = 0.012$). Other rates of common adverse effects were similar between the two groups (Table 2).

CONCLUSION: The overall procedural success of MIST was similar in both catheter groups. The proportion of neonates requiring multiple attempts was lower with Angiocath use, though this difference was not statistically significant. Desaturation episodes were seen more frequently in the Angiocath group, possibly related to higher use of procedural sedation in this group.