Is Kangaroo Mother Care Associated with Reducing the Odds of Autism Spectrum Disorder in preterm babies in Canada? A Protocol for a Longitudinal Quasi-experimental Study

Whitney (Huei-Chen) Chiu

1 Lay Summary

Autism Spectrum Disorder (ASD) can have devastating effects throughout life. People with ASD suffer impairment in social communication skills and language development. According to the 2015 data from the National Autism Spectrum Disorder Surveillance System (NASS), 1 in 66 Canadian children is diagnosed with Autism Spectrum Disorder. The risk of ASD is elevated by approximately 70% in preterm babies born between 28 to 37 weeks of gestational age. Kangaroo mother care, a new technique that involves placing the infant upright on the mother's bare chest to provide skin to skin contact between the mother and the infant, has been reported to have beneficial effects on cognitive functioning. In this study, we are studying the relationship between the intervention of KMC and the outcome of ASD in preterm babies. To understand the relationship, we will recruit 4238 preterm babies between 28 to 37 weeks gestational age, 2119 in intervention group and 2119 in control group. These subjects would be recruited either in the intervention or non-intervention group based on where they were given birth. The total amount of time spent on KMC will be recorded as the intervention variable for those who are in the intervention group, while those in the non-intervention group will receive traditional care, in which babies are placed in incubators. After subjects are discharged from the NICU in each hospital, they will be followed up starting their second birthday until they reach ten years old. Subjects will be screened annually in the follow-up period and referred to a comprehensive diagnostic evaluation if screening results were positive. Two different screening tools will be adopted considering the age of the subject being screening. By analyzing the data collected on the exposure and outcome variable from recruited subjects, we hope to identify the preventive effect provided by KMC, the skin to skin contact between mother and her preterm baby, on the outcome of ASD, and raise awareness of the importance of Kangaroo Mother Care.

2 Background and Research Aim

According to the 2015 data from the National Autism Spectrum Disorder Surveillance System (NASS), 1 in 66 Canadian children is diagnosed with Autism Spectrum Disorder. The risk of Autism spectrum Disorder (ASD) is elevated by approximately 70% in preterm babies born between 28 to 37 weeks of gestational age. Kangaroo mother care, a new technique that involves placing the infant upright on the mother's bare chest to provide skin to skin contact between the mother and the infant, has been reported to have a wide range of beneficial effects including improved brain and motor development, cognitive functioning, immunity, and physiologic stability [1]. Previous studies that examine the association between KMC and cognitive functioning mostly focused on examining the Intellectual Quotient(IQ) as the outcome; however, other studies suggest that almost half (44%) of children identified with ASD has average to above average

intellectual ability [2]. Few studies have been conducted to examine the preventive effect of KMC on the outcome of Autism spectrum Disorder in premature babies (gestational age less than 37 weeks) who run an elevated risk in developing ASD in later childhood. The aim of this study is to gain insight into the relationship between Kangaroo Mother Care and the outcome of Autism Spectrum Disorder and further estimate the magnitude of the association.

3 Methods

A longitudinal quasi-experimental study will be conducted to assess the association between Kangaroo Mother Care (KMC) and Autism Spectrum Disorder (ASD). In this study we will recruit a total of 4238 preterm babies between 28 to 37 weeks gestational age, 2119 in intervention group and 2119 in control group. Subjects in the intervention group will receive Kangaroo Mother Care while those in the non-intervention group will receive traditional care. Each case will be recruited from St. Michael's hospital and Sunny Brook Health Science Center. The two intervention hospitals will be matched by geographical proximity and level of neonatal care to two non-intervention hospitals, Mt. Sinai hospital and North York General Hospital, from which controls would be recruited. Each case will be matched to a control by sex and gestational age. Demographic data including parents' educational and income level as well as ethnicity will be recorded when the child is born in order to control for potential confounders at the analysis stage. The total amount of time KMC being implemented will be recorded for each case by NICU nurses. After subjects are discharged from the NICU in each hospital, both cases and controls will be followed and screened starting their second birthday until they reach ten years old. Subjects will be screened annually during the follow-up period and referred to a comprehensive diagnostic evaluation if their screening results were positive. Diagnosis of ASD will be based on DSM-5. The Modified Checklist for Autism in Toddlers, Revised (MCHAT-R) will be used as the screening tool before subjects the age of three; afterwards, the childhood Autism Spectrum Test (CAST) will be adopted. Finally, logistic regression will be used to assess the intervention of Kangaroo mother Care based on the total amount of time (length of time per day added up over the entire duration of the KMC) the KMC was implemented.

4 Expected Outcomes

We hypothesize that that Kangaroo Mother Care can reduce the odds of Autism Spectrum Disorder (ASD) in preterm babies in the Canadian population compared to traditional care after adjusting to all possible confounders.

References

[1] Serena Stockwell. Benefits of kangaroo care for premature babies continue into young adulthood. *AJN The American Journal of Nursing*, 117(3):15, 2017.

[2] Jon Baio, Lisa Wiggins, Deborah L Christensen, Matthew J Maenner, Julie Daniels, Zachary Warren, Margaret Kurzius-Spencer, Walter Zahorodny, Cordelia Robinson Rosenberg,

Tiffany White, et al. Prevalence of autism spectrum disorder among children aged 8 years—autism and developmental disabilities monitoring network, 11 sites, united states, 2014. *MMWR Surveillance Summaries*, 67(6):1, 2018.