Conclusions Modified Kobayashi score performed best among the established international risk scores for IVIG resistance with good specificity but fair sensitivity in our population. We have designed a preliminary novel clinical risk score for IVIG resistance, HK-KD score v1, with sufficient sensitivity and specificity for potential clinical use.

Background Early identification of developmental delays with timely intervention, especially before the age of 3 years, can optimise child development. With the pre-existing model of developmental surveillance in Singapore however, children with suspected developmental delays first consult a developmental specialist at a median age of 44 months to undergo a detailed developmental assessment and diagnosis, and only then receive intervention.

Objectives Our Quality Improvement team agreed that improvements made to the pre-existing model of developmental surveillance would enable earlier identification of developmental delays thereby triggering early intervention. Hence, we aimed to increase the proportion of children seen in primary care who screen positive for potential developmental delays by 5% before the age of 3 years, with the use of a novel two-tiered developmental screening programme in a primary care setting, without increasing the false positive rates.

Methods We describe the implementation and evaluation of a novel two-tiered developmental screening programme into the existing 9-month and 18-month screening schedule, with an additional screening at 30 months to replace the pre-existing 36-month screening of the National Child Health Surveillance Programme. The new programme utilizes some of the American Academy of Pediatrics’s recommended screening tools: Parents’ Evaluation of Developmental Status (PEDS), Parents’ Evaluation of Developmental Status - Developmental Milestones (PEDS-DM) and The Ages & Stages Questionnaires (ASQ) as part of our new two-tiered screening programme. We evaluated this programme using quality improvement methods by measuring the proportion of children referred to child development units after positive screening for developmental delays under the new programme, with a pre-post and with-without comparison. We also studied risk factors associated with positive screening in the programme.

Results The two-tiered screening was most effective at 18 months with the proportion referred improving from 3.5% to 7.1% over a 6-month period. In addition, the referred proportion at 18 months was also significantly higher at the primary care center where the two-tiered screening was implemented as compared to other primary care centres in the same health-care cluster who were utilizing the pre-existing screening (7.8% compared to 3.2%). For those who received further assessment by developmental specialists after the two-tiered screening, 100% received a definitive diagnosis of developmental delays, similar to our baseline data. The risk factors identified for screening positive among Singaporean toddlers: male gender, low maternal education, preterm births and low income shed light on population subgroups which may require more attention and resources in future.

Conclusions Our quality improvement efforts have facilitated the integration of a novel two-tiered screening programme into the pre-existing screening schedule, with improved referral proportions without increasing the screening process’s false positive rates. While we highlight challenges in implementation that need to be addressed, our findings support a potential nation-wide adoption of the two-tiered programme.