The Minnesota Academy of Pediatrics invites medical students and residents to take part in an annual scientific poster competition. Residents and students from the two pediatric training programs in the state (the University of Minnesota’s and Mayo Clinic’s) submitted a number of entries for consideration at the chapter’s annual meeting in Minneapolis last May. Submissions were in the following categories: clinical vignette, research and medical student. A People’s Choice award winner was also selected.

Posters were judged by practicing pediatricians, pediatricians from the state’s academic medical centers and peers. The judges used clinical relevance, originality, and written and visual presentation as their criteria for evaluating the entries during a “poster rounds” session. Special thanks to Andrew Olson, M.D., from the University of Minnesota for coordinating the competition.

The winners presented their posters at the American Academy of Pediatrics annual meeting in Orlando in October 2013. Congratulations to all who participated on their excellent work.

Medical Student Winner

Nonclassical Presentation of Transient Myeloproliferative Disorder in a Patient with Down Syndrome

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Transient myeloproliferative disorder (TMD) is a leukemia found in approximately 10% of newborns with trisomy 21 (Down syndrome). Although this disorder normally resolves spontaneously within the first few months of life, patients are at increased risk of developing acute myeloid leukemia later in life. Studies have shown that mutations in GATA1 lead to a proliferation of multiple cell types that are responsible for this syndrome. Documented cases of TMD reflect this proliferation with a predominance of blasts in the peripheral blood.

Case Description: A full-term female infant born to a mother of advanced maternal age was found to have physical exam findings suggestive of Down syndrome including hypotonia, a flat nasal bridge, epicanthal folds, low-set ears and macrognosia. A karyotype revealed trisomy 21.

The infant developed hyperbilirubinemia. As part of the evaluation, a complete blood count (CBC) was obtained. The CBC was significant for a white blood cell count of 35.2 x 10^9 cells/L in the absence of fever; the differential showed an eosinophilic predominance (44%). Because this was not a traditional presentation for TMD, other potential sources of hyperbilirubinemia associated with eosinophilia, including congenital cytomegalovirus or toxoplasma infection, were evaluated and found to be negative. A peripheral blood smear was obtained and the final pathologic diagnosis was transient myeloproliferative disorder.

Hyperbilirubinemia resolved within several days and was thought to be physiologic. During the newborn’s hospitalization, her white blood cell count declined to 22.5 x 10^9 cells/L and the percentage of eosinophils decreased to 19% by the eighth day of life. The infant was discharged and the family received instructions to follow-up with a primary care physician. The leukocytosis subsequently resolved with no acute sequelae. The child will have ongoing follow up to monitor for the development of AML, which can occur in up to 30% of patients with a history of TMD.

Discussion: The classic laboratory finding in TMD is leukocytosis with a predominance of blasts in the peripheral blood. However, this case demonstrates that TMD can involve other cell types, such as eosinophils, that are also regulated by GATA1. As evidenced by this case, TMD is often asymptomatic and found incidentally. However, hepatic fibrosis, respiratory failure and congestive heart disease can occur from continued proliferation and differentiation of the megakaryocytic lineage. Cases of TMD with an eosinophilic predominance have not been previously documented in the literature, and the association between hypereosinophilia and TMD is an important finding. It is also important to note that despite this atypical presentation, the natural course of spontaneous resolution remains true. As with all children who are diagnosed with TMD, close follow up is warranted because of the increased risk of AML.
Traumatic brain injury (TBI), which is a cause of childhood morbidity and mortality, is usually evaluated by CT. There is growing concern about radiation exposure from head CT. The Pediatric Emergency Care Applied Research Network (PECARN) developed a Clinical Decision Rule (CDR) that can potentially reduce the number of unnecessary head CTs. However, physicians’ poor recollection of CDRs during patient encounters may result in nonadherence. Studies suggest that visual cues may play a role in reminding them to use CDRs.

**Objective:** To assess the effectiveness of cartoon pictures illustrating key components of PECARN’s TBI CDR embedded in the electronic health record (EHR) in reducing the rate of head CT for TBI.

**Methods/Design:** The study involved children 0 to 18 years of age who presented to the ED of Children’s Hospitals and Clinic of Minnesota within 24 hours of TBI who had a GCS of ≥14. Data were collected by chart review. Exclusion criteria were CTs done in an outside facility; obvious penetrating TBI; trivial injury with no signs or symptoms of head trauma other than scalp abrasions or lacerations; known brain tumors, pre-existing neurological disorders complicating assessment, ventricular shunts or bleeding disorders. Use of CDR was evaluated before and after the intervention. The pre-implementation phase included 1,250 total patients (424<2 years of age, 826≥2 years of age). The post-implementation phase included 1,125 patients (373<2 years of age; 752≥2 years).

**Intervention:** Working with a graphic designer and the hospital’s information technology team, we developed cartoon pictures illustrating the key components of the PECARN TBI CDR that pop up the first time a provider opens the electronic chart of a patient with a TBI-related chief complaint (Figure).

**Results:** We looked at the use of head CT before and after implementation and found a statistically significant decrease in head CT utilization rates for the total sample and for children younger than 2 years of age. The decrease for children 2 years and older, though clinically significant, was not statistically significant (Table).

**Conclusion:** Cartoon pictures illustrating key components of the PECARN TBI CDR embedded in an EHR may reduce the rate of CTs done for head injuries, especially in children younger than 2 years of age.
Validation of automated QT interval monitoring in the hospital setting has allowed for its expanded use in clinical and research domains. Understanding of the heart-rate corrected QT interval (QTc) and its evolution in premature infants is important in determining its clinical utility in this specific population.

Methods: All infants older than 31 weeks and younger than 37 weeks estimated gestational age (GA) admitted to our institution’s level II neonatal intensive care between December 2012 and March 2013 were included in the study. The infants were stratified into two cohorts: 31–33 6/7 weeks GA (cohort A) and 34–36 6/7 weeks GA (cohort B) for analysis. For each infant, automated QTc values were obtained every 15 minutes and recorded in the electronic medical record. A prospective analysis of the QTc values was performed during the first week of life for each infant. A student’s t-test was used to compare the number of infants exceeding a proposed QTc screening cut-off.

Results: A total of 21 and 39 premature infants were in cohort A and cohort B, respectively. The mean QTc value on Day 1 of life for those in cohort A was significantly higher compared with those of cohort B (474 ± 71 ms versus 449 ± 50 ms; P<0.0001). The QTc means within each cohort declined significantly (P<0.05) until Days 4 and 5 for cohort A and B, respectively (Figure). The QTc values on Day 7 of life were similar for the two cohorts (427 ± 26 ms versus 428 ± 30 ms; P=0.312). During the first 48 hours, 18 infants (30%) in the two cohorts would have exceeded a proposed QTc screening cut-off mean value of 470 ms compared with only two (3.3%) infants after 96 hours (P=0.0002).

Conclusion: Automated QTc monitoring demonstrated that premature infants showed significant elevation of QTc values in the first 24 to 72 hours of life before reaching a stable and less variable baseline. This electrophysiologic transition period coincides clinically with the similar transition from fetal to extraterine circulation. Any evaluation of QTc in premature infants has to be done in the context of this transition period; our data suggest that true determination of QTc values in this population should not be explored until after the first 72 to 96 hours of life to minimize false positives.