Hana Isphani's Medical Elective Scheme report

HAPPI Kids: Amending mistakes made in blood

"Children are not just miniature adults."

These were the words that permeated the introductory lectures for my fifth-year paediatrics placement. Little did I know the significance this adage would hold for me just over a year later and more than 10,000 miles away. My elective experience relates to a ballad sung by the blood, with the melody played in a key unique to each stage of a child's development. Any confusion or overlap that arises between categories may invoke different consequences for the harmonisation – there may be some cases where the odd incorrect note has no ill bearing on the overall melody, where another may lead to discordance which disrupts the entire orchestration.

It came as a surprise to me when I learnt many of the reference intervals (RIs) used in paediatric pathology tests were either derived from adult data, based on populations of unwell children, or grouped in categories that are often unexplained. For example, there may be a RI for children between 6–12 years old, but why was it decided that those ages are matched together? That the existing RIs are discrete highlight a further limitation – for children who are days away from turning 6 or have just reached their 13th birthday, why should they be cast into an entirely new category? Thus was my introduction to the Harmonising Age Pathology Parameters in Kids study, otherwise known as HAPPI Kids. This is a project based in Victoria, Australia, creating age-specific RIs using continuous limits rather than discrete ones, enabling more accuracy in diagnosing children who sit at the cutoff ages of existing ranges. With a strong personal interest of mine in haemostasis and thrombosis, I was delighted to hear my role would be centred around coagulation assays.

Arriving at The Royal Children's Hospital in Melbourne was a truly spectacular experience, complete with a cinema, aquarium and meerkat enclosure! Attached is the Murdoch Children's Research Institute where I was based, gifting me the opportunity to see the laboratory work behind the study whilst being on the doorstep of where many of the blood samples used were collected. Glimpsing through the windows of my team's office enabled me to ponder on how the patients just beyond may very well benefit from the fruits of this project in upcoming years.

Following a warm introduction to the HAPPI Kids team, I was taken into the lab, where I was able to see and involve myself in the work taking place. The phlebotomists would bring in blood samples taken from healthy children in the hospital, or from neonates at The Royal Women's Hospital just down the road – a feat in itself given historical difficulties in creating paediatric RIs included the ethics of collecting blood from healthy children, alongside the smaller blood volumes to work with. These samples would be spun down, aliquoted and stored for all the exciting future directions of the study.

Within the lab, I was involved in the process of preparing samples and reagents for coagulation assays. As someone who had seen many prothrombin times and activated partial thromboplastin times as a medical student, it was fascinating to step behind the scenes. Naturally, my first day was filled with classic scientific frustrations – 1 sample being insufficient, some results failing to report in the appropriate units, the analyser altogether giving an error message at one point. Yet in place of annoyance, I found myself aglow with a reflection to carry through my clinical journey – behind every delay in result reporting is a team of people trying their upmost to seek a resolution – hidden work I otherwise would not have appreciated. I was most in awe of how the research assistant no longer needed to call in a technician; she had so much experience with the coagulation analyser, she simply set about fixing it herself.

The lab I was in used a STAGO analyser, where other hospitals even within Victoria may use different manufacturers, including Siemens or Werfen. This would become especially relevant, as my project sought also to use data from other labs to create RIs for three different analysers based on specific reagent combinations.

With the data collected, I was tasked to interpret the graphs and functions synthesised by our statistician and write a paper on the findings. This formed the heart of my project,

working out the best way to communicate the significance of what HAPPI Kids is accomplishing to the rest of the scientific community.

The realisation struck me upon delving into developmental haemostasis, an established phenomenon in the literature highlighting the unique physiology behind paediatric coagulation. Inaccuracy in results implicates anything from school absences due to additional appointments, delays in elective surgeries, potential exclusion from contact sports, unnecessary prescriptions and mental health impacts. Most sombre of all is the potential for repeated bruising to be misdiagnosed with devastating impacts either way, whether abuse recognition is delayed due to confusion from a false result, or alternatively if parents are wrongly accused because current RIs missed their child's diagnosis.

Whilst haematology has been consolidated as the specialty I seek to pursue, regardless of the direction my clinical career takes me, this elective will benefit me indefinitely. Pathology results underpin the majority of diagnoses, yet without this experience, I would have begun my foundation training sending out test orders with limited appreciation of the effort behind each result I await. Every report is not just the product of a machine's analysis, but decades of research and literature behind the RIs in patients of all ages, with the field continually evolving.

Fittingly, my first and last foundation rotations are paediatrics and haematology respectively, and so as I embark upon my next chapter, I will hold fast to the following: children are much more than just miniature adults and whether we use a microscope or the latest analyser, the value in blood as a diagnostic tool comes from our willingness to keep challenging what should truly be defined as healthy.

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