Children have Higher Odds of Developing Adverse Drug Reactions

Title: Adverse Drug Reactions (ADR) Among Malaysian Paediatric Populations and Performance of Medication Safety Signal Detection Methods

Student: Beldona Hema Rekha, Master of Medical Science
Supervisor: Dr. Shairyzah Ahmad Hisham

After she became a mother, Hema Rekha started to realise that paediatric medication that are prescribed on a day-to-day basis are not studied for safety and efficacy. Dosages are prescribed merely based on a child's body weight estimation. This motivated her to implement her research project which analysed the safety of drugs that are marketed for children in order to highlight the importance of how drugs are prescribed to children as well as how paediatric adverse drug reactions are determined.

According to this study, children aged 1 to 12 years old most frequently reported to experience adverse drug reactions (ADR). Some of these reactions can include drug induced growth disorders or skin reactions such as erythema. In children aged 2 to 11 years, attention deficit hyperactivity disorder (ADHD) medications have also been reported to cause weight loss, sleep problems and decreased appetite. In relation to this, the study was carried out to determine the association between patient factors (age group, gender and ethnicity) and ADRS experienced by the paediatric population in Malaysia. This study was also conducted to evaluate the performance of medication statistical safety signal detection methods.

The study was conducted with data obtained from the National Centre for Adverse Drug Reactions Monitoring and utilised a 5-year ADR data of paediatric patients from birth up to 12 years of age. Adverse reaction reports were recorded using a data collection form and analysed.
The ADRs were manually reviewed and selected for disproportionality analysis. Disproportionality measures known as the Proportional Reporting Ratio (PPR), Reporting Odds Ratio (ROR), Bayesian Confidence Propagation Neural Network (BCPNN) and Multiitem Gamma Poisson Shrinker (MGPS) were applied on each drug reported. The generated safety signals were further analysed for performance related test-characteristics based on the standard drug label.

The study revealed that during a 5-year study period, 484 serious paediatric cases were reported to the National Pharmaceutical Regulatory Agency. According to the results, children between the ages of 1 to 12 years of male gender and of Malay race have higher odds of developing ADRs. The results also showed that that male children are more likely to experience nervous and respiratory system disorders due to medicines.

Examples of the serious ADRs reported in this study include anaphylactic reaction to NSAIDs (paracetamol and ibuprofen) and antibiotics (amoxicillin and benzylpenicillin); Stevens-Johnson Syndrome (SJS) to antibiotics (amoxicillin, ampicillin and phenoxy methyl penicillin) and anti-epileptics (carbamazepine and lamotrigine). The presence of serious ADRs such as SJS, and anaphylaxis in children indicate that caution is needed while prescribing antibiotics and anti-epileptics.

This study also demonstrated that active drug safety surveillance systems are essential to detect ADRs and safety signals associated with it among paediatric patients. In addition, the use of multiple methods of disproportionality enhances the detection of safety signals. Of all the disproportionality measures, PPR, ROR and MGPS were found to be the most effective methods in signal detection.