A Quantitative Strategy for Combined Use of Current Psychostimulant Drug Formulations in ADHD Therapy

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Objectives: Attention Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder known mostly for school-aged children, but can last in adulthood [1]. People with ADHD often have trouble in paying attention, or difficulty in controlling impulsive behaviors, or being overly active. A worldwide prevalence has been reported between 5.29% and 7.1% in children and adolescents [1]. Psychostimulants, mainly methylphenidate (MPH), are used in extended release (ER) and immediate release (IR) formulations from different pharmaceutical companies. Using clinical and statistical criteria, the current study aims to present a quantitative strategy for a better combined use of these medications, while respecting a patient’s specific needs.

Methods: Using population pharmacokinetic models of various formulations of MPH that were built using the data at hand, we generalized our previously developed computational strategy for IR MPH [2] to the case of combination use of IR and ER. It consists of three steps: first, a clinical selection process, followed by a statistical comparison procedure (mean, ratio and variance), and then as the last step, a detailed computation regarding the distribution of the regimen’s performance to provide additional information on the comparison.

Results: A combination regimen of ER and IR formulations can give a better performance compared to a once daily ER dosing regimen. There is an increase of 22.5% of performance scores from the combination regimen than the simple use of ER. This performance score is also 16% higher than a comparable TID regimen of IR formulations.

Conclusions: The proposed strategy and algorithm can be adapted for the management of psychostimulant drug use, while accounting for the daily routine and activities of patients.