

Stimulant Prescribing for ADHD Over 20 Years in Two Regional Paediatric Departments

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Background

Attention-Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder, originating in childhood, and characterised by a pervasive pattern of inattentiveness, overactivity and/or impulsivity¹. The worldwide prevalence of ADHD is between 5.29% and 9% and, it is one of the most frequently made diagnoses by paediatricians in Australia and elsewhere^{2,3}. When left untreated, it may be profoundly impairing, with outcomes such as reduced occupational functioning, mental health and physical health problems⁴. ADHD is highly responsive to treatment with stimulant medication, with Methylphenidate (MPH), Dexamphetamine (DEX) and Lisdexamphetamine (L-DEX) shown to be equally effective⁵. Research shows that more boys than girls are treated, possibly due to higher scores on scales of disruptive behaviour, attention difficulties and aggression among boys compared with girls⁶.

Methods

Ethical approval was granted by the Greater Western Human Research Ethics Committee, with site-specific approval granted by the Bathurst Base (BBH) and Orange Base (OBH) Hospitals. A retrospective audit of stimulant medication prescribing records between 1997 to 2016 for two full-time paediatricians at two Central Western NSW Paediatric Clinics (Orange and Bathurst) was undertaken. The records contain data on gender, weight, patient initials, date of birth, medication type and dose, and postal code. Age of patient and dose in mg/kg/day were calculated from the data. Data were transcribed into an Excel spreadsheet. Statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS) v. 19. Descriptive Statistics were used to summarise the data. T-tests were used to compare prescriptions for medication type, length of treatment, and changes in doses over early (BBH: 1998-2000; OBH: 2003-2005) and later years (2012-2016). Pearson correlations were used to explore weight loss and weight gain in different participant weight groups.

Results

Number of prescriptions and gender distribution

- Prescription records were available for OBH for the years 2003-2005 and 2007-2016 and for BBH for the years 1997-2016.
- The total number of prescriptions was 9719, which were written for 1764 patients
- In BBH 6726 prescriptions for 1106 patients (921 boys and 185 girls) within years 1997-2016 and OBH 2993 prescriptions for 658 patients (540 boys and 118 girls) (Figure 1)

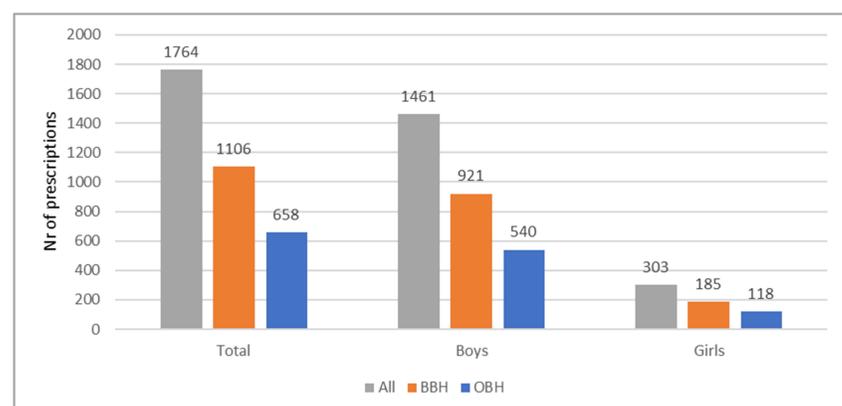


Figure 1. Number of prescriptions and gender distribution.

Medication dose

- Increase in mean dose over time was found for MPH in males, but not for females, and not for DEX.
- The mg/kg/day dose was significantly higher in males than females on both the first ($p < .01$) and last ($p < .01$) dose analysed. The mg/kg/day dose increase significantly for L-DEX for males between first and last dose ($p < .01$).

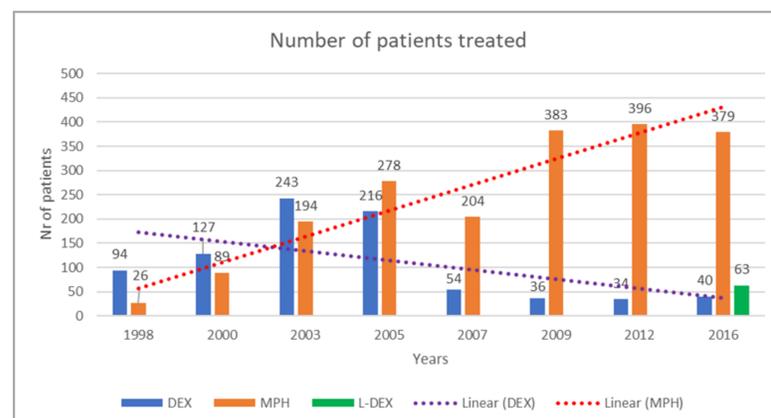


Figure 2. Number of patients per year treated with DEX, MPH & L-DEX.

Prescribing practice

- Over the early years, there was significantly more prescriptions for DEX than MPH ($p < .001$) and in the later years significantly more MPH than DEX ($p < .001$) (Figure 2).
- The average age at which stimulants were prescribed was 9.9 years for boys and 10.4 years for girls. The average duration of treatment with stimulants was 3 years, and this was similar across both centres.
- Average number of years treated was 3 years (range 1-15 years). In 74% (1052) patients only one medication type was prescribed.
- For males treated with only one medication type, treatment with MPH was significantly longer than treatment with DEX ($p < .01$).
- When more than one medication was used, treatment with MPH was significantly longer than treatment with DEX ($p < .05$).

Weight analysis

- Treatment with MPH was associated with increased Z scores in the underweight group of males ($p < .01$) and females ($p < .01$).
- In the underweight group prescribed MPH, increase in weight was correlated with treatment duration, with greater increase in weight associated with longer treatment duration ($p < .01$) (the average treatment duration was 2 years, 7 months).
- The degree of weight increase with MPH was independent of average dose ($p = .06$).
- In the normal weight group, treatment with MPH was associated with significant weight loss in both males ($p < .05$) and females ($p < .05$) (average treatment duration was 2 years and 3 months).
- In overweight males receiving MPH, weight reduced significantly ($p < .05$) and the size of this reduction was dependent on average dose ($p < .05$), with higher doses associated with more weight loss. Average treatment duration was 2 years and 2 months.

Key Messages

- Over the course of 20 years MPH has become more frequently prescribed medication than DEX. MPH was also used for longer period of time even when one or multiple medications had been used throughout treatment, which could have been due to availability of short and long-acting forms. Average duration of treatment was three years.
- Treatment with MPH showed a time-dependent increase in weight in underweight individuals and a dose-dependent reduction in weight in overweight individuals.
- Further research is necessary to gain more understanding of stimulant effects on weight, especially on underweight individuals; and the dose-dependent effect on weight that was established in the current study in overweight individuals.

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