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Can parents believe websites' information about methylphenidate's side effects?

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ABSTRACT

Background Attention deficit and hyperactivity disorder (ADHD) is one of the most common behavioural disorders, affecting around 5% of the global population. Methylphenidate is recommended as the first-line drug treatment for ADHD for children over the age of 5 in the UK. It can have many side effects and it is important that families are well informed. Other than their healthcare professionals and friends, the major information source for families is the internet.

Aims To evaluate the validity of online information regarding the adverse effects of methylphenidate.

Methods Side-effects of methylphenidate hydrochloride listed in the British National Formulary for Children (BNFC) were taken as the 'gold standard' and compared with online websites for accuracy. The first 10 websites found on each of nine different search engines were used as comparators.

Results From the 90 hits, 10 top hits found in each of 9 search engines, 25 unique websites were identified. A quarter (six sites; 24%) documented only side-effects that all appeared in the BNFC. Three quarters (19 websites; 76%) had at least one side-effect that did not appear in the BNFC; with six websites documenting more than five side-effects not found in the BNFC.

Conclusions Methylphenidate's frequent use makes it important that the general public are provided with accurate, reliable and easily accessible information. Most websites have dependable quality information on side effects, but several seem to list excessive side-effects.

BACKGROUND

Attention deficit and hyperactivity disorder (ADHD) is one of the most common behavioural disorders in children. ADHD has a global prevalence of around 5%,¹ with around 4% of children in the UK and up to 10% of children in the USA affected. The National Institute for Health and Care Excellence (NICE) recommends methylphenidate as first-line drug treatment for children over the age of 5 years, followed by lisdexamfetamine as a second-line option in the UK². Other drugs used for ADHD include atomoxetine, guanfacine and clonidine.³ Methylphenidate and other medications are increasingly prescribed in the UK for ADHD, with just under two-thirds of young people receiving medication;⁴ a similar proportion now to the USA.⁵

Outside of the family's healthcare practitioners and friends, the internet provides the most rapidly available information on health to modern families. Thus, it is important for high-quality unbiased information to be available to families; until July

What is already known on this topic?

- ▶ Methylphenidate prescribing for attention deficit and hyperactivity disorder is common and it is associated with a wide variety of side effects.
- ▶ Parents and families often seek information rapidly from the internet and social media connections to complement that given by their healthcare professionals.
- ▶ The reliability of information to families on the adverse effects of methylphenidate on the internet is unknown.

What this study adds?

- ▶ Most easily accessible websites contain reasonably dependable information about methylphenidate's side-effects.
- ▶ It provides clinicians with some reassurance regarding the reliability of information about methylphenidate's adverse effects on commonly found internet websites.

2019 NHS England verified high-quality websites with the Information Standard. Since then, the Patient Information Forum (pifonline.org.uk/pif-tick/) have been developing a new quality mark for health information. Some existing sites, such as "Medicines for Children" (www.medicinesforchildren.org.uk/), achieve this through a structured process. This involves pharmacists and doctors initially writing and reviewing the leaflets, editing for clarity by parents/carers and finally a review editor checks them to ensure they are both accurate and easy to read.

AIMS

To audit the accuracy of websites' listed adverse effects of methylphenidate hydrochloride against those listed in the British National Formulary for Children (BNFC).

METHODS

The 66 adverse effects of methylphenidate hydrochloride documented in the BNFC were taken as the 'gold standard'. Any side-effect not listed in the BNFC was considered to be incorrect. The top 10 websites (excluding the BNFC) listed on 9 different popular search engines were identified searching for "Methylphenidate". If all side-effects on the website were listed in the BNFC, it was



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Table 1 Summary of websites, their listed side-effects and frequency in top 10 searches

Ranking	Website	% of side-effects not found in BNFC (number of side effects)	Number of times it appears in top 10 searches
=1	www.cochrane.org	0%	2
=1	www.medicinesforchildren.org.uk	0%	5
=1	https://www.narcolepsy.org.uk	0%	2
=1	www.pubmed.ncbi.nlm.nih.gov	0%	2
=1	www.nhs.uk	0%	5
=1	www.patient.info	0%	1
7	www.netdoctor.co.uk	3.1% (1/32)	1
8	www.youngminds.org.uk	3.3% (1/30)	6
9	www.mymedicines.nz	3.7% (1/27)	2
10	www.medlineplus.gov	4.0% (2/50)	1
11	www.medicinenet.com	4.2% (1/24)	7
12	www.drugbank.ca	4.8% (1/21)	2
13	www.medicalnewstoday.com	5.0% (1/20)	3
14	www.everydayhealth.com	5.3% (1/19)	2
15	www.mayoclinic.org	7.1% (6/84)	1
16	www.webmd.com	7.4% (2/27)	4
17	www.additudemag.com	7.7% (2/26)	3
18	www.drugs.com	7.9% (7/88)	7
19	www.healthline.com	10.7% (3/28)	9
20	www.en.wikipedia.org	11.1% (3/27)	9
21	www.medicines.org.uk	12.2% (11/90)	5
22	www.rxlist.com	13.4% (9/67)	2
23	https://pubchem.ncbi.nlm.nih.gov	14.6% (7/48)	3
24	www.talktofrank.com	30% (3/10)	4
25	www.tocris.com	43.8% (7/16)	1

BNFC, British National Formulary for Children.

considered accurate. Directly equivalent words were taken as correct, for example, “convulsions” in the BNFC and “seizures” on a website. However, if they were not directly equivalent, for example, BNFC lists “sexual dysfunction” and website “priapism”, these were classified as incorrect.

RESULTS

From the 90 hits, 10 top hits from 9 search engines, 25 unique websites were identified. Six sites (24%) documented only side-effects that all appeared in the BNFC. The majority (76%; 19/25) of websites document at least one side-effect that does not appear in the BNFC; with six documenting more than five side-effects not found in the BNFC.

Table 1 lists all 25 websites, the frequency they were found in top 10 searches and their total number of side-effects alongside the percentage not listed in the BNFC. Tocris (www.tocris.com) had the highest percentage (7/16; 43.8%) of side-effects not listed in the BNFC; Medicines.org had the highest number of side-effects that were not listed, with 11 out of their 90 adverse effects not documented in the BNFC.

The search engines ‘finding’ websites documenting the lowest percentage of side-effects not listed in the BNFC were AOL (5.8%), Google (6.0%), Yahoo (6.1%) and AskJeeves (6.8%). Those documenting the highest percentage of side-effects not listed in the BNFC were Bing (11.3%), Yippy (8.9%), Dogpile (8.7%), Ecosia (8.7%) and DuckDuckGo (8.6%). AskJeeves and Google had a mean of 1 adverse event per website not listed in

the BNFC; Ecosia, Yahoo, AOL and DogPile had a mean of 3 adverse events per website not listed. Bing, DuckDuckGo and Yippy all had a mean average of 4 adverse events per website that were not listed in the BNFC.

Certain websites appear frequently in the top 10 searches. Wikipedia and Healthline appeared on the front page of all nine search engines; both websites had three non-listed adverse effects. Despite Patient.info, Cochrane, Narcolepsy and NCBI documenting no ‘incorrect’ side-effects, they appeared only once or twice in each top 10 search.

DISCUSSION

Families with children receiving methylphenidate for ADHD may be concerned about its potential side effects. After receiving initial information from their healthcare professional(s), they will probably rapidly use the Internet for additional information and verification. Most sites seem to provide reasonable information quality on side effects. In the UK, the Royal College of Paediatrics and Child Health, Neonatal and Paediatric Pharmacists Group and the parent Charity “Wellchild” combine to run the Medicines for Children website. It offers worldwide Internet-based free access to reliable patient information leaflets and videos specifically developed to advise parents and carers how to give medicines effectively to their child. All medical information including the benefits and side-effects of a drug are produced through a rigorous audited writing and review process involving paediatricians, pharmacists and parents alongside the expertise of the Medicines for Children project board.

It is beyond the scope of our ‘audit’ to explain why some websites or search engines appear more valid than others. However, the search engines Bing, Dogpile, Yahoo and Yippy displayed certain websites as an advertisement in preference to others, which raises some concerns as to the influence of sponsorship. Some websites with side-effects not listed in the BNFC may have had conflicts of interest. Tocris sells methylphenidate hydrochloride on its website; Medicines.org is funded by Mylan Pharmaceuticals. The other websites did not display any immediately apparent conflicts of interests.

CONCLUSIONS

The common use of medication, particularly methylphenidate, to treat ADHD makes it vital that families are provided with accurate and reliable information from their healthcare professionals. Many families will often verify this and quickly seek additional information via Internet searches; this will produce much helpful and reliable information. However, the majority of websites found through common Web search engines often list at least one side-effect not in the BNFC.

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