

Penicillin prescriptions risk under-dosing children, experts say

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Millions of children in the UK are potentially receiving penicillin prescriptions below the recommended dose for common infections, according to new research led jointly by researchers at King's College London, St George's, University of London and Imperial College London. The authors are calling for an urgent review of penicillin dosing guidelines for children - which at the time of study had not changed in over 50 years - after discovering wide variation in current prescribing practice.

The research adds to growing concern about the global threat of antibiotic resistance, whereby misuse of antibiotics leads to the emergence of bacteria that cannot be controlled by available medicines.

Published today in the *British Journal of General Practice*, the study is the first to examine actual prescriptions of oral penicillins, the most commonly prescribed antibiotics for children worldwide, by GPs in the UK.

Analysing data from the IMS Disease-Analyzer database, researchers found that of the children under the age of one who were prescribed amoxicillin - the most commonly prescribed oral [penicillin](#) - none of them were prescribed the dose recommended (62.5 mg per unit) by the British National Formulary for Children (BNFC). In fact, the majority received double the recommended dose (125 mg).

96 percent of children aged 1-5 received the recommended dose but 40

per cent of 6-12 year olds and 70 per cent of 12-18 year olds were prescribed unit-doses below the BNFC guidelines. Similar patterns of prescribing were found for penicillin V and flucloxacillin.

The study, funded by the National Institute for Health Research (NIHR) Biomedical Research Centre at Guy's and St Thomas' NHS Foundation Trust and King's College London, also looked specifically at prescriptions for ear infection, the most common condition in childhood that can lead to the prescription of oral penicillin, and found that children under the age of one were the only group who received the recommended dose of amoxicillin. For children aged 4-15 years the prescriptions equated to approximately 33 per cent of the recommended dose.

Dosing guidelines for oral penicillin are currently provided by the BNFC and are determined by age and weight-bands. Although guidelines specifically for amoxicillin did change late last year, the authors suggest this has only made the situation worse, particularly in the approval of a new, wider 5-18 age band.

Dr Paul Long, Reader in Pharmacognosy at King's College London, said: '12-18 year olds should have received a 500mg dose based on pre-2013 guidance but our study shows that many of these teenagers were actually prescribed 250mg. Introducing a new 5-18 age band would seemingly justify a 250mg prescribing practice, but actually only further exacerbates potential under-dosing in the 12-18 age group.'

Another problem with the current guidelines, according to the researchers, is that they do not take into account how the average weight of children has changed over time. Due to the rising prevalence of childhood obesity, prescriptions based on age-bands could lead to doses prescribed at too low a level to produce a therapeutic effect (sub-therapeutic dosing).

This new study follows a literature review of evidence in 2011 to understand the origins of dosing guidelines, which found that prescribing based on age-bands had first been suggested in the early 1950s. Following these findings, a general recommendation to use age banding for all antibiotics in children was published in the BMJ in 1963, and these same recommendations remain in use today. This is despite the re-evaluation of guidelines for adult penicillin prescriptions, which did take modern weights into consideration.

The authors attribute wide variation in prescription practice to the complicated nature of current guidelines. Dr Long of King's College London said: 'Although oral penicillins have been widely used for over 50 years to treat infections in children, the dosing guidelines have remained complicated, which carries the risk of confusing prescribers. Age and weight bands are well established but there is no standardised or evidence-based guideline to clarify which method of dose selection is best.'

'The need to review these [guidelines](#) is more urgent than ever as it is clear from our research that age-banding doses is no longer appropriate.'

'A detailed qualitative assessment of prescriber practice is also required to understand reasons for the use of age-bands and the barriers to implementation of weight-based dosing.'

Dr Sonia Saxena, co-author from the School of Public Health, Imperial College London and a practising GP, said: 'It is important now to understand why GPs are prescribing sub-therapeutic levels of penicillin. Some GPs may be erring on the side of caution, prescribing low doses to avoid errors or side effects.'

Dr Saxena added: 'In the majority of cases children will still get better, but undertreating those [children](#) who do need antibiotics could mean

more infectious complications and more health contacts overall.'

Provided by King's College London

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