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SUSTAINABLE PRACTICE

Why learning how to swallow pills is good for patients, parents, and the planet

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What you need to know

- Pills are likely to have a reduced environmental impact compared with an equivalent dose of liquid medication, with less packaging and less wasted medicine
- Pill swallowing is an important life skill that can improve dosing accuracy and adherence
- Young patients often prefer pills to liquids. Pills contain fewer additives, need fewer doses, and have a longer shelf life
- Children can successfully learn to swallow pills from the age of 4

Healthcare professionals and patients often assume that liquids are the most suitable oral medicinal formulation for children and young people. However, swapping liquids to pills can be safer, more cost effective, more acceptable to patients and carers, and is likely to reduce the carbon footprint of prescribing.

Why change is needed

Medicines and chemicals account for 25% of the NHS England carbon footprint.[1] Few environmental impact studies compare liquid and tablet medicines, although available evidence suggests that pills have a lesser carbon footprint than equivalent liquid medications. A life cycle assessment based in India found that the carbon footprint of paracetamol pill production is 15 times less than an equivalent dose of liquid.[2] Pills typically come in smaller, lighter packets than liquids, take up less space in distribution lorries, and create less packaging waste. Liquids also require dosing syringes or spoons, contributing to increased plastic waste.

Importantly, pills have a longer shelf life and can be stored out of the fridge so have lower energy requirements during their use, and are less likely to be discarded as a result of inadequate storage conditions. Pill packets can be divided up to dispense a specific number of doses, whereas liquid formulations must be dispensed in whole bottles, meaning excess doses from short term prescriptions (such as antibiotics) are often wasted. For long term prescriptions, pills can be dispensed in larger quantities than liquids, reducing the number of patient journeys to and from the pharmacy.

Switching from liquid medicines to pills also has benefits in terms of cost, safety, and adherence. In one US single centre retrospective study of 150 paediatric discharge prescriptions, one third of children aged 5 and over who could have been taught to swallow pills were discharged from hospital with liquid medicines.[3] Switching to pills could have saved $436 per prescription, and an estimated $200 000 for discharge prescriptions annually.

Liquid medicine is hard to measure out accurately.[4] A US multi-site randomised controlled trial of 2110 parents found that >80% made at least one dosing error when measuring out nine doses of liquid medicine for their children, and 21% of parents made at least one large dosing error of more than twice the intended dose.[5] Even among experienced healthcare professionals, medication dosing errors occur more frequently with liquids than pills.[6] Liquid formulations may also be associated with poorer adherence. A small retrospective US study of 23 children with HIV found improved adherence to medication regimens six months after pill training.[7] Adults can also find pill swallowing challenging, and pill aversion in adults has been linked to poor adherence.[8-10] Liquid medications can be unpalatable and contain sugar, colourings, and preservatives to improve their taste or texture and shelf life but these additives increase the risk of dental caries and erosion.[11,12] Bitter taste in medicine was the second most frequently cited reason for non-adherence with short term antibiotic therapy in a questionnaire study of 414 patients in Saudi Arabia.[13] Furthermore, modified-release liquids are rarely available, leading to increased dosing frequency, which presents additional challenges for children, parents, and teachers when doses are required during the school day.

Evidence for the solution

Pill swallowing is a life skill that can be learnt early on to improve experiences for children and their parents, and increase medication adherence in adulthood. Children with a normal swallow can be successfully taught to swallow pills from the age of 4.[14] Healthcare professionals can offer pill swallowing training to both children and adults when required.

A single centre UK based quality improvement project used an interactive training package with a supplementary online video and comic poster to provide pill training to children attending renal clinics.[14] Twenty one children aged 5-15 were successfully converted from liquids to pills in a three month period, equating to savings of £46 588 per year.

This article is part of a series that offers practical actions clinicians can take to support reaching net zero. Browse all the articles at https://are.bmj.com/graphics/2023/tangibleActions-v8/. To pitch your idea for an article go to https://bit.ly/46Etl9i

The exact carbon impact of switching from liquids to pills has yet to be calculated and is an area of research that would support the move to more sustainable prescribing practices.

What you can do

Pill training can be started from age 4 in children who don't have swallowing difficulties. In our view, patients of any age should be asked about pill swallowing ability, and by age 10 children should be prescribed pills as standard. Children and young people with chronic diseases who are on long term daily medication, (eg, epilepsy or cystic fibrosis) or require long term courses of unpalatable oral antibiotics (eg, osteomyelitis) are most likely to benefit from learning pill swallowing.

Some countries have developed specific resources to facilitate pill swallowing. One of these in the UK is KidzMed an evidence-based six-step technique, illustrated with videos, cartoons, and a quiz, to teach professionals, parents, children, and young people how to swallow pills (box 1).

Box 1: How to teach a child or young person to swallow pills

Clinicians can teach patients while in hospital or explain to parents how they can practise pill swallowing at home.

- Find a comfortable place with no distractions.
- Let the child chose their own drink.
- Start with the smallest practice pill or sweet.
- Place the sweet or practice pill in the middle of your tongue.
- Take three gulps of liquid.
- Try another pill or sweet following the same steps (always say the "next" one, not the "bigger" one).

Pills are safer, cheaper, and—with less packaging and wasted doses—are more environmentally sustainable than liquid preparations. Early attention to recognising pill swallowing difficulties and training patients to learn this life skill will have numerous short and long-term benefits.

Pill swallowing resources

- NHS England. KidzMed.
- https://www.e-lfh.org.uk/programmes/kidzmed/
- NHS England. KidzMed.
- https://www.nenc-healthiertogether.nhs.uk/parentscarers/medicine-children/pill-swallowing-kidzmed
- KidzMed Project: teaching children to swallow tablets. https://www.youtube.com/watch?v=XwiuU-k2FIM
- RCPCH Learning. Podcast: pill swallowing in children. Pill swallowing in children podcasts | RCPCH
- Royal Children's Hospital Melbourne. Teaching children how to swallow tablets and capsules. https://www.rch.org.au/pharmacy/medicines-information/Teaching_children_how_to_swallow_tablets_and_capsules/#:~:text=Buy%20some%20small%20empty%20gelatin,with%20sprinkles%20before%20taking%20them.
- Johns Hopkins All Children's Hospital. Teaching children how to swallow a pill—on call for all kids. https://www.youtube.com/watch?v=37ZRkenMDxE
- OHSU School of Medicine. Instructional video on swallowing pills. https://www.ohsu.edu/school-of-medicine/snack-lab/instructional-videos-swallowing-pills
- Michigan CS Mott Children's Hospital. How to take a pill: teaching kids how to take medication.https://www.youtube.com/watch?v=yjqU9ZxUcHo
- Alberta Children's Hospital. Better than a spoonful of sugar - How to swallow pills: one complete training session. https://www.youtube.com/watch?v=kK1xdhElRjs
- McMaster Children's Hospital, Calgary. Help your child learn to swallow pills.https://kiwipediatricscalgary.com/files/HelpYourChildrenLearn-ToSwallowPills.pdf

Education into practice

- How often do you ask your patients if they are able to swallow pills?
- What resources and advice do you offer patients and families on learning how to swallow pills?
- In what circumstances can electronic prescribing systems help (eg, automatic use of pills for older patients and prescribing courses of liquids in multiples of whole bottles to reduce wastage)?

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EP has designed, collected, and analysed work on Ecokidzmed looking at the carbon footprint of prescribing pills versus liquids. We hope to publish this research soon.

All authors wrote and reviewed the article.

Alice McCloskey analysed data on teaching and disseminating KidzMed and on the problems adults have swallowing pills.

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