



# Mobile video directly observed therapy can be used to improve at-home inhaler technique in children with asthma

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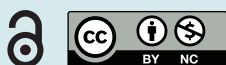
To the Editor:

We were very pleased to read the article “Comparison of inhalation technique with the Diskus and Autohaler in asthmatic children at home”, recently published in *ERJ Open Research* [1]. In that paper, the authors describe using video Directly Observed Therapy (vDOT) to detect children’s errors when using their inhalers at home. This is very important, and clearly shows that paediatricians and asthma specialists can wrongly assume that if a child can demonstrate correct inhaler technique in the clinic, they will continue to use correct inhaler technique when at home. The authors also report that errors were more frequent when the dry-powder Diskhaler was compared with the Autohaler.

We have previously developed remote, mobile-device vDOT as a tool to use in our difficult-to-treat asthma service. We carried out a study using vDOT for a group of children referred as potentially needing biological anti-asthma therapy. We asked the children to submit videos each time they used their preventer inhalers over a 6-week period, as we needed to know that the children had both taken their inhaled preventer (adherent) and taken the inhaled medication correctly (good inhaler technique) [2]. Despite having given the children clear training in correct inhaler technique prior to using the vDOT, we were surprised to find that in the first week of vDOT, only 20% of children in the study demonstrated correct inhaler technique. We found an excellent feature of using vDOT was that the asthma nurses were able to immediately provide corrective action by contacting the children or parents immediately and by 5 weeks, all children were using their inhaler correctly. After the period of vDOT, asthma control in the children had improved and none needed an expensive biologic anti-asthma therapy.

Indeed, we have integrated the use of vDOT within our regional difficult asthma service care pathway [3]. The results from an audit on the implementation of the vDOT programme into routine practice has shown a dramatic reduction in the number of children who require medication escalation to biological medications, *i.e.* in the 48 months ahead of full implementation of vDOT, some 17 asthma children within Northern Ireland were escalated to biologicals, while over the 48 months with vDOT, implemented that number had dropped to two patients.

vDOT has been used within our difficult-to-treat asthma care pathway: 1) to ensure a period of optimised care has been delivered (with correct inhaler technique and regular medication use/adherence) [3, 4]; 2) to enable the asthma nurses to support children and parents who are having difficulty mastering the correct use of an inhaler (the asthma nurses are able to view uploaded videos and provide day-to-day support to enable the child to develop correct inhaler technique over a few days and weeks *via* the vDOT platform); 3) to support the exhaled nitric oxide fraction ( $F_{ENO}$ ) suppression test [5]; and importantly, 4) to monitor adherence and nasal spray technique in children requiring allergic rhinitis treatment. When a child who is not enrolled for vDOT attends the asthma clinic and has an elevated  $F_{ENO}$ , it is difficult to know whether the child needs additional steroid therapy or simply to start taking the current prescribed inhaled corticosteroid correctly. If, using the same medication regimen,  $F_{ENO}$  is suppressed after a 5–7-day adherent period, supported and validated by vDOT, then the problem is likely to have been non-adherence or incorrect inhaler technique.



Shareable abstract (@ERSpublications)

Most children and parents have mobile smartphones that can be used to record videos while the child uses their inhaler. The timed (stamped with date and time) videos can be submitted to a secure repository. An asthma nurse then can review the video. <https://bit.ly/2UyG11W>

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We believe that the paper published in *ERJ Open Research* [1] and our study [2] suggest that the use of vDOT provides another approach or tool to improving asthma control that may be preferable to, or additional to, the use of electronic inhaler device monitors [5].

The advantages of the vDOT approach include: 1) being device independent; 2) facilitating immediate corrective action (via the vDOT platform); 3) it can be used to assess treatments for allergic rhinitis (both adherence and nasal spray technique); and 4) it provides monitoring of both correct inhaler technique and adherence (each inhalation is stamped with time and date).

Overall, we believe that the use of vDOT as described in this paper could not only be incorporated into difficult asthma care pathways but also facilitate further research into how people use inhalers over time. This could lead to improved ways of training children to master inhaler technique so that correct inhaler technique at home is assured.

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Conflict of interest: The authors launched (January 2017) a commercial enterprise to develop and market a vDOT solution ([www.continga.co.uk](http://www.continga.co.uk)).

## References

- 1 van der Kolk A, Lammers N, Brusse-Keizer M, *et al.* Comparison of inhalation technique with the Diskus and Autohaler in asthmatic children at home. *ERJ Open Res* 2021; 7: 00215-2019.
- 2 Shields MD, ALQahtani F, Rivey MP, *et al.* Mobile direct observation of therapy (MDOT) – a rapid systematic review and pilot study in children with asthma. *PLoS One* 2018; 13: e0190031.
- 3 Morton RW, Elphick HE, Craven V, *et al.* Aerosol therapy in asthma-why we are failing our patients and how we can do better. *Front Pediatr* 2020; 8: 305.
- 4 O'Donoghue DB, Shields MD. A multidisciplinary approach to managing difficult to treat asthma in children. *In: Forno E, Saglani S, eds. Severe asthma in children and adolescents: Mechanisms and management.* Cham, Springer International, 2020; pp. 168–182.
- 5 Butler CA, Heaney LG. Fractional exhaled nitric oxide and asthma treatment adherence. *Curr Opin Allergy Clin Immunol* 2021; 21: 59–64.