Feasibility of using remote video observed therapy to support children with asthma in West Baltimore

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BACKGROUND

- Asthma remains a significant public health problem and disproportionately affects minorities and socioeconomically disadvantaged children
- Medical care, missed school, and missed work related to asthma cost the health care system more than $80 billion annually
- Up to 40-50% of patients are challenged by improper technique and adherence to controller medications, which contribute to suboptimal care and preventable exacerbations and ED visits

OBJECTIVE

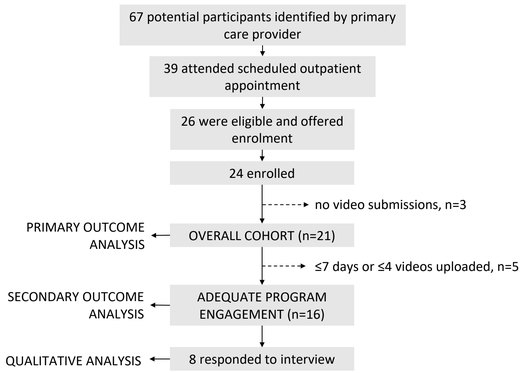
To determine the feasibility of video directly observed therapy (video DOT) to assess adherence and inhaler technique to controller medications in children with asthma.

METHODS

STUDY DESIGN

Between February and March 2020, patients with asthma were recruited into this 60-day pilot study at Greenspring Pediatric Associates at Sinai Hospital, an inner city residency continuity practice. Patients were followed through May 2020.

Figure 1. Study flow and analysis cohorts



METHODS (cont'd)

ELIGIBILITY

Children aged 12 – 18 years with a prescribed inhaled corticosteroid (ICS) and poorly controlled asthma (recent hospitalization, medication non-compliance, frequent rescue inhaler use, therapy escalation or Asthma Control Test score <20).

DATA COLLECTION

- Baseline variables abstracted from the medical record
- Nurse-collected data during video DOT dose-by-dose adherence; inhaler technique ("correct" or "incorrect"); inhaler errors and adherence issues (pre-specified checklist); action taken in response to video DOT or missed dose
- Post-participation, semi-structured interview with caregivers

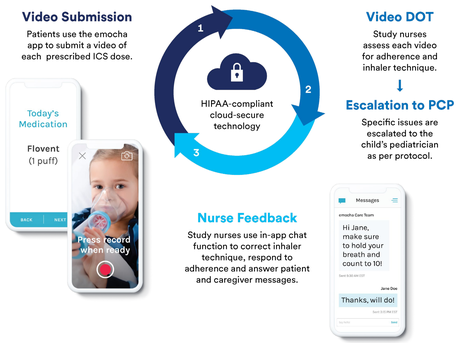
OUTCOMES

- Primary – feasibility and acceptability (enrollment, longitudinal engagement, program metrics)
- Secondary – ICS adherence (# video DOT submissions/# prescribed doses x100) and Inhaler error rate (proportion of video DOT submissions with ≥1 error)

ANALYSIS

- Descriptive statistics summarized covariates by analysis cohort and study outcomes
- Thematic analysis of transcribed interview data
- Wilcoxon rank-sum test and Spearman's rank-order coefficient assessed secondary outcomes

INTERVENTION



RESULTS

Inhaler technique significantly improved by week 2 with near complete resolution of inhaler errors.

Table 1. Baseline characteristics by analysis cohort

	Overall[a] (n=21)	Adequate Engagement[a] (n=16)	Inadequate Engagement (n=5)
Age, y			
Range	2 – 18	2 – 18	5 – 17
Median (IQR)	11 (8 – 15)	11.5 (7.5 – 15.3)	9 (8 – 13)
Male sex	15 (71)	10 (63)	5 (100)
Low SES[b]	19 (90)	14 (88)	5 (100)
Enrolled in February	15 (71)	10 (63)	5 (100)
Twice daily regimen	17 (81)	12 (75)	5 (100)
Single ICS	15 (71)	12 (75)	1 (20)
ICS/LABA	6 (29)	4 (25)	0 (0)
≥ 1 exacerbation[c]	13 (62)	9 (56)	3 (60)
Median ACT[d], score (IQR)	18 (14 – 22)	19 (14 – 23)	N/A

Data are n (%) or median (IQR). Abbreviations: ACT, asthma control test; [a] Overall, enrolled with ≥1 vDOT submission; adequate engagement, engaged >7 days with >4 vDOT submissions. [b] Medicaid used as proxy for low SES. [c] Asthma-related ED visit or hospitalization or oral steroid course in prior 6 months. [d] ACT available for 9 patients. SES, socioeconomic status.

Table 2. Inhaler errors and adherence issues detected during vDOT

	Proportion of Participants with ≥ Event (n=21)	Frequency of Event among Observed Doses (n=810)
Inhaler error[a]	20 (95)	274
Any adherence issue[b]	19 (90)	107
Behavioral barrier	16 (76)	73
Medication administration issue[c]	11 (52)	32
Social determinant of health	2 (10)	2
Any side effect	5 (24)	8

a. Inadequate breath hold, Forgets to shake inhaler, Inadequate inspiration, No spacer used
b. Disrupted routine, Forgetfulness
c. Takes more or less drug, Inappropriate time

Figure 1. Primary (A) and secondary (B) outcomes by program week

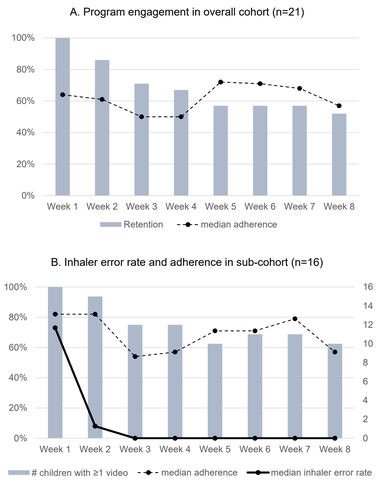
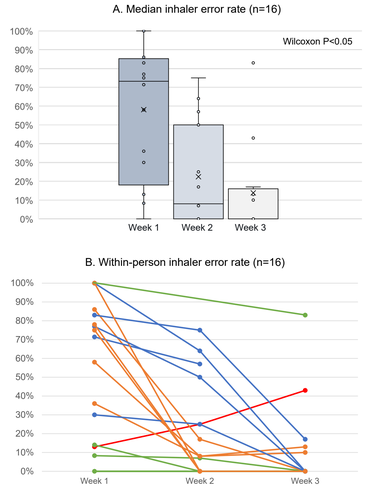


Figure 2. Change in Inhaler error rate from week 1 to week 3



CONCLUSIONS

- Program acceptability was high among children and caregivers
- Most patients participated for at least 30 days.
- More than 250 inhaler technique errors were identified.
- Most inhaler errors were resolved within the first 14 days of the program. A shorter program length may be just as effective and should be considered in future implementations
- This clinical tool may be another option to help improve adherence and technique in patients who need help to use asthma controller medications correctly.

FUTURE DIRECTIONS

- A larger, randomized study would allow for rigorous evaluation of 12-month clinical outcomes, program efficacy, and refinement of the program implementation model
- Video DOT monitoring of asthma controller use could be used by school-based health centers or payer population health management programs.

CONFLICTS OF INTEREST

- LY is an employee of emocha Mobile Health (emocha), a private company that licensed the video DOT technology. LY conducted subject recruitment and screening for eligibility in collaboration with LifeBridge Health clinicians, obtained informed consent, conducted participant education, oversaw monitoring of participant compliance, engaged in participant enrollment and follow-up, and conduct participant interviews as part of this study.
- KM is an independent consultant contracted by emocha for data analysis and manuscript preparation.
- SDK and BW declare no conflicts of interest.

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