Effect On Asthma Control Using A Novel Digital Self-Management System: A Physician Blinded Randomised Controlled Cross-Over Pilot Trial

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Background: AsthmaTuner is a novel self-management system that consists of a patient app, a cloud based storage solution and a healthcare interface. Patients use a Bluetooth spirometer (MIR SmartOne) to measure FEV_1 and can register symptoms. They then receive immediate feedback on asthma control and an image of the correct inhaler(s) to use and the dose, Figure 1.

Aims: We aimed to evaluate the effect of AsthmaTuner on Asthma Control Test (ACT).

Figure 1. Description of AsthmaTuner self- management system

1. Measure lung function 2. Evaluate symptoms 3. Receive treatment plan 4. Visualize self-management

Methods: This cross-over pilot study evaluated 40 school children with uncontrolled asthma (ACT <20 points), randomised to start 8 weeks with AsthmaTuner or conventional management (paper personalized treatment plan), and with 2 weeks wash-out period between the periods, Figure 2. The effect of AsthmaTuner on ACT was evaluated with paired t-tests.
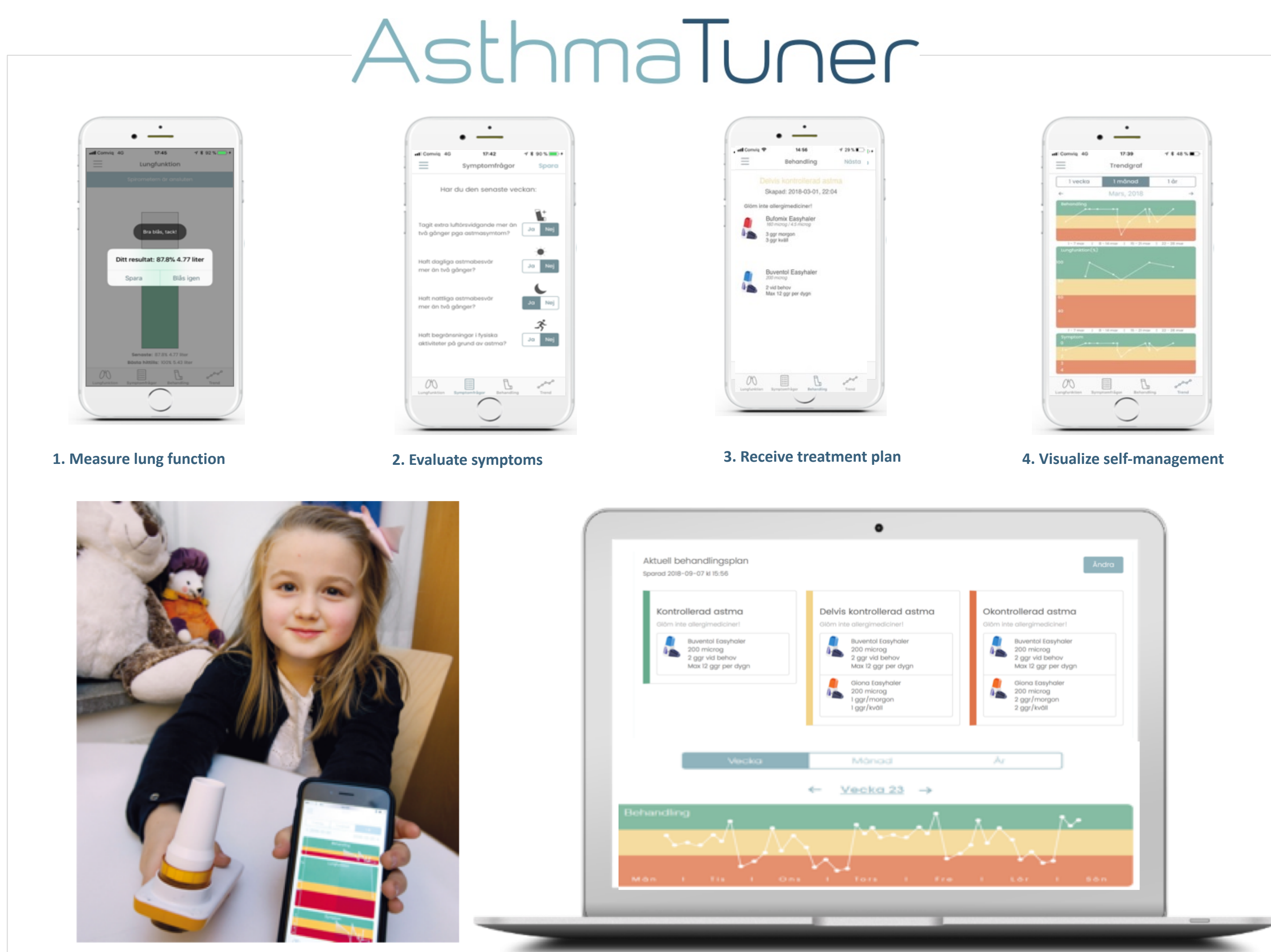
Figure 2. Study design: blinded randomised controlled cross-over pilot trial
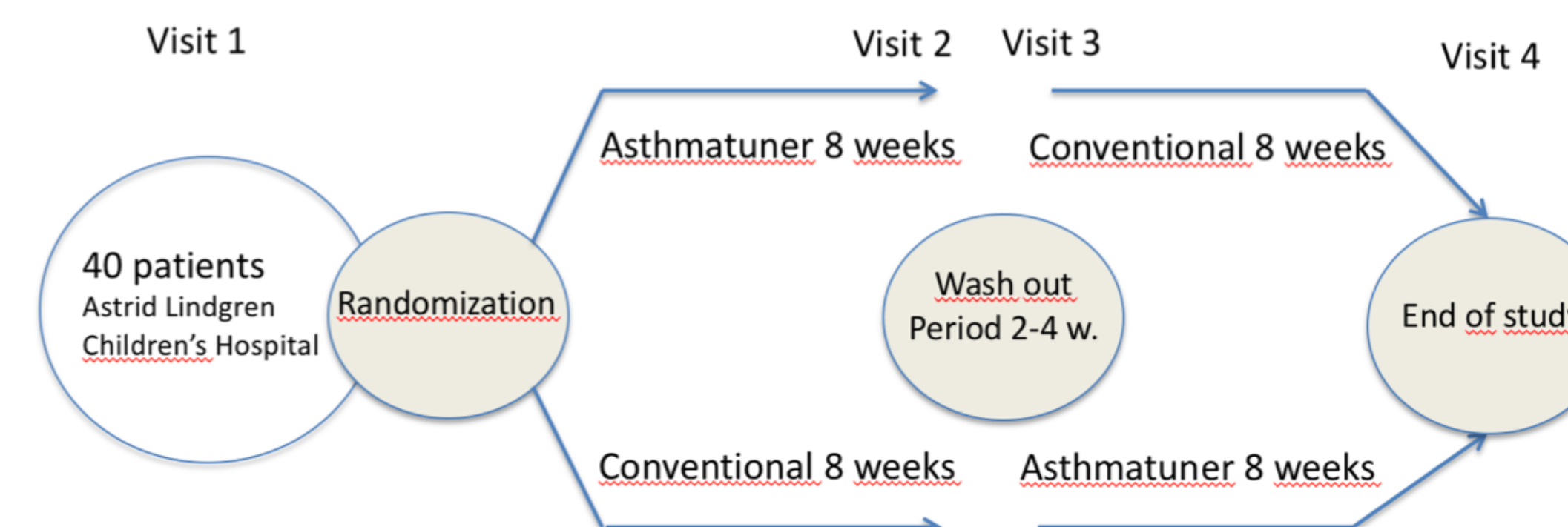
Table 1. Baseline characteristics of the study population, n=40.

Age, mean (SD)	11.7 years (3.2)
Females, n (%)	18 (45%)
Asthma Control Test, mean (SD)	15.9 (3.2)
Treatment: Controlled Asthma, ICS* mean µg	411
Partly Controlled Asthma, ICS* mean µg	630
Uncontrolled Asthma, ICS* mean µg	811
Montelucast, n (%)	23 (58%)
Long-acting beta-2 agonist, n (%)	36 (90%)
Co-morbidities: Eczema, n (%)	12 (30%)
Rhinoconjuctivitis, n (%)	15 (38%)
Food allergy, n (%)	16 (40%)

* Dose budesonide or equivalent

Results: Asthmatuner and conventional management resulted in significantly improved ACT between visit one and two (overall mean scores 3.7 vs 2.4, p-values <0.003), Figure 3. In addition, AsthmaTuner improved the ACT between visit three and four (mean score 0.8 vs. - 0.2). No significant difference was found in effectiveness between AsthmaTuner and conventional management (ACT 2.1 vs. 1.2, p=0.29).

Figure 3. Asthma Control Test before and after each treatment period
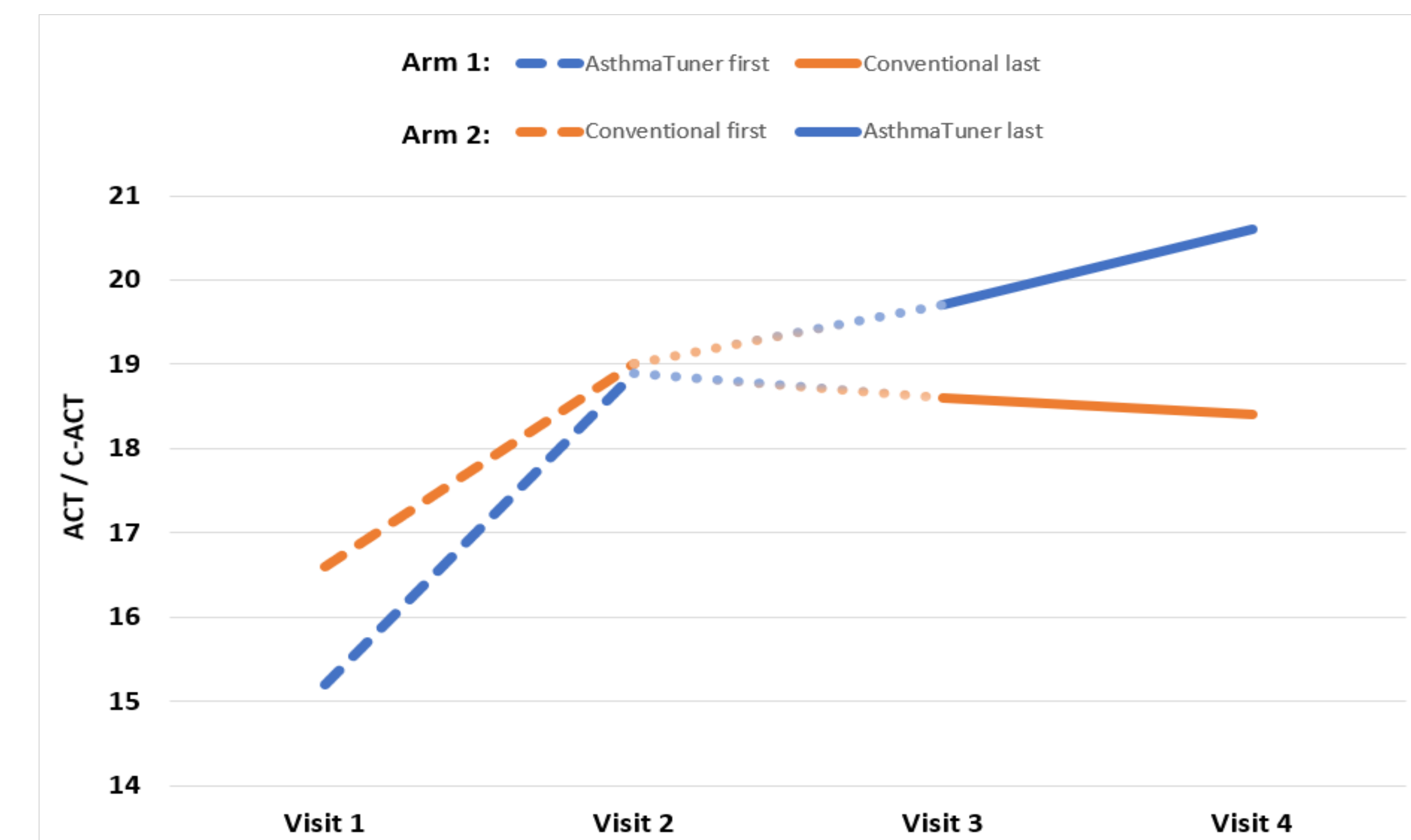
Conclusions: This pilot study indicates that AsthmaTuner improves asthma control. The findings support the use of digital self-management solutions for asthma.

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