Asthma attacks

using technology for early identification and monitoring resolution

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ABSTRACT

Background
Previous studies showed that signs of poor asthma control could be recognised 7-28 days before the patient presents with an attack [1,2] and reduced lung function can persist up to 28 days after.[3] Electronic surveillance, particularly post-COVID, assists patients and clinicians effectively monitor and manage attacks early and in the post-attack phase. We present some example data demonstrating the effectiveness of an electronic solution for remote monitoring.

Method
Smart Respiratory Products Ltd applications and sensors provide convenient technology for patients to self-monitor their Peak Expiratory Flow (PEF), symptoms (ACQ and ACT) and reliever use. The Smart Peak Flow (SPF) and Smart Rescue sensors send time stamped data (PEF and inhaler actuation) to smartphone apps, with secure anonymous cloud backup. Prediction of next day PEF zones provides early indication of asthma degradation[4] by calculating CompEx diary events, a novel composite surrogate measure of moderate/severe asthma attacks.[5]

Results
Over 1,000 patients are using these products in the UK and Europe and analysis of data collected provides information for clinicians, clearly demonstrating deteriorating control. PEF variability is evident 27 days before the CompEx event and hasn't returned to the best level after 30 days. Symptoms and SABA use increased from baseline 20 days before the CompEx event and only returned to baseline after 20 days.

Conclusions
Electronic monitoring using Smart Respiratory products provide timely early warnings of poor control for patients and clinicians which could be used to initiate early interventions to prevent attacks as well as a method for post-attack monitoring.

References
1. Levy et al ERJ 2021; 58: Suppl. 65, PA3397
2. Tattersfield AE et al Am J Respir Crit Care Med. 1999;160(2):594-9.
3. Ferrer A et al 1993;147:579-84.
4. Sakkatos P et al. ERJ. 2020; 56: Suppl. 64, 155.
5. Fuhlbrigge AL The Lancet Resp med. 2017;5(7):577-90

SMART RESPIRATORY

Electronic monitoring of asthma – early detection of Attacks

- Asthma attacks – not usually sudden
- Electronic warnings of impending attacks
- Electronic monitoring with Self Management

Plans for recording and sharing:

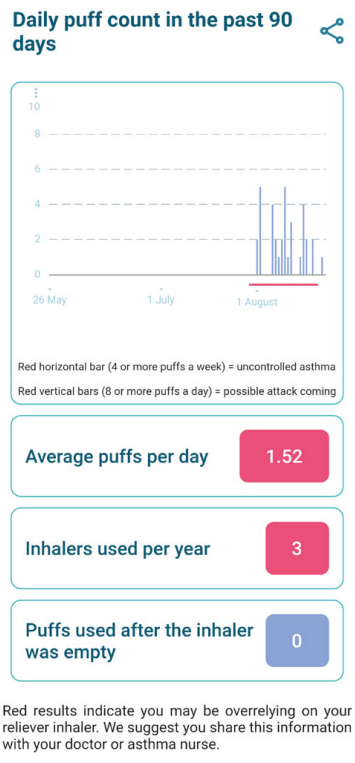
- Symptoms
- Use of reliever medication
- Lung function

- We present a system for collecting,
- analysing and summarising data to identify and act on poor asthma control

Smartphone app provides alerts for patients and clinicians

Daily puff counter highlighted in red if ≥ 4 a day and weeks with ≥ 4 puffs a week are highlighted

Summary reliever use Chart for sharing with clinician at reviews



Smart Respiratory MDI counter, PEF meter and App

The Smart Rescue MDI counter keeps track of puffs used and the app displays puffs remaining.

Smart Peak Flow is a CE marked Class 2 medical device, validated against spirometry.

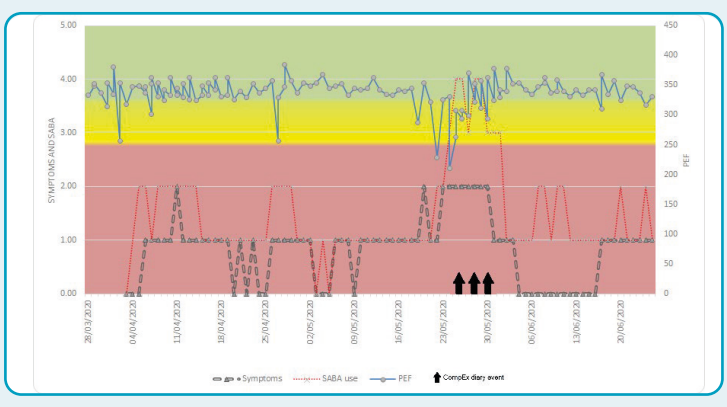
The Smart Asthma app records

1. Reliever inhaler use
2. PEF
3. Symptoms

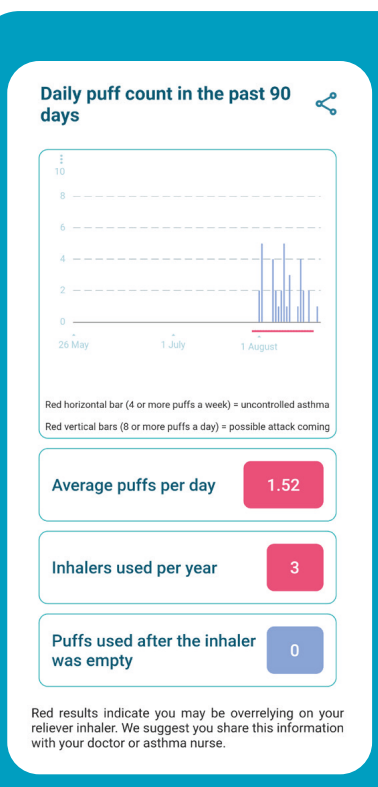
Example data summaries for patients to share with clinicians

Over 1,000 patients are using these products in the UK and Europe and analysis of data collected which could be used by the patient to share with their clinicians to provide some objective evidence for use in reviews.

This is an example showing how patients and clinicians can use this data to identify asthma flare-ups/attacks at an early stage. PEF variability is evident 27 days before the CompEx event and hasn't returned to the best level after 30 days. Symptoms and SABA use increased from baseline 20 days before the CompEx event and only returned to baseline after 20 days.



Summary data from Smart Peak Expiratory Flow, Dose counter, Symptom score and calculated CompEX (a validated surrogate measure for an asthma flare-up/attack) (5).
The red zone depicts levels of PEF below 60% of the patient's personal best reading.



Excess SABA use (4+ puffs a week) and excess prescriptions for SABA inhalers (≥3 200 dose inhalers a year) and where patients continue to use an empty inhaler are signals that a patient's asthma is out of control and that education and care requires optimisation.

This example screenshot shared by a patient provides the information clearly for a clinician.

Summary

Electronic monitoring using Smart Respiratory products provide :

timely early warnings of poor control to prevent attacks a method for post-attack monitoring
Information to share with clinicians to enhance clinical decision making.