



Inhaler adherence in severe asthma: is there an electronic solution?

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Combining electronic devices with traditional methods, a good patient–doctor relationship, and mutual, informed decisions about treatment might provide the best inhaler adherence in severe asthma <http://ow.ly/Ra8630DQm3>

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The management of severe asthma in daily clinical practice is challenging. It requires meticulous characterisation and close monitoring of the patients, and high-dose treatment with inhaled corticosteroids (ICS)/long-acting β_2 -agonists and add-on medications. Severe asthma add-on treatments include systemic steroids that have side-effects and increased long-term risk, and/or biologicals that are effective in specific phenotypes but should be used in a targeted manner and have high cost. Therefore, these medications should be prescribed after careful selection of the patients and close follow-up over at least a few months. Moreover, before resorting to add-on treatments for severe uncontrolled asthma, it is important to examine exposure to triggers such as allergens or irritants, comorbidities, and importantly, adherence to treatment and proper use of inhaler devices [1, 2], as adherence to ICS regimens is a pivotal factor in achieving optimal asthma control.

Poor adherence is a clear unmet need, and better ways to assess and address it must be found. Real-world studies report that adherence levels rarely exceed 50% of asthmatic patients, depending on the chosen tools and measurements applied [3]. Distinguishing between nonadherent, difficult-to-treat and true severe asthma is often complex. This is because poor adherence is related to poorer asthma-related health outcomes, such as oral corticosteroid bursts, hospitalisations and emergency department visits [3, 4]. Even in specialised centres, dealing with severe asthmatics, asthma adherence and control is still a major issue. Previous studies have unravelled this problem [5], and have also shown that interventions may lead to clinically significant improvements in adherence and control, which are nevertheless on a modest scale [6].

In this issue of the *European Respiratory Journal*, SULAIMAN *et al.* [7] from Richard Costello's group present the findings of a prospective multicentre randomised clinical trial that examines adherence in patients with severe unstable asthma using a special inhaler compliance assessment (INCA) device that provides objective assessment of both when and how the inhaler was used. Patients were divided into two groups: one (control) group that received intensive education/training and a second group that received the same intervention/training plus biofeedback from the device. At baseline, the majority of patients in both groups were uncontrolled according to the Global Initiative for Asthma criteria. The authors report that after 3 months of repeated feedback, inhaler adherence significantly improved in both groups, while the biofeedback group was significantly more adherent than the control group. Asthma control was significantly increased in both groups at the end of the study, and control or partial control rates were

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achieved to the same degree in both groups. However, many of the patients that remained poorly controlled during the study continued to show low adherence despite both intensive training and biofeedback. This study shows that biofeedback devices may help to some degree but the percentage of patients who are more adherent in the biofeedback group *versus* the intensive education group is rather small (~10%). Moreover, the groups achieve similar rates of control, whether in the education group or the education plus biofeedback group. So what are the important issues in adherence and severe asthma management?

In general, there are two important domains that have been shown to affect health outcomes. The first is the level of education of the patient, which affects their lifestyle. BOSSUYT *et al.* [8] showed that at 20 years of age, people with basic education have, on average, another 25 years of healthy life; patients with secondary school education have around 40 years of healthy life expectancy; and people with university/higher education, 45.8 years. This is because education and higher socioeconomic status are linked to healthier lifestyles including eating habits, nonsmoking and exercise. This is clearly a domain that can only be improved through state policies on education and public health rather than the individual healthcare providers.

The second is a structured health plan for asthma as was shown in Finland with the 10-year asthma plan [9]. There, a structured state-wide programme on asthma, based on education and training of healthcare providers in the community, lead to better control of asthma, fewer disability pensions, fewer hospitalisations and reduced cost [9]. This is different to what happens in unstructured settings; in a recent study from Denmark examining the diagnostic workup in severe asthma patients in a real-life setting, inhalation technique and adherence were assessed by treating physicians in only 20% and 30% of patients, respectively [10]. There are several reasons why this might occur, such as having a busy practice, lacking specialised nurses and overestimating patients' ability to master their devices [11]. Again, a state-wide structured setting has to do with public health; however, a structured practice approach can be achieved on an individual basis.

Our aim is to control asthma. Avoidance of triggers, understanding of the disease and the way medications work, a targeted, personalised prescription, and adherence to medication are important means of reaching this goal. Education, therefore, is pivotal; we need to find ways to provide effective education, and further help our patients understand and act. In uncontrolled asthma, we also need to objectively assess our patients' adherence. Conventional ways to assess adherence and technique issues include regular follow-up visits during which the pharmacist reports and/or prescriptions are checked, blister and inhaler counters are recorded, and inhaler technique is re-assessed using common errors checklists and questionnaires [12]. Such assessment tools provide only a snapshot of the patients' inhaler technique during the visit and a subjective estimation of adherence, based on patient self-reports. A more objective way would be to use specific markers but serum ICS concentration or cortisol levels [13] are restricted to specific medication (corticosteroids) and cannot address inhaler technique issues. New technologies, such as internet-based home telemonitoring [14, 15], and electronic devices connected to an inhaler and/or a peak flow meter, have also been tried over the last few years in order to objectively assess asthma control and compliance [16, 17]. An important advantage of the INCA device used in the study by SULAIMAN *et al.* [7] is that it provided objective information on both when and how the inhaler was used, therefore assessing both adherence and inhaler technique at the same time. So far, few other devices have been developed and tested to assess both adherence and technique, and a total of four, including INCA, have received US Food and Drug Administration approval [18]. INCA provides feedback on all essential inhaler steps; however, it is currently limited only to the Diskus inhaler (GlaxoSmithKline, London, UK), which is an important limitation. Another limitation of such devices is that resources have to be allocated in the form of extra visits where the doctor will collect and interpret data that will be communicated to the patient at a later time. Such devices nevertheless have the potential to improve patient inhaler technique in the home environment provided that they are portable, affordable, and give feedback to the patient in a user friendly and understandable manner. This type of feedback may be helpful to patients when starting treatment or switching to a new device, especially in severe asthma where adherence and inhaler technique are very important.

The problem of adherence in severe, difficult-to-treat asthmatics is pivotal and remains an unmet goal; many nonadherent patients unfortunately move, unnecessarily, to systemic steroids, biologicals or other add-on therapies in the real-life clinical setting. Checking adherence is important but other further important issues include choosing the device that fits the patient, and matching the device and treatment plan to the specific patient [19]. Patient preferences are important. Although there is no perfect inhaler, new devices are emerging and a few of them are already "smart" in the sense that they provide patients with audio and/or visual feedback, such as the Genuair (AstraZeneca, Södertälje, Sweden) and Nexthaler (Chiesi, Parma, Italy) devices. An individualised approach is necessary to accomplish the goal of

improving adherence and inhaler technique. Patient's preferences and needs must be taken into account, and this requires a good patient–doctor relationship as well as allocating time with the patient. A standard operating procedure including examination of inhaling technique and adherence is also important. The study by SULAIMAN *et al.* [7] provides a new tool to use in our effort to adequately assess adherence and inhaler technique; however, combining electronic devices with older traditional methods, a good patient–doctor relationship, and mutual and informed decisions about treatment might provide the best solution in the long term.

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