immunotherapy treatment. This could be a promising new therapeutic intervention for the short- to medium-term management of well selected patients. It is stated that this treatment should always be given in clinical settings and patients should be monitored carefully.

The authors wisely conclude¹⁰ that the science suggests that this approach has indeed potential, but many obstacles remain. So far, immunotherapy for food allergens, including peanut, is an experimental therapy in specialist centres. Robust evidence-based medicine data is required.

It is important to consider that in order to achieve successful results in terms of tolerance and desensitisation after using allergen specific immunotherapy, the dose of allergen given to the patient should be at high doses. This implies an innate risk of inducing severe systemic adverse reactions including anaphylaxis. Therefore, in some specific cases such as asthmatic patients with peanut allergy, it may be worth evaluating the use of anti-IgE therapy as combination treatment with allergen immunotherapy. This may allow higher doses of immunotherapy to be achieved more rapidly in a safe manner.

Oral immunotherapy for food allergy is a new approach in the treatment of allergic diseases. This systematic review¹⁰ shows the urgent need in the field of food allergy to conduct well-designed and well-powered studies using proper standardised allergens. Serious attention should be focused on various methodological issues including:

- (i) the selection of patients
- (ii) the design of the studies
- (iii) the selection of validated outcomes for the evaluation of effectiveness
- (iv) the statistical analyses
- (v) the duration of treatment, and
- (vi) the evaluation of safety.

Due to the nature of food allergies, future cost-effective studies are mandatory.

Conflicts of interest The authors declare that there are no conflicts of interest in relation to this article.

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Single inhaler maintenance and reliever therapy (SMART) in general practice asthma management: where are we?

See linked article by Riemersma et al. on pg 50

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Despite effective pharmacological options for treating asthma, most patients fail to achieve good control.¹ Non-adherence is common, with over-reliance on short-acting β_2 -agonists (SABA) and under-use of inhaled corticosteroids (ICS) frequently being observed.² There is a real need to consider new approaches to improve outcomes.

One approach that has attracted attention and controversy is Single Inhaler Maintenance And Reliever Therapy (SMART) using the budesonide-formoterol combination inhaler SymbicortTM. SMART is advocated by proponents on both pragmatic and theoretical grounds,³ and its use in primary care is addressed by Riemersma et al. in this issue of the *PCRJ*.⁴

In the traditional 'step-wise' asthma guideline model, therapy classes are added and doses increased when control is not achieved. Most patients use regular ICS 'preventer' treatment and an additional SABA inhaler used on an 'as-needed' basis; but when patients remain uncontrolled on ICS, long-acting β_2 -agonist (LABA) treatment is added, increasingly in the form of a fixed-dose ICS/LABA combination

inhaler. The traditional approach has been to prescribe an ICS/LABA combination inhaler providing sufficient doses of ICS and LABA to achieve control, and to provide additional SABA for 'rescue' use – so most patients will use at least two different inhalers. In the SMART model, however, the patient is only provided with an ICS/LABA inhaler, used both for maintenance treatment and for additional rescue use in place of SABA. This results in a variable ICS dose which is higher when the patient is more symptomatic. The rationale is that the higher ICS use at the time of increased symptoms improves outcomes by reducing exacerbation risk,⁵ and in fact allows lower total ICS exposure without compromising outcomes.

Although SMART has been advocated as being safe and more effective than traditional regimes, controversy persists concerning its relative effectiveness compared to guideline-based therapy, and when and in whom it should be used. Critics claim that the SMART trial programme has not actually compared SMART with current best practice, since the control arms (generally consisting of a fixed-dose regime) in the SMART studies are chronically under-treated.⁶ Recent Cochrane reviews of SMART have been published, one concluding that despite there being evidence that it reduces exacerbations compared to fixed-dose ICS monotherapy, current evidence of benefit over guideline-based treatment was lacking.⁷ A second review⁸ concluded that in mild asthma it is not yet known whether SMART use of a budesonide/formoterol inhaler for relief of asthma symptoms results in clinically important benefits (indicating that ICS monotherapy plus as required SABA likely still remains the right approach for most patients), but that in more severe patients at risk of exacerbations SMART combination ICS/LABA inhaler use reduced exacerbations.

SMART is currently only possible in inhalers containing the LABA formoterol, as its rapid onset of action (comparable to that of SABA preparations⁹) allows its use as a rapid-onset rescue bronchodilator, with a maximum dose of 72 mcg/day. (Symbicort™ formulations contain 6 or 12 mcg per actuation with SMART generally using 6mcg formulations, and total daily use should not usually exceed 8 puffs/day). Although theoretically possible to use this approach with other combination inhalers containing formoterol, the current evidence (and statutory licensing arrangements) only permits its use with Symbicort™. However, despite these limitations, the simplicity and ease of the SMART approach – and the extensive trial programme underpinning its use – make it popular with patients and clinicians, and its use is now widespread.

There remain some important gaps in our understanding of how SMART fits into our overall strategy, and in whom it should be used. ICS treatment is used to control airway inflammation, and effective inflammatory control will over time lead to a reduction in bronchial hyperresponsiveness (BHR), the 'twitchiness' in the airways smooth muscle that leads to episodes of bronchoconstriction when exposure to triggers occurs. A possible concern with SMART is that inadequate anti-inflammatory treatment may be given to (at least some) patients, resulting in persistent inflammation and increased BHR. A recent study compared airways inflammation in patients randomly allocated to SMART or a fixed-dose combination regime of 4-times the daily ICS dose.¹⁰ It reported less inflammation in the fixed-dose group, although

inflammation levels in the majority of the SMART group were within the range associated with stable clinical control, so the clinical significance is not clear.

In Riemersma *et al.*'s primary care study of patients with mild-to-moderate asthma,⁴ stable patients were randomised to SMART or 'usual care', and a range of control measures was observed over 12 months, with BHR measured at baseline and after 12 months. The study showed that although the SMART group received 59% less ICS, the change in BHR over the study was not significantly different between groups, and clinical outcomes were likewise similar. This is a very reassuring finding for patients and clinicians using the SMART regime, although some slight cautionary notes can be sounded. Firstly, this was a relatively small study recruiting stable patients, and there may be a sub-group of patients with more severe inflammation in whom BHR could have increased with the lower ICS load. Secondly, although this was a 12-month study, BHR may vary over prolonged time periods, and a longer study might show differences. Thirdly, the results cannot be extrapolated to unstable patients or to those with less well-controlled disease, (or indeed to those using other formoterol-containing combination inhalers).

Where does this leave us? SMART is now a realistic strategy for adults at 'step 3' of the BTS/SIGN guidelines, i.e. those requiring treatment with LABA in addition to ICS, and who use budesonide-formoterol fixed-dose combination inhalers. It has the advantage of simplicity, and in stable patients with mild-to-moderate asthma is unlikely to lead to deterioration in BHR and may allow lower cumulative ICS doses to be used without a loss of control. SMART may be particularly useful in patients who adhere poorly to their regular preventer therapy; ICS use has been shown to increase in such patients randomised to SMART therapy.¹¹ Whether there are other groups of patients who should or shouldn't be treated with SMART, and whether it can be used with other combination inhalers, remains to be clarified.

Conflicts of interest Neither MT nor any member of his close family has any shares in pharmaceutical companies. In the last 3 years he has received speaker's honoraria for speaking at sponsored meetings from the following companies marketing respiratory and allergy products: AstraZeneca (AZ), Boehringer Ingelheim, (BI) GSK, MSD, Napp, Schering-Plough, Teva. He has received honoraria for attending advisory panels with; Almirall, AZ, BI, Chiesi, GSK, MSD, Merck Respiratory, Schering-Plough, Teva, Novartis. He has received sponsorship to attend international scientific meetings from: GSK, MSD, AZ Mundipharma. He has received funding for research projects from: GSK, MSD, Napp. He held a research fellowship and is Chief Medical Advisor to Asthma UK. He is a member of the UK Department of Health Asthma Strategy Group and Home Oxygen Group. He is a member of the MHRA Respiratory and Allergy Expert Advisory Group. He is a member of the BTS SIGN Asthma guideline group.

In the last 3 years IDP has received speaker's honoraria for speaking at sponsored meetings from AZ, BI, GSK. He has received honoraria for attending advisory panels with; Almirall, AZ, BI, GSK, MSD, Schering-Plough, Novartis, Dey, Napp. He has received sponsorship to attend international scientific meetings from BI, GSK, AZ and Napp. He is Chief Medical Advisor to Asthma UK, a member of the UK Department of Health Asthma Strategy Group and Home Oxygen Group, a member of the BTS SIGN Asthma guideline group and joint editor in chief of Thorax. Neither IDP nor any member of his family has any shares in pharmaceutical companies.

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Qualitative studies enrich telemonitoring research, practice, and technology design

See linked article by Ure et al. on pg 57

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Telemonitoring of serious chronic conditions continues to gain traction in practice despite the dearth of consistent research to support its use, our limited understanding of the behavioral mechanisms underlying most interventions, and the lack of consensus on the workflows and process that should guide its implementation. The study by Ure et al.¹ reported in this issue of the *PCRJ* underscores the value of qualitative methods to fill some of these gaps – and in ways that exceed the capacity of much revered randomised controlled trials (RCTs).

An example of the limited picture painted by individual RCTs when considered in isolation is the oft-cited study of heart failure patients by Chaudrey et al.² published recently in the *New England Journal of Medicine*. Rather than recognising that their purely quantitative

design was vulnerable to important confounding factors that randomisation could not eliminate, the authors chose to use their findings as fodder to question the effectiveness of telemonitoring as a whole whilst overriding smaller studies, meta-analyses, and exploratory subgroup analyses supporting its use.³⁻⁵ Many of the confounders that might explain the negative findings in Chaudry's study – such as the need for manual entry of readings into the touchpad of patients' home phones and the lack of real-time self-care instruction and clinical feedback – could have been identified and easily eliminated, with a potentially significant reduction in the high attrition rate experienced throughout the study.

The report by Ure et al.¹ illustrates the value of mixed methods during the evaluation of telemonitoring interventions for people living with chronic conditions. In this case, by conducting a preparatory qualitative study, the authors were able to detect and address, in advance, key human and technological issues that could threaten the validity of their RCT. As has been shown elsewhere, small sophisticated studies can help ensure that both patients and clinicians are keen to use the interventions before committing to a potentially expensive and time-consuming RCT.^{6,7} They can also uncover apparently trivial challenges for the successful implementation of telemonitoring programmes that RCTs are unlikely to reveal – such as the need for appropriate balance between self-care and professional support, the introduction of interventions to overcome the prejudices of health professionals towards telemonitoring technologies, and effective measures to prevent patients from under-reporting their symptoms for fear of bothering their health care providers, or to let technological readings override their judgment.

The study also reveals technological nuances that are rarely considered or reported by RCTs that could have a major impact on their validity. These include the need to reduce uncertainty around data transmission, to simplify self-assessment of symptoms by