Evaluation of fractional exhaled nitric oxide measurement in defence primary healthcare

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Fractional exhaled nitric oxide (FeNO) was recommended by the National Institute for Health and Care Excellence (NICE) as an aid to optimising asthma diagnosis and management in 2017.1 By measuring eosinophilic infiltrates in the airways, treatment with inhaled corticosteroids (ICS) can be tailored (step up/step down) and deprescribed where a diagnosis is unlikely.2 For service personnel (SP), a reduction in adverse effects can be anticipated and deploying while expected to have severe asthma would be considered by their superiors.3 In the UK, this is done through a Grade 2 (clinical) diagnosis, which requires a ‘personal history of severe exacerbations, exercise induced or not’ and ‘recent asthma hospital admission or emergency treatment’ and can result in being unable to deploy to locations where exposure to pollen is high.4 For service personnel; SP, service personnel; SPTA, Salisbury Plain Training Area.

Objective markers of control such as the Asthma Control Test (ACT).3 Optimising management in SP results in a high ACT score, improves deployability, reduces the risk of exacerbation while deployed and should result in a less restrictive Joint Medical Employment Standard (JMES) grade.5 For the last 18 months, the Academic Department of Military General Practice has been evaluating a FeNO device, Niox Vero, at a large medical centre on the edge of the Salisbury Plain Training Area (SPTA) in the UK.

Of the 88 patients who underwent FeNO testing, 65 (74%) were SP. A breakdown of initial FeNO readings for all 88 patients is shown in figure 1. Of the 65 SP, 30 (46%) had a FeNO level greater than 40 ppb (current NICE cut-off). 25 (38%) had a diagnosis confirmed and ICS initiated, 19 (29%) had a diagnosis ruled out. 18 (28%) had their treatment optimised and 3 (5%) had treatment restarted. Known asthmatics on ICS had concordance confirmed with a reading below 40 ppb. For 8 SP (12%), the predominant symptom was allergic rhinitis (AR) with wheeze, so treatment was optimised by adding in ICS. This group was SP exercising on SPTA who had presented acutely despite standard AR treatment plus short-acting beta agonist treatment. Subsequent readings were taken in 11 SP (17%) who had commenced ICS treatment, all of whom showed a reduction in their FeNO levels suggesting reduced inflammation. This was a service evaluation so access to medical records was not undertaken to assess the effect of FeNO on subsequent medical employment standard. However, table 1 describes three hypothetical cases based on presentations throughout the evaluation period.

Despite initial financial outlay, FeNO is a cost-effective way for the diagnosis and optimising the management of asthma, as well as ruling out the diagnosis and enabling deprescribing.2 The device is simple to use, requires no special expertise and the results are interpreted by the clinician.6

Figure 1 FeNO measurement level at first presentation. Red line indicates 40 ppb, diagnostic cut-off for positive test. FeNO, fractional exhaled nitric oxide.

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<th>Table 1 Hypothetical cases (based on cases in evaluation) where FeNO has aided diagnosis, management and occupational grading</th>
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ACT, Asthma Control Test; FeNO, fractional exhaled nitric oxide; ICS, inhaled corticosteroids; JMES, Joint Medical Employment Standard; SABA, short-acting beta agonist; SP, service personnel; SPTA, Salisbury Plain Training Area.
very little maintenance, is acceptable to patients and can be undertaken in children as young as 8. FeNO is better at ruling in than ruling out the diagnosis of asthma, which would lead to SP being appropriately treated. This provides an additional occupational benefit, as accurate diagnosis and optimising of treatment will reduce the risk of exacerbation. Subsequent deployment of SP on operations will, therefore, carry less risk, reducing the chance of medical evacuation. Further work may be required to ascertain the effect of FeNO when an SP has a restrictive JMES grade due to asthma. However, this evaluation supports the introduction of FeNO measurement into Defence Primary Healthcare to enable this.

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