and 106 non-asthmatic participants and performance metrics were generated from an unseen validation set of 29 asthmatic, and 27 non-asthmatic participants. This was repeated 20 times with different validation participants for additional statistical power, and the average and variability of these metrics were recorded.

Results The classification model achieved AUROC of 0.908 ± 0.016, sensitivity of 0.800 ± 0.043, specificity of 0.883 ± 0.012, positive predictive value (PPV) of 0.873 ± 0.010, and negative predictive value (NPV) of 0.817 ± 0.031 in detecting asthma from a single breath record.

Conclusion TidalSense’s N-TidalTM capnometer and machine learning classifier could be used as an accurate, rapid, point-of-care diagnostic test for asthma, particularly in primary care. Future work will incorporate longitudinal capnography data into a diagnostic classifier.

Please refer to page A293 for declarations of interest related to this abstract.

Introduction One in four cases of asthma in adults are caused or worsened by work (work-related asthma: WRA). Early detection of WRA could prevent poor health and employment outcomes, but WRA is often missed, or diagnosis delayed. Standardised screening tools and their effectiveness in practice are not well established. We aim to summarise and compare the performance of screening tools for identifying WRA in both clinical settings and workplaces.

Methods We searched for articles using structured questionnaires or prediction models (that may also include physiological tests) to identify WRA in clinical settings or workplaces, in MEDLINE, EMBASE, other bibliographic databases and grey literature between 1975–2021. Studies were screened independently by two reviewers using predetermined criteria, also with data extraction. Quality was assessed using QUADAS-2 and/or PROBAST tools. Screening tools and their indices of accuracy were summarised with paired forest plots of sensitivities and specificities.

Results Of 17,006 articles identified by the search, 6 studies were included following full-text review. Four studies focused on occupational asthma and two on WRA. All comprised tertiary hospital (n=4) and specialist centre (n=2) populations. The screening tools used were questionnaires alone (asking about generally respiratory symptoms and their relation to work, n=5), questionnaire with methacholine challenge test (n=1) and diagnostic models (n=3). Three studies using questionnaires alone reported only the performances of each individual questionnaire items (e.g. wheezing, wheezing at work). The item ‘improvement of symptoms on weekends/vacations’ showed 74–87% sensitivity.

Abstract M14 Figure 1 Paired forest plot of questionnaire items (wheezing, improvement of symptoms off work), questionnaires alone and questionnaire with objective tests
and 15–58% specificity. Another two studies using questionnaires alone had 80–100% sensitivity and 8–55% specificity. Addition of methacholine challenge test in one questionnaire gave 65% sensitivity and 74% specificity. Diagnostic models which added extra variables (e.g. age, exposure duration, sensitization result) reported AUC 0.58–0.94. Forest plots for individual questionnaire items and questionnaires are shown in the figure 1.

**Discussion** Questionnaires alone give a high sensitivity but low specificity for WRA, which could be sufficient for purposes of screening. Adding demographic variables and objective tests can improve specificity. However, studies on screening tools for WRA are few and inadequately reported; further evaluations of performance are needed, especially in general populations and workplaces.

**M15 QUANTIFICATION OF CLINICAL DETERIORATION OF ASTHMA BASED ON THRESHOLD FOR SABA USE IN TWO STUDIES OF THE DIGIHALER SYSTEM**

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**Background** In two studies of the Digihaler System (DS), patients with suboptimally controlled asthma used an albuterol inhaler with an integrated sensor that objectively recorded real-time reliever use. US asthma experts, through a modified Delphi process, developed clinical thresholds for reliever use which likely represent impending or ongoing asthma exacerbations.

**Methods** Two conservative clinical threshold rules (‘≥25 episodes of reliever use in any 7-day period’ or a ‘≥100% increase in weekly reliever use from patient baseline’) were retrospectively applied to data from patients using the albuterol DS for ≥3 months in the CONNECT1 and CONNECT2 studies. A clinical deterioration episode was defined as ≥1 consecutive day(s) with ≥1 threshold met, separated by ≥7 days.

**Aim** To compare the number of threshold-defined clinical deterioration episodes with confirmed clinical exacerbations in CONNECT1 and CONNECT2 participants.

**Results** Across the 360 patients in both studies, 513 unrecognized deteriorations occurred whereas only 22 exacerbations were clinically confirmed (figure 1).

**Conclusions** Even using these very conservatively defined thresholds, a substantial incidence of unrecognized episodes of clinical deterioration was detected. Electronic monitoring of reliever use has clear potential to identify periods of clinical deterioration that would otherwise remain hidden, thereby supporting risk management.

Please refer to page A293 for declarations of interest related to this abstract.

**M16 RECOGNIZING ASTHMA RISK SCENARIOS: INDIVIDUALIZED INHALER USAGE AND INHALATION PARAMETER PROFILES FROM AN ELECTRONIC INHALER WITH INTEGRATED SENSORS**

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**Rationale** Suboptimal adherence, errors in inhaler technique, and reliever overuse are risk factors associated with poor asthma outcomes. The Digihaler® electronic inhaler provides objective data on usage and inhalation parameters that can be...