**Background** Developing a comprehensive picture of the burden of asthma in the UK will enable informed national decisions about care provision and planning. We sought to provide the first UK-wide estimates of the epidemiology, healthcare utilisation and costs of asthma.
**Methods** We undertook analyses of national health surveys, routine healthcare and administrative datasets over the period 2010–12. Economic modelling was carried out to estimate costs. Estimates were calculated for each nation and the UK as a whole.
**Results** The UK lifetime prevalence of patient-reported symptoms suggestive of asthma in 2010–11 was 30.7% (95% Confidence Intervals [CI] 29.2–32.2; equivalent to [~] 18,949,516 people), lifetime prevalence of patient-reported physician-diagnosed asthma was 15.9% (95% CI 14.7–17.1; ~10,841,030 people), annual prevalence of patient-reported physician-diagnosed-and-treated asthma was 9.1% (95% CI 8.0–10.2; ~5,765,237 people), annual prevalence of GP reported-and-diagnosed asthma was 8.2% (95% CI 8.2–8.2; ~5,215,607 people) and annual prevalence of GP reported-and-diagnosed-and-treated asthma was 6.0% (95% CI 6.0–6.0; ~3,946,796 people). In 2011–12, asthma resulted in an estimated: 6,392,670 primary-care consultations; 93,916 inpatient-care episodes; 1,864 (317 paediatric and 1,547 adult) intensive-care unit episodes; 36,800 disability living allowance (DLA) claims; and 1,160 deaths. The estimated cost of asthma in the UK was at least £1.1billion in 2011–12: 75% of this was for primary-care (60% prescribing and 15% consultations), 13% for DLA claims, and 10% for hospital care.
**Conclusions** We found that asthma is very common, affecting at least 3.95 million people, and that it is responsible for substantial morbidity, healthcare and societal costs in the UK. Setting ambitious targets for improving asthma outcomes is paramount and resources should be targeted to improving community-based prescribing decisions and reducing the risk of asthma exacerbations and associated hospitalisations and deaths.
**Funding** Asthma UK, with additional support from the Edinburgh Health Services Research Unit and Farr Institute, UK.

## P219 POTENTIAL IMPACT OF AIR POLLUTION COVERAGE IN THE MEDIA ON RESPIRATORY DISEASE ADMISSIONS

[1]PS Tang, [2]D Shaw, [3]G Smith, [3]J Goulding. *[1]East Midlands Academic Health Sciences Network; [2]Division of Respiratory Medicine, University of Nottingham, Nottingham, UK; [3]Horizon Digital Economy Research, University of Nottingham, Nottingham, UK*

10.1136/thoraxjnl-2015-207770.355

**Introduction** Air pollution can exacerbate respiratory disease. However, when air quality warnings are provided by authoritative bodies (e.g. MET office) media coverage may be disproportionate. We explored whether there is an association between respiratory admissions and media pollution coverage via non-linear predictive models, to potentially predict respiratory admissions.
**Methods** The association was examined as follows:

1. Baseline regression models were generated to predict daily respiratory admission episodes from 1st January 2009–9th April 2014. Predictors consisted of daily logs for PM10 particulate matter, PM2.5, Nitric oxide, Nitrogen dioxide, Ozone, Black carbon, Mean Temperature, Precipitation (obtained from *National Oceanic and Atmospheric Administration* data) and the DAQI Air Pollution Index. Models were optimised via cross-validation using daily respiratory admission levels sourced from Nottingham University Hospitals Trust data (ICD10 codes J39 – J9999).
2. Time series of levels of media coverage were generated by applying kernel density estimation at a range of bandwidths (using linear and exponential kernels at bandwidths of 1, 10, 25, 50 and 100 days) to daily counts of online news articles featuring pollution and air quality issues over the period 01.01.2013 – 9.04. 2014.
3. Predictive model accuracies were compared following integration of these time series of media coverage levels as an additional predictor.

**Results** Of the predictive models tested, random forests parameterized provided optimal results for air-quality predictors. When predicting daily respiratory admissions, the model's accuracy was 19.90% better than simply predicting mean daily admissions, with an average root mean square error (RMSE) of 7.5031. However, on introduction of the media-coverage variable, RMSE was reduced to 7.3210, representing a 21.85% improvement over mean prediction. While this reflected a slight improvement in admissions forecasting, a corrected t-test suggested these differences were not statistically significant, with a p-value of 0.0633.
**Conclusion** Initial results indicate that consideration of media coverage may offer minor improvements in predicting respiratory admissions, but this effect was not statistically significant. While such a relationship requires further investigation, models informed by media coverage cannot currently be considered to be accurate enough for use in a practical setting. Better media data collection may improve prediction accuracy.

## P220 USING FUNNEL PLOTS TO MAKE MEANINGFUL CENTRE COMPARISONS

[1]L Pierotti, [2]MA Mohammed, [3]M Wildman, [4]D Bilton, [5]J Boote, [4]SB Carr, [6]K Collins, [1]P Cullinan, [7]C Elston, [3]S Harrison, [8]P Norman, [9]SJ MacNeill. *[1]Imperial College London, London, UK; [2]University of Bradford, Bradford, UK; [3]Sheffield Teaching Hospitals, Sheffield, UK; [4]Royal Brompton Hospital NHS Trust, London, UK; [5]University of Hertfordshire, Hatfield, UK; [6]National Services Scotland, Edinburgh, UK; [7]King's College Hospital NHS Trust, London, UK; [8]University of Leeds, Leeds, UK; [9]University of Bristol, Bristol, UK*

10.1136/thoraxjnl-2015-207770.356

**Objectives** The UK CF Registry annual reports include comparisons between centres on key outcomes such as FEV1 using rankings. While illustrating the distribution between centres, they promote the assumption that those with the highest measures provide "better" care. We hypothesised a more scientific approach based on statistical "process control" using funnel plots and adjustment for case-mix may help to identify exceptional CF care services in terms of clinically meaningful outcomes.
**Methods** We extracted data from annual reviews (2007–2012) on the CF Registry. Our outcomes included FEV1 (% predicted) at 15 years and change in FEV1 between 18 and 21 years. Funnel plots were generated with confidence limits at 2 and 3 standard deviations (SD). Centres with mean values outside these limits are said to display "special cause variation" -variability outside what one would expect. Outcomes were then adjusted for case mix (including gender, genotype, pancreatic sufficiency and socio-economic deprivation) and analysed using funnel plots.
**Results** 31 paediatric centres provided FEV1 data on 15 year olds between 2007 and 2012. Funnel plots of unadjusted FEV1 (% predicted) showed few centres with evidence of special cause variation (2SD limits). Initial case-mix adjustment reduced the number of centres outside these limits to 3. We also identified 28 adult centres providing sufficient data to calculate change in

FEV1 (% predicted) between 18–21 years. While there was some evidence of special cause variation (at 2SD limits) in prior to case-mix adjustment, after adjustment none were outside the 2SD limits. None of the centres were outside the 3SD limits in either analysis.

**Conclusion** In conclusion the work to-date illustrates that funnel plots can be used to explore potential differences in $FEV_1$ between specialist centres. Case-mix adjustment models should develop into a useful tool for making centre comparisons which can continue to be used by stakeholders. This is early work, however, and we need to bear in mind that by examining outcomes in small populations risk missing true differences due to low statistical power. Further work is required to assess whether any observed differences are due to chance or are related to the care patients receive.

## P221 EVALUATION OF EXACERBATION FREQUENCY AND RE-HOSPITALISATION, AND RISK FOR SUBSEQUENT EXACERBATIONS IN ASTHMA PATIENTS IN A UK PRIMARY CARE SETTING

RY Suruki, JB Daugherty, N Boudiaf, FC Albers. *GlaxoSmithKline, Stockley Park, UK*

10.1136/thoraxjnl-2015-207770.357

**Introduction and objective** Exacerbations occur in all asthma patients but disproportionately impact those with more severe disease. This study aimed to describe the frequency of exacerbations by asthma severity and the risk for future exacerbation.

**Methods** In a retrospective cohort of asthma patients in the CPRD (2009–2011), we defined asthma severity based on asthma medication use and exacerbation history; index date was asthma medical code date. Asthma severity was determined by asthma medication use and exacerbation history during the 12 months preceding the index date. Exacerbations were ascertained during the 12-month follow-up period and were defined as an asthma-related accident and emergency (A&E) department visit or hospitalisation, or any oral corticosteroid (OCS) prescription with an asthma medical code recorded within ±2 weeks. A proportional hazard model was developed to evaluate the risk for subsequent exacerbations associated with the type of exacerbation (OCS vs. ED/hospitalisation).

**Results** A total of 211,807 patients with asthma were identified in CPRD during the study period. The mean age was 45 years and females made up 58% of the study population. Of these patients, 17,785 (8.4%) and 3,592 (1.7%) experienced $\geq$1 and $\geq$2 exacerbations, respectively during the follow-up period. The proportion of patients experiencing $\geq$1 or $\geq$2 exacerbations increased with severity and prior exacerbation frequency (Table 1). Among 1,900 patients with an asthma-related hospitalisation, 2.3%, 3.3%, and 3.8% experienced asthma-related readmissions within 30-, 60-, and 90-days, respectively. When limited to patients with more severe disease, the readmission rates increased significantly, up to three times in those with a history of $\geq$2 exacerbations. Compared to an OCS defined exacerbation, an A&E visit or hospital admission was associated with a 30% greater risk for any subsequent exacerbation (HR = 1.3, 95% CI 1.15–1.44), after adjusting for gender, disease severity, atopy, and exacerbation history.

**Conclusion** Asthma exacerbations remain a burden for patients with severe asthma or a history of frequent exacerbations. Additionally, patients should be managed carefully after an asthma exacerbation as they are at higher risk for subsequent exacerbations and readmission. (GSK-funded; WEUSKOP7092).

## P222 RATES OF HOSPITALISATION AFTER DIAGNOSIS OF LUNG CANCER: A LINKED AUDIT AND HOSPITAL EPISODE STATISTICS STUDY

A Khakwani, RB Hubbard, LJ Tata. *Division of Epidemiology and Public Health, University of Nottingham, Nottingham, UK*

10.1136/thoraxjnl-2015-207770.358

Much of the research in lung cancer is concerning survival or treatment rates and little is known about the rate of hospitalisation (emergency/elective) following the diagnosis of lung cancer.

Newly diagnosed English patients from the National Lung Cancer Audit database (NLCA), 2007–2011, were linked with Hospital Episode Statistics (HES) data to provide details on their subsequent hospital admissions. Hospitalisations for receipt of chemotherapy or cardiothoracic surgery were excluded to ensure only non-treatment related admissions were included. We only included patients included who survived at least 30 days after their first presentation to a physician to exclude more advanced disease. We calculated rates and rate ratios (RR) of elective and emergency admissions per person-year (ppy) by patient features including sex, age, performance status and co-morbidity.

Among 92,482 patients, there were 261,121 non-treatment related hospitalisations with rate of 2.92 admissions ppy (95% CI, 2.91–2.93). Emergency admissions constituted 57% of all admissions at a rate of 1.66 admissions ppy while the elective admission rate was lower at 1.26 admission ppy. Adjusted RRs in Table 1 show that males were approximately 20% more likely than females to be admitted through either route (RR 1.17, 95% CI 1.16 – 1.18 for emergency and 1.20 (1.18–1.21) for elective). Worsening performance status, co-morbidity and advanced stage were all associated with higher emergency admissions while there was no strong association with age. For elective admissions pattern were similar yet associations were weaker and performance status did not show a linear association with admissions. Increasing socioeconomic deprivation was associated with a moderate increase emergency admission rates but a decrease elective admission rates.

The rate of emergency admissions was higher than the rate of elective admissions following diagnosis of lung cancer. Sex, worsening performance status, advanced stage and co-morbidity were all independently associated with admissions with similar patterns for emergency and elective admissions. However, being from a more deprived socioeconomic class was associated with more emergency admissions and fewer elective admissions. Reason for these findings could be related to variation in receiving treatment in these groups or treatment related side effects leading to more emergency admissions.

## P223 VALIDITY AND INTERPRETATION OF SPIROMETRY FOR PATIENTS IN PRIMARY CARE

[1]KJ Rothnie, [2]H Mullerova, [3]H Goss, [3]J Chandan, [1]JK Quint. *[1]Respiratory Epidemiology, Occupational Medicine and Public Health, National Heart and Lung Institute, Imperial College London, London, UK; [2]Respiratory Epidemiology, GlaxoSmithKline R&D, Uxbridge, UK; [3]Medical School, Faculty of Medical Sciences, University College London, London, UK*

10.1136/thoraxjnl-2015-207770.359

**Background** Previous studies have questioned the validity and interpretation of spirometry undertaken in primary care. Knowing that data are accurate is important as many respiratory diseases are diagnosed and managed in primary care. Additionally researchers use data entered into electronic health records both