Annual Scientific Meeting 2019

Celebration of the first 5 years
and vision for the next 5 years
of the Asthma UK Centre for
Applied Research

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#ASM19
Dear Friends

It is our great pleasure to welcome you to the Asthma UK Centre for Applied Research Annual Scientific Meeting 2019.

Recent successes

Since its launch in 2014, our Centre has been at the forefront of research making a real difference to the lives of those affected by asthma.

Over the past year, our network of world-leading researchers has contributed to important advances on (amongst others) the topics of air pollution, online health communities and female hormones in asthma.

2018 also saw the launch of ground-breaking new studies, including CHILL, which will evaluate the impact of London’s Ultra Low Emission Zone on children’s health, and IMP2ART, which aims to help general practices embed supported self-management into routine asthma care.

It’s also been fantastic to see our first PhD students begin to graduate. Developing the next generation of world-class applied asthma researchers through our postgraduate training programme is a key role of the Centre.

Looking forward

As we gather together to celebrate our achievements over the first five years of the Centre, we also embark on a new chapter.

We are delighted to announce that the Asthma UK Centre for Applied Research has been funded for an additional five years. We are exceptionally grateful to Asthma UK for this further support. Our vision for the Centre during this next period will be explored over the course of the meeting.

Collaboration is at the heart of what we do, and we’re thrilled to formally welcome the Universities of Leeds, Oxford and Southampton as full members of the Centre as part of our renewal.

As we reach this important milestone, we’d like to take this opportunity to thank you for your continued support of the Centre. Our overarching principle, as recommended by The Lancet Commission on Asthma, is “Zero tolerance of asthma attacks”. We look forward to working together as a network to build on our achievements over the past five years and create lasting impact for people with asthma throughout the UK and beyond.

Aziz and Chris

Professor Aziz Sheikh, University of Edinburgh, and Professor Chris Griffiths, Queen Mary University of London

Co-Directors of the Asthma UK Centre for Applied Research
Day 1: Tuesday 12th March – celebration of AUKCAR work

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<td>Research success and key messages</td>
<td>Hilary Pinnock, Susan Morrow, Kirstie McClatchey &amp; Io Hui</td>
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<td>Keys to success</td>
<td>Steff Lewis, Chris Newby, Tracy Jackson &amp; Mome Mukherjee</td>
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<td>12.30 – 13.00</td>
<td>Plenary: Technology, asthma and the future</td>
<td>Stan Szeller</td>
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<td>Asthma in real life: today’s dilemmas and future solutions</td>
<td>Gwyn Davies, Rob Horne, Steff Lewis, Daniel Russell, Anna de Simoni</td>
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<td>Looking ahead: The next 5 years for AUKCAR</td>
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<td>Plenary: Celebrating the past and looking to the future</td>
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Day 2: Wednesday 13th March

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<td>Centre AGM and feedback from the IAB - All welcome</td>
<td>Aziz Sheikh, Chris Griffiths</td>
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<td>09.30 – 10.00</td>
<td>A practical look ahead – next 5 years</td>
<td>Aziz Sheikh, Chris Griffiths, Andrew Wilson, Hilary Pinnock, Steff Lewis &amp; Gwyn Davies</td>
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<td>10.00 – 11.00</td>
<td>Methodology: Evaluating asthma apps</td>
<td>Chris Newby</td>
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<td>11.30 – 12.15</td>
<td>New from the Centre (3x15min talks)</td>
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<td>Chair: Mike Shields &amp; Holly Tibble</td>
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<td>Patient and Public Involvement</td>
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<td>14.15 – 15.15</td>
<td>New from the Centre (4x15min talks)</td>
<td>Travis Jackson</td>
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<td>Looking ahead: The next 5 years for AUKCAR</td>
<td>Mome Mukherjee</td>
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<td>Plenary: Acute asthma: treatable and preventable</td>
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<td>15.15 – 15.45</td>
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Locations: Refreshments - Conference foyer
Posters - Ada Salter Suite
Talks - THE LIGHT
Oral Presentations

Wednesday 13th March: 11.30-12.15

Please note that oral presentations 01-07 are the same as posters 17-23.

Oral presentation 01* (Poster 18)
Defining Near Fatal asthma – an international eDelphi study.
McMurray A, Fleming L, Cunningham S.

Oral presentation 02* (Poster 21)
Developing a value pyramid to guide implementation of asthma interventions in the UK.
Roukas C, Tomini F, Griffiths C, Roberts CM, Mihaylova B.

Oral presentation 03* (Poster 23)
Identifying patients with asthma-chronic obstructive pulmonary disease overlap syndrome using latent class analysis of electronic health record data.
Mohammad Al Sallakh, Sarah E Rodgers, Ronan A Lyons, Aziz Sheikh & Gwyneth A Davies

Wednesday 13th March: 14.15-15.15

Oral presentation 04* (Poster 17)
Exploring primary care staff experiences of financial incentives for implementing asthma self-management: a qualitative study in Northern Ireland using normalisation.
Jackson T, Kendall M, Shields M, Heaney L, Pinnock H

Oral presentation 05* (Poster 19)
Identifying strategies to overcome roadblocks towards utilising near-real time healthcare and administrative data to create a Scotland-wide learning health system (LHS) for asthma.
Mukherjee M, Cresswell K, Sheikh A

Oral presentation 06 (Poster 20)
Asthma and early exit from employment: a European cohort study.
Leveneur P, Newby C, Mihaylova B.

Oral presentation 07* (Poster 22)
The 25-hydroxyvitamin D response to vitamin D supplementation is blunted in adults with asthma and COPD.
Stefanidis C, Jolliffe DA, Griffiths CJ, Bush A & Martineau AR.

Oral presentation 1*
Defining Near Fatal asthma – an international eDelphi study.
1McMurray A, 2Fleming L, 3Cunningham S,
1University of Edinburgh; 2Imperial College, London.

Background: National and international asthma guidelines categorise the severity of asthma attacks into mild, moderate and severe/life threatening episodes with guidance on clinical signs and objective measurements identified for each. In those who experience a particularly severe asthma attack there is a penultimate event which, if not recognised, will result in death. The name for this attack varies and requires clarity and definition to enable the frequency of defined attacks to be measured, against which future interventions can be trialled to reduce these and asthma deaths.

Aims: To gain an international clinical consensus definition for this penultimate attack and agree an appropriate name.

Methods: An eDelphi survey was conducted with international experts in the fields of both paediatric and adult respiratory, intensive care and emergency medicine. A series of structured questionnaires was used to reach consensus on a name for the event, clinical features, objective measurements and other features. Consensus was defined in advance as ≥ 70% agreement.

Results: 104 participants from 25 countries completed all three rounds of the Delphi. Near fatal asthma was the preferred name for this event (66%). Participants reached consensus on the following definition: A near fatal asthma attack occurs in a person who is exhausted, with severe dyspnoea, unable to speak with a silent chest. Respiratory arrest is considered imminent and invasive ventilation will likely be required. They will be responding poorly to emergency asthma therapies. This is associated with hypoaxemia, hypercarbia and a falling pH.

Conclusions: The eDelphi procedure resulted in a comprehensive definition of a near fatal asthma attack which will be used in future work to determine eligibility criteria for studies of near fatal asthma and devise treatment pathways.

Funding: This work is funded by the University of Edinburgh College of Medicine and Veterinary Medicine PhD Studentship (AUKCAR Ph.D/15/01)

Oral presentation 2*
Developing a value pyramid to guide implementation of asthma interventions in the UK.
1Roukas C, 2Tomini F, 3Griffiths C, 4Roberts CM, 5Mihaylova B
1Centre for Primary Care and Public Health, Queen Mary University of London; 2UCLPartners

Background: A range of interventions are employed to manage asthma in UK. However, a value pyramid to assist policy makers, commissioners and clinicians in prioritising implementation is unavailable.

Aim: To develop a cost-effectiveness value pyramid of asthma interventions in the UK NHS using incremental cost-effectiveness ratio (ICER) per quality-adjusted life year (QALY) evidence.

Methods: A review of asthma interventions in current use and their cost-effectiveness evidence with focus on UK healthcare perspective. Firstly, interventions and cost-effectiveness results were extracted from NICE asthma guidelines and technology appraisals. Secondly, results were extracted from our recent in-house systematic review of economic evaluations in asthma (5 databases searched for the period 1990–2017). Thirdly, to address gaps in evidence among people with asthma, for highly relevant interventions (e.g. flu vaccination, stop smoking interventions), results from NICE appraisals in general populations were extracted. Finally, the economic evaluations outside the UK informed interventions without UK evidence. The incremental cost, effects and ICERs were extracted with costs converted to 2017UK£.

Interim results: The highest value interventions were: stop smoking services (ICER £13 – £3,734 per QALY), outpatient asthma clinics (£1,511), flu vaccination (£3,039 – £4,819), leukotriene receptor antagonists (LTRAs) in children (£7,441) and temperature-controlled laminar airflow devices (£9,467). Likely to be cost effective were: salmeterol xinafoate/fluticasone propionate combination inhaler for children (£1,511-£3,734), salmeterol xinafoate/fluticasone propionate combination inhaler for adults (£29,365)...

*Eligible for competition
for adults (£79,670) and omalizumab (£33,722 - £87,370 in children and £35,595 - £64,463 in adults) were not cost-effective. Emerging results suggest differences in value between adult and paediatric asthma populations particularly for newer and more expensive interventions.

On-going work: Impact of study quality on conclusions is being assessed. The lack of relevant cost-effectiveness evidence, variation in methods and study populations poses challenges.

Trial registration: (not applicable)

Funding: No external funding

**Oral presentation 3**
Identifying patients with asthma-chronic obstructive pulmonary disease overlap syndrome using latent class analysis of electronic health record data.

Mohammad Al Sallahk, Sarah E Rodgers, Ronan A Lyons, Aziz Sheikh & Gwyneth A Davies

Background: Asthma and chronic obstructive pulmonary disease (COPD) are two common different clinical diagnoses with overlapping clinical features. Both conditions have been increasingly studied using electronic health records (EHR). Asthma-COPD overlap syndrome (ACOS) is an emerging concept where clinical features from both conditions co-exist, and for which, however, there is no consensus definition. Nonetheless, we expect EHR data of people with ACOS to be systematically different from those with "asthma only" or "COPD only".

Aims: We aim to develop a latent class model to understand the overlap between asthma and COPD in EHR data and to identify patients with ACOS using these data.

Methods: From the Secure Anonymised Information Linkage (SAIL) Databank of Wales, we will use routinely collected data related to asthma and/or COPD and recorded in or before 2014 for people who aged 40 years or more on 1 Jan 2014. A set of ordinal variables will be constructed from these data and used to specify latent class models with varying numbers of classes. We will select the best fit model based on model diagnostics and clinical interpretability, and will describe its latent classes using their item-response probabilities. Based on the developed latent class model, we will train a classification algorithm and compare its performance with commonly used objective and self-reported case definitions for asthma and COPD.

Progress made: Informed by a previously developed latent class model to identify patients with asthma, we developed an extended set of variables related to asthma and/or COPD, including diagnosis, primary care visits and prescriptions, lung function tests, eosinophil counts, as well as secondary care utilisation. These variables will be used to specify latent class models for asthma-COPD overlap.

Discussion: While we expect asthma-COPD overlap to be reflected in EHR data, the clinical meaning and usefulness of the latent classes that will be identified will depend on data quality and how the observed variables are chosen and constructed. There will be levels of subjectivity in the construction of the observed variables, model selection and interpretation. The resulting classification algorithm is intended to be used to identify people with ACOS, 'asthma only', and 'COPD only' in EHR databases.

**Oral presentation 4**
Exploring primary care staff experiences of financial incentives for implementing asthma self-management: a qualitative study in Northern Ireland using normalization.

Jackson T, Kendall M, Shields M, Heaney L, Pinnock H

1University of Edinburgh; 2Queens University Belfast

Background: In 2008, Northern Ireland introduced a healthcare scheme that pays a financial incentive to general practitioners for providing self-management education, including an asthma action plan, to patients with asthma.

Aim: To explore how primary care staff responded to the introduction of this scheme and how they implemented new processes into their practice routines.

Methods: Qualitative interviews were conducted to explore staff response to the healthcare scheme and perceptions of its impact on the implementation of asthma self-management. Interviews were recorded, transcribed verbatim and analysed using a framework informed by the Normalization Process Theory (NPT).

Results: 23 participants (five GPs; five nurses; 13 administrative staff) from 15 primary care practices across Northern Ireland provided 15 semi-structured telephone interviews, six individual in-depth interviews and two group interviews. Processes created since the introduction of the scheme appear successfully embedded into primary care practice routines. Multi-disciplinary teams and working together were continually discussed by participants in relation to the scheme, from inception to implementation and delivery in primary care practices. Significant support from the Public Health Agency and pharmaceutical companies in providing funding and training for nurses was acknowledged as a key to the successful embedding of new processes, but there was concern regarding reduction in funding from both of these sources and the impact on the future provision of asthma self-management education in primary care.

Conclusions: The NPT assisted in identifying the enablers and barriers to the implementation of the scheme in general practice in Northern Ireland. Primary care staff identified multi-disciplinary teamwork throughout the lifespan of the scheme as key to its "normalization", which was now so embedded that concerns were expressed that threats to funding and withdrawal of external support. Understanding how practices "normalized" this healthcare scheme could inform further policy on similar initiatives.

Funding: The University of Edinburgh CMVM PhD Studentship [Asthma UK Centre for Applied Research PHD/14/16]

**Oral presentation 5**
Identifying strategies to overcome roadblocks towards utilising near-real time healthcare and administrative data to create a Scotland-wide learning health system (LHS) for asthma.

Mukherjee M, Cresswell K, Sheikh A

1 2 3 Asthma UK Centre for Applied Research, The University of Edinburgh

Background: We are working towards the creation of a national learning health system (LHS) for asthma, which we hope will support efforts to reduce asthma attacks and associated hospitalisations and deaths in Scotland. Success is however dependent on the ability to access digitised patient data in near-real time to support clinical decision-making.

Aim: To identify strategies to overcome critical roadblocks to utilising near-real time digitised patient data to support the creation of a Scotland-wide LHS for asthma.

Methods: We conducted 38 in-depth semi-structured face-to-face/telephone interviews with purposely sampled NHS staff, Scottish Government and academics across Scotland to explore the current barriers and facilitators in accessing and utilising digitised patient data. All interviews were digitally recorded, transcribed verbatim and qualitatively coded using Quirkos software. Results were analysed thematically drawing on the data lifecycle.

Results: Participants agreed that Scotland offered considerable potential to play a world-leading role in the exploitation of routinely collected data to drive forward improvements in health outcomes and research capability, but noted some major impediments in realising this vision. These included the: i) persistence of paper-based records and the variety of not interoperable information systems storing data across regions in Scotland; ii) lack of agreed and proportionate approaches to managing information governance; and iii) absence of a suitable infrastructure, capacity and capability to process data supporting research and quality improvement.

Conclusions: This work highlights the pressing need to digitise and integrate existing health information infrastructures, guided by a nationwide proportionate approach to information governance. Investing in technological and human capabilities to support these efforts will be crucial to maximise use of Scotland’s rich data-assets to enhance asthma outcomes across Scotland.

Funding: Chief Scientist Office Catalytic Research Grant (CGA1704)

**Oral presentation 6**
Asthma and early exit from employment: a European cohort study.

Leveneur P, Newby C, Mihaylova B, 1Queen Mary University of London; 2ENSAE

Background: Health status determines workforce participation and people with chronic conditions may have a shortened work-life.

*Eligible for competition
Aim: The impact of asthma and other chronic conditions on early exit from employment, defined as exiting the workforce before the country’s retirement age was investigated overall and by exit type (early retirement, unemployment, disability, other).

Methods: Data from Survey of Health, Ageing and Retirement in Europe, a large European longitudinal study among people 50 years or older was used. Data on chronic conditions (asthma, chronic lung disease, cardiovascular disease, cancer, diabetes, musculoskeletal disease and depression) and employment were collected throughout the study. Participants in paid employment at entry and information on chronic conditions and employment during follow-up were studied. Logistic and multinomial logistic models studied associations between chronic conditions and early workforce exit overall and by exit type, adjusting for socio-demographic, job quality and country.

Results: 10,222 participants from 15 countries with median age 54 years, 54% male were included. At entry, 1,162 (11%) of participants had chronic lung disease, 924 (9%) asthma alone, 5,196 (50%) cardiovascular disease, 962 (9%) diabetes, 1,209 (12%) cancer, 6,656 (65%) musculoskeletal disease (including osteoporosis) and 785 (8%) depression. In multivariable analysis, cardiovascular disease (Odds Ratio (OR) 1.37, p<0.001) and diabetes (OR 1.17, p=0.045) were the only two diseases clearly associated with an overall early workforce exit. In analysis investigating associations with type of early exit, cardiovascular disease was associated with early retirement or disability benefit; diabetes and musculoskeletal diseases with disability benefit; and depression with disability benefit or unemployment. Chronic lung disease and asthma alone were not clearly associated with an early workforce exit overall or by type. Job characteristics were strongly associated with early exit.

Conclusions: In a large European cohort asthma was not associated with an early exit from employment, but may contribute to associated conditions such as depression and musculoskeletal disease.

Trial registration: NA

Funding: No external funding

Oral presentation 7

The 25-hydroxyvitamin D response to vitamin D supplementation is blunted in adults with asthma and COPD.

Stefanidis C, 1 Jolliffe DA, 1 Griffiths CJ, 1 Bush A 2 & Martineau AR 1

1 Centre for Primary Care and Pubic Health, Queen Mary University of London, London, UK
2 Faculty of Medicine, National Heart & Lung Institute, Imperial College London, London, UK

Background: Inflammatory diseases may alter the metabolism of Vitamin D. This could alter the ability of vitamin D supplementation to increase serum concentrations of 25-hydroxyvitamin D (25(OH)D), its major circulating metabolite. We hypothesized that the rise in plasma 25(OH)D with a standard dose of vitamin D have not been compared in patients with inflammatory airways disease would be less than those of healthy controls.

Method: We analysed baseline and 1 year 25(OH)D concentrations in adults with asthma (N=125), with chronic obstructive pulmonary disease (COPD) (N=122) and otherwise healthy controls (N=137) who had been randomised to the intervention arm of clinical trials of vitamin D supplementation. Multiple linear regression compared the effect of supplementation with six 2-monthly oral doses of 3 mg (120,000 IU) vitamin D3 on 1-year serum 25(OH)D concentrations between groups, adjusting for baseline 25(OH)D concentration, age, ethnicity, sex, body mass index, smoking status and vitamin D supplementation.

Results: In an adjusted model, patients with asthma had -16.9 nmol/L lower post-supplementation 25(OH)D concentration (95% CI; -29.0 to -4.9, p=0.006) compared to healthy controls (mean 25(OH)D of 86.5 nmol/L). Similarly, patients with COPD had -18.9 nmol/L lower post-supplementation 25(OH)D D concentrations compared to healthy controls (95% CI; -31.2 to -6.76, p=0.002).

Conclusions: Adults with asthma and COPD had blunted 25(OH)D responses to vitamin D supplementation, as compared to controls with neither condition. Determining whether this relates to adherence or the effects of inflammation requires further work. For whatever reason, people patients with inflammatory airway disease may need increased doses of vitamin D supplements than healthy controls in order to optimise vitamin D status.
**Poster Sessions**

**Tuesday 12th March: 13:30-14.15**

**Poster 1**: Predicting asthma attacks in primary care: protocol for developing a machine learning-based prediction model.
Tibble H, 1,2 Tsanas A, 1,2 Horne E, 1,2 Horne R, 1,2 Mizani MA, 1,2 Simpson CR, 1,2 Sheikh A 1,2

1Usher Institute of Population Health Sciences and Informatics, Edinburgh Medical School, College of Medicine and Veterinary Medicine, University of Edinburgh – Teviot Place, Edinburgh, United Kingdom

2Asthma UK Centre for Applied Research, Usher Institute of Population Health Sciences and Informatics, Centre for Medical Informatics, The University of Edinburgh, Edinburgh, UK

**Poster 2**: Clinical prediction models to support the diagnosis of asthma in primary care: a systematic review

Poster 17-23 are the same as oral presentations 01-07. See pages 5 to 9 for full details.

**Wednesday 13th March: 13:15-14.15**

**Poster 3**: Is Poor Asthma Self-Management Due to Failure to Recognise Symptoms or Failure to Act? Novel Insights from Mining Large-Scale Clinical Observational Study
Syed Ahmar Shah

**Poster 4**: Using information on all previous exacerbations to predict future risk of attack
Bonnetti L, Blakely J.

**Poster 5**: Stakeholder perspectives on evaluation of apps supporting asthma management
Chris Newby, Anna Dowrick, Nicola Maayan, Sandra Eldridge.

**Poster 6**: Validating the accuracy of asthma outcomes in routine UK primary care data
Chris Newby, Neil Wright, Thomas Hamborg, Sandra Eldridge, Susan Morrow, Steven Julious, Francis Appiagyei, Derek Skinner, Victoria Carter, David Price, Steph Taylor, Hilary Pinnock

**Poster 7**: ELEVATE: evaluation of the impact of Patient and Public Involvement in the Asthma UK Centre for Applied Research
Olivia Fulton, Allison Worth, Tracy Jackson, Gill Higget

**Poster 8**: A Patient-Centred Definition of Severe Asthma: The Patient Understanding Leading to an appropriate Severe Asthma Review (PULSAR) Initiative.

**Poster 9**: The effects of anomynisation on the accuracy and generalisability of observational studies: A case study in asthma.
Mehrdad A Mizani, Aziz Sheikh

**Poster 10**: Cluster analysis to identify asthma subtypes: a critical view of methodological considerations.
Elise Horne, Chris Griffiths, Aziz Sheikh, Thanasis Tsanas

**Poster 11**: Development and Feasibility Testing of a Scalable Intervention to Promote Physical Activity Among Sedentary Adults with Moderate or Severe Asthma.
Tyson L, Wilson A, Jones A, Hardeman W, Stratton G, Davies G

**Poster 12**: Current recommendations/practices for anonymising data from clinical trials in order to make it available for sharing: A scoping review

**Poster 13**: Investigating the national context for supported self-management to inform the IMP2ART implementation strategy
Renukantihan A, Sheringham J, Pinnock H, Morrow S, McClatchey K, Taylor S

**Poster 14**: IMPLEMENTing IMProved Asthma self-management as Routine Treatment: the IMP2ART programme.
McClatchey K, Morrow S, Taylor S, Pinnock H

**Poster 15**: Learning Health Systems: Translating current approaches into a chronic disease management framework.
Sengupta M, Sheikh A, Simpson C

**Poster 16**: Investigating the Burden of Asthma coMorbidities (IBAM): a retrospective cohort study.
Karim El Ferkh, Bright I Nwari, Chris Weir, Chris Griffiths, Aziz Sheikh A

**Poster 1**
Predicting asthma attacks in primary care: protocol for developing a machine learning-based prediction model.
Tibble H, 1,2 Tsanas A, 1,2 Horne E, 1,2 Horne R, 1,2 Mizani MA, 1,2 Simpson CR, 1,2 Sheikh A 1,2

1Usher Institute of Population Health Sciences and Informatics, Edinburgh Medical School, College of Medicine and Veterinary Medicine, University of Edinburgh – Teviot Place, Edinburgh, United Kingdom

2Asthma UK Centre for Applied Research, Usher Institute of Population Health Sciences and Informatics, Centre for Medical Informatics, The University of Edinburgh, Edinburgh, UK

**Poster 2**
Clinical prediction models to support the diagnosis of asthma in primary care: a systematic review
Luke Daines1, Susannah McLean1, Audrey Buolo1, Steff Lewis1, Aziz Sheikh1, Hilary Pinnock1

1Asthma UK Centre for Applied Research, Usher Institute of Population Health Sciences and Informatics, The University of Edinburgh

**Poster 3**
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**Poster 6**
Validating the accuracy of asthma outcomes in routine UK primary care data
Chris Newby, Neil Wright, Thomas Hamborg, Sandra Eldridge, Susan Morrow, Steven Julious, Francis Appiagyei, Derek Skinner, Victoria Carter, David Price, Steph Taylor, Hilary Pinnock

**Poster 7**
ELEVATE: evaluation of the impact of Patient and Public Involvement in the Asthma UK Centre for Applied Research
Olivia Fulton, Allison Worth, Tracy Jackson, Gill Higget

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A Patient-Centred Definition of Severe Asthma: The Patient Understanding Leading to an appropriate Severe Asthma Review (PULSAR) Initiative.

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Mehrdad A Mizani, Aziz Sheikh

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Elise Horne, Chris Griffiths, Aziz Sheikh, Thanasis Tsanas

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Renukantihan A, Sheringham J, Pinnock H, Morrow S, McClatchey K, Taylor S

**Poster 14**
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McClatchey K, Morrow S, Taylor S, Pinnock H

**Poster 15**
Learning Health Systems: Translating current approaches into a chronic disease management framework.
Sengupta M, Sheikh A, Simpson C

**Poster 16**
Investigating the Burden of Asthma coMorbidities (IBAM): a retrospective cohort study.
Karim El Ferkh, Bright I Nwari, Chris Weir, Chris Griffiths, Aziz Sheikh A

Please note that posters 17-23 are the same as oral presentations 01-07. See pages 5 to 9 for full details.
assessment of the probability of asthma in primary care may improve diagnostic accuracy. We aimed to identify and describe existing prediction models to support the diagnosis of asthma in children and adults in primary care.

Methods: We searched Medline, Embase, CINAHL, TRIP and U.S. National Guidelines Clearinghouse databases from 1/1/1990 to 23/11/17. We included prediction models designed for use in primary care or equivalent settings to aid diagnostic decision-making of clinicians assessing patients with symptoms suggesting asthma. Two reviewers independently screened titles/abstracts/full-texts for eligibility, extracted data, and assessed risk of bias.

Results: From 13,798 records, 53 full-text articles were reviewed. Seven modelling studies (8 papers) were included; all studies were at high risk of bias. Patient-reported wheeze, symptom variability and history of allergy or allergic rhinitis, were associated with asthma. Two studies used data from clinical tests, spirometry and fractional exhaled nitric oxide, as predictors.

Conclusion: Clinical prediction models may support the diagnosis of asthma in primary care, but existing models are at high risk of bias and thus unreliable for informing practice. Future studies should adhere to recognised standards, conduct model validation and include a broader range of clinical data to derive a prediction model of value for clinicians.

Registration: PROSPERO (CRD42018078418)

Poster 4
Using information on all previous exacerbations to predict future risk of attack

Bonnett LJ, Blakey J
University of Liverpool; Sir Charles Gairdner Hospital, Perth, Australia;

Background: Identifying individuals who are at risk of asthma attack has the potential to improve quality of life, and reduce the possibility of hospital admission. Statistical methods enable predictions regarding which subgroups of people with asthma have a higher risk of an exacerbation than others. Most existing statistical models only include information about events prior to starting treatment; they fail to account for events along a person's journey.

Aim: To develop a statistical model which provides patients with an estimate of risk of, and ultimately time to, their next asthma attack using information about all exacerbations, rather than just the first after starting treatment.

Methods: Data from the Optimum Patient Care Research Database were modelled using three different approaches – negative binomial regression, zero-inflated negative binomial regression and the multiple time-to-event approach of Prentice, Williams and Peterson.

Results: According to data from the first observation window, modelling count of exacerbations via the negative binomial distribution appears the most appropriate choice based on the model fit statistics shown in Table 1. The smaller the values, the better the model fit.

Table 1: Model Fit Statistics

<table>
<thead>
<tr>
<th>Model</th>
<th>RMPSE</th>
<th>MAPE</th>
<th>Prediction Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Binomial</td>
<td>1.31</td>
<td>1.43</td>
<td>0.01</td>
</tr>
<tr>
<td>ZINB</td>
<td>2.33</td>
<td>2.83</td>
<td>0.07</td>
</tr>
<tr>
<td>PWP-GT</td>
<td>11.79</td>
<td>41.29</td>
<td>-0.70</td>
</tr>
</tbody>
</table>

Sensitivity analyses using the entire dataset, only those patients with definite asthma, and according to a random split of the data agreed that the negative binomial model was the most appropriate choice.

Conclusions: Dates of events were previously thought to be useful. However, based on these analyses, counts lead to much better model fit. This may be due to the relatively small number of events experienced by people with asthma. Further work is now required to build a statistical model which adjusts for patient characteristics and provides personalised risk predictions via an online calculator.

Funding: This research was funded by a Post-Doctoral Fellowship (PDF-2015-08-044) from the National Institute for Health Research.

Poster 5
Stakeholder perspectives on evaluation of apps supporting asthma management

Newby C, Dowrick A, Maayan N, Eldridge S.

Asthma UK Centre for Applied Research, Centre for Primary Care and Public Health, Queen Mary University of London;

Background: Evidence suggests apps could play an important role in the management of asthma. It is less clear how the effectiveness of apps should be evaluated. This study aimed to collect the views of expert stakeholders about the evaluation of apps as part of asthma management.

Aim: To gain stakeholder perspectives on the issues surrounding the evaluation of apps to support asthma management

Methods: This was a mixed method qualitative study. First, a survey was conducted among methodological stakeholders across the UK around general app evaluation. Second, an expert stakeholder workshop was held. Stakeholders gathered for a one-day discussion of the challenges of evaluating digital interventions for asthma. Attendees also completed a pre and post workshop free-text survey. Data were analysed thematically. The thematic analysis and workshop were informed by a scoping review of the literature on methodologies for evaluating apps.

*Eligible for competition
Selected highlights from the last 5 years

2014
- Asthma UK Centre for Applied Research officially launched at the Scottish Parliament, with initial five years funding
- A collaborative network of leading asthma researchers from 13 partners across the UK
- 11 PhD studentships start
- ARRISA-UK (At-Risk Registers Integrated into primary care to Stop Asthma crises in the UK) study launched
- Launch of Patient and Public Involvement group
- First Annual Scientific Meeting, Oxford
- Established world-leading International Advisory Board

2015
- University of Southampton joins as an affiliate member
- Steff Lewis promoted to Professor of Medical Statistics, University of Edinburgh
- Edinburgh International Science Festival
- SPEAKAsthma, our Children and Young People’s PPI group, officially launched
- Andrew Wilson promoted to Professor of Respiratory Medicine, University of East Anglia
- Second Annual Scientific Meeting, Manchester
- Dunbar Science Festival

2016
- Third Annual Scientific Meeting, Edinburgh
- Steve Cunningham promoted to Honorary Professor of Paediatric Respiratory Medicine, University of Edinburgh
- Universities of Oxford and Exeter join as affiliate members
- Cochrane Review, Vitamin D for the management of asthma, published
- Midlothian Science Festival 2016
- BTS/SIGN British Guideline on the Management of Asthma published
- Hilary Pinnock promoted to Professor of Primary Care and Respiratory Medicine, University of Edinburgh

2017
- University of Leeds joins as an affiliate member
- The Lancet Commission on Asthma published
- Professor Aziz Sheikh awarded the University of Edinburgh Principal’s Medal for Exceptional Service
- Effectiveness of Influenza Vaccines in Asthma published
- Professor Chris Griffiths publishes opinion piece on air pollution and public health in The Guardian
- REACH database launched
- BBC Terrific Scientific event
- Patient Involvement Fair, Edinburgh

2018
- Fourth Annual Scientific Meeting, Bristol
- IMPART (IMplementing IMProved Asthma self-management as RouTine) study launched
- First two PhD graduations, with 23 students at the centre
- Study on impact of London’s Low Emission Zone covered by the BBC and The Guardian
- CHILL (Children’s Health in London & Luton) study launched
- Gwyn Davies promoted to Professor of Respiratory Medicine, Swansea University
- Air Pollution and You event at Our Dynamic Earth

Continued support from Patient and Public Involvement (PPI) and our wider network
Validating the accuracy of asthma outcomes in routine UK primary care data


Background: Routine clinical data offers the opportunity to observe healthcare outcomes in populations but the measures used are rarely validated against the full medical record which includes free text and correspondence.

Aim: To validate and explore asthma outcomes in electronic health care records compared to the reference standard.

Methods: We compared data on unscheduled asthma care and action plan provision over 12-months extracted manually by inspection of the electronic healthcare records (EHR) (the reference standard) with electronically-extracted coded data from the same 500 patients. Combinations of Read codes and prescribing data were tested to derive the most accurate algorithm compared to the reference standard.

Results: Ten practices each provided data on 50 people with asthma of whom 34% had an unscheduled asthma care event in the manually-extracted data. The best performing algorithm gave a sensitivity/specificity of 71% (95%CI 63% to 78%) and 82% (95%CI 77% to 86%) respectively. The intra-cluster correlation was 0.12 (95%CI 0.030 to 0.33).

For action plan provision, the best performing algorithm only achieved a sensitivity of 34% (95%CI 18% to 54%).

Conclusion: Unscheduled care, but not provision of action plans, can be detected with acceptable accuracy in routine data, though the intra-cluster correlation was high. Validating coded data against a reference standard is an important step in designing, analysing and interpreting the findings of clinical initiatives, implementation and real-life studies.

Funding: NIHR Programme Grant
professionals. This background research was used by a multidisciplinary working group to help draft a patient-centred definition of severe asthma. The working group consisted of two patients with severe asthma, four patient advocacy group members, two nursing specialists, one primary care physician, three respiratory specialists and one clinical scientist.

Results: Patient organisation websites mostly define severe asthma using symptoms, whereas asthma guidelines base their definitions on treatment failure or symptoms experienced by patients despite receiving high-intensity therapy. Medication information did not specifically define severe asthma. Common terminology and concepts (treatments, symptoms, activity levels and emotions) used to define severe asthma were agreed within the working group and a definition of severe asthma was drafted.

Conclusions: A novel patient-centred definition of severe asthma has been drafted to improve patient understanding of the condition. This may encourage patients to visit their GP, which may increase specialist referrals and prompt optimal management strategies in severe asthma. The definition will be reviewed by a behavioural scientist, to optimise the language used, and surveyed by patients with severe asthma to produce a final definition for a consensus publication.

Funding: GlaxoSmithKline, Global Allergy and Asthma Patient Platform

Poster 9
The effects of anonymisation on the accuracy and generalisability of observational studies: A case study in asthma.
Mehrdad A Mizani, Aziz Sheikh
1 Asthma UK Centre for Applied Research, The University of Edinburgh

Background: Access to individual-level data is important for accurate and generalisable observational studies. Data holders provide individual-level data usually in safe-havens, after applying anonymisation methods. The most common methods are variations of k-anonymity, query control, synthetic datasets, Statistical Disclosure Control (SDC), and differential privacy. These methods delete, change, swap, or summarise data elements, thereby potentially reducing the usefulness and precision of the dataset. Researchers who receive anonymised data are not always informed about the characteristics of manipulation applied to the dataset. These uncertainties regarding data precision can lead to undetected bias in observational studies based on statistical and Machine Learning (ML) methods.

Aim: We aim to develop ML tools to measure and characterise the utility of anonymised asthma data as well as non-disclosive characteristics of anonymisation methods. This utility measurement will be used to understand the implication of anonymisation and the induced bias. Further, it provides the grounds for cross-disciplinary analysis of the effects of anonymisation on the interpretation of observational studies and their generalisability in asthma research. It can also be helpful in guiding anonymisation procedures suitable for observational studies.

Proposed methods: Clustering validity indices will be used to measure the overall numerical utility of anonymised datasets. SDC and differential privacy will be used to report non-disclosive characteristics of anonymisation methods.

Points for discussion: We seek to stimulate discussion on approaches currently used in asthma research to maintain data anonymity and to consider the potential impact of these on analytic considerations; opportunities for working with colleagues to investigate this empirically; development of novel approaches to maintain data granularity whilst at the same time preserving anonymity.

Funding: Mehrdad A. Mizani’s Newton International Fellowship is funded by the Academy of Medical Sciences and the Newton Fund.

ARRISA-UK
Reducing the risk of hospital admission by targeting the most high-risk patients for asthma attacks
Established the £2m ARRISA-UK NIHR HTA funded cluster RCT, testing the impact of a web-based education programme linked to risk registers for asthma patients.

IMP²ART
Implementing more effective asthma supported self-management in day-to-day clinical care practice
Building on systemic review work (PRISMS) we have completed feasibility work on implementing supported self-management for asthma in GP practices across the UK, resulting in the award of funding for a 5 and a half year £2.5m IMP²ART NIHR programme grant, which will culminate in a UK-wide implementation trial.

MOMENTUM
Collaboration between 10 organisations across the UK

ARRISA-UK
Collaboration between 8 universities

Poster 9*
Eligible for competition

Interviews will be conducted to explore the findings and aid the development of a definitive trial. Focus groups and/or semi-structured interviews will use qualitative and quantitative methods to assess feasibility, acceptability and implementation. Outcomes delivery. It is envisaged that the intervention will comprise of behaviour change support, individual exercise capacity, asthma symptoms and attack frequency. Qualitative research and stakeholder consultations will also be undertaken to inform intervention content and delivery. It is envisaged that the intervention will comprise of behaviour change support, individual exercise prescriptions and delivered by a mHealth component. The piloting and feasibility testing of the intervention will use qualitative and quantitative methods to assess feasibility, acceptability and implementation. Outcomes will include exercise capacity, asthma symptoms and attack frequency. Focus groups and/or semi-structured interviews will be conducted to explore the findings and aid the development of a definitive trial.

Poster 10*

Cluster analysis to identify asthma subtypes: a critical view of methodological considerations.

1Elsie Horne, 1Chris Griffiths, 1Aziz Sheikh, 1Thanasis Tsanas
1University of Edinburgh; 2Queen Mary University London

Background: Asthma is increasingly recognised as an umbrella term used to describe a group of distinct diseases leading to similar symptoms. Numerous groupings of asthma have been suggested (e.g. early-onset atopic, severe) but at present none fully account for the heterogeneity observed across asthma patients. The first study to define subtypes of asthma by applying cluster analysis was published by Halder et al. (2008). Many groups have since applied cluster analysis with similar aims. However, carrying out a robust cluster analysis can be challenging when dealing with heterogeneous clinical data.

Aim: To review and critically assess the methodological validity of clustering methods used to identify clinical subtypes of asthma.

Methods: A PubMed search was carried out to identify studies which applied cluster analysis to heterogeneous clinical datasets to identify asthma subtypes. Studies focusing on genetic or cytokine profiling, and those which exclusively used imaging and mobile app data were excluded. Details of clustering methodologies were extracted from all studies. In cases where the methodology was unclear, authors were contacted for clarification. Clinical findings were summarised and compared across studies. Based on the methodological findings, recommendations will be made for future researchers intending to carry out cluster analyses to identify clinical subtypes of asthma.

Interim results (or Progress made): Forty-six studies have been identified and data are currently being extracted. On-going challenges (or Points for discussion): Although data extraction is not complete, three limitations have been identified in many of the studies: 1) samples sizes are very small for meaningful, robust cluster analysis; 2) methods suitable only for continuous data are being applied to mixed data; 3) the stability and validity of the cluster solutions are not adequately tested.

Trial registration: NA

Funding: Medical Research Council (MRC)

Poster 11*

Development and Feasibility Testing of a Scalable Intervention to Promote Physical Activity Among Sedentary Adults with Moderate or Severe Asthma.

1Tyson L, 1Wilson A, 1Jones A, 1Hardeman W, 1Stratton G, 1Davies G
1University of East Anglia; 2Swansea University

Background: Regular physical activity is considered an important component in the overall management of asthma. However, studies found that patients with asthma are less physically active compared to people without the condition, possibly due to fear of triggering symptoms. Behaviour change interventions that promote physical activity have potential to reduce asthma attacks and the burden of asthma on healthcare services and patients. Recently, there has been a greater focus on using mobile devices (mHealth) to help transform how asthma care is delivered. This technology has the potential to deliver just-in-time adaptive interventions, to provide behaviour change support to patients in a scalable cost-effective way.

Aim: Develop and test the feasibility of a scalable behaviour change intervention to promote physical activity among sedentary adults with moderate/severe asthma.

Proposed Methods: A literature review is underway to examine the effects of physical activity interventions on behavioural and health outcomes, and to identify different intervention components currently being used. Qualitative research and stakeholder consultations will also be undertaken to inform intervention content and delivery. It is envisaged that the intervention will comprise of behaviour change support, individual exercise prescriptions and delivered by a mHealth component. The piloting and feasibility testing of the intervention will use qualitative and quantitative methods to assess feasibility, acceptability and implementation. Outcomes will include exercise capacity, asthma symptoms and attack frequency. Focus groups and/or semi-structured interviews will be conducted to explore the findings and aid the development of a definitive trial.

Points for Discussion: The development and piloting of a complex intervention according to Medical Research Council guidelines that, following evaluation, can be used to increase physical activity in people with asthma. The use of behaviour change techniques via digital mHealth components.

Funding: Asthma UK Centre for Applied Research and University of East Anglia Faculty of Medicine and Health Sciences.

Poster 12*

Current recommendations/practices for anonymising data from clinical trials in order to make it available for sharing: A scoping review

1Rodriguez A, 1Tuck C, 1Dozier MF, 1Lewis SC, 1Eldridge S, 1Weir CJ
1Edinburgh Clinical Trials Unit, Usher Institute of Population Health Sciences and Informatics, the University of Edinburgh
1Library & University Collections, Information Services, the University of Edinburgh
1Pragmatic Clinical Trials Unit, Blizard Institute, Barts and the London School of Medicine and Dentistry, Queen Mary University of London

Background: There are increasing pressures for anonymised datasets from clinical trials to be shared across the scientific community. There are various sets of recommendations on how to perform anonymisation prior to sharing clinical trial data.

Aim: We aim to systematically identify, describe and synthesise these recommendations.

Methods: We will systematically search literature databases and websites of key organisations in the field. Any publication reporting recommendations on anonymisation to enable data sharing in clinical trials will be included. Two reviewers will independently screen titles, abstracts and full text for eligibility. One reviewer will extract data from included papers which will then be sense checked by a second reviewer. Results will be summarised by narrative review. This scoping review will provide information about existing recommendations for anonymising clinical trial datasets in order to make them available for sharing and it will inform (if applicable) the development of new recommendations.

Interim results: We just have the protocol finalised on the 11JAN2019 and I (Aryelly Rodriguez-AR) hope to present preliminary results on the meeting to be held on the 12MARCH2019 in London

On-going challenges: There might be potential issues in the coding of the themes arising from the relevant literature

Conclusions: Currently there is a strong demand for academic researchers to share their research data more readily. In clinical trials, data can be shared more widely if they are anonymised, yet we do not have standardised recommendations on how to do this. To the best of our knowledge, this will be the first systematic review of these emerging recommendations/techniques. We will gather and describe all the identified recommendations and we will provide a map for future research regarding anonymisation of datasets in clinical trials to enable data sharing.

Funding: AR has a scholarship from the University of Edinburgh to undertake a PhD with the support from the Asthma UK Centre for Applied Research (AUKCAR).
Poster 13

Investigating the national context for supported self-management to inform the IMP 2ART implementation strategy

1 Renukanthan A, 1Sheringham J, 1Pinnock H, 2Morrow S, 2McClatchey K, 2Taylor S, for the IMP 2ART programme group.
Asthma UK Centre for Applied Research, 1University College London; 2The University of Edinburgh; 3Queen Mary University of London.

Background: The IMP 2ART study is developing an implementation strategy to embed supported self-management into routine asthma care. Implementation strategies need to align with the context in which practices are working. This project aimed to provide a baseline of the national context at the start of IMP 2ART.

Methods: A search for guidance documents (2008-2018) was undertaken, supplemented with documents recommended by the IMP 2ART team on supported self-management in long-term conditions (LTCs) and primary care contractual arrangements. A descriptive comparative review was conducted on retrieved documents. Informal discussions with respiratory leaders from the Primary Care Respiratory Society (PCRS) provided insights into the documents’ influence on self-management in practice.

Results: Eight documents guiding supported self-management in asthma or LTCs and the GP contract were reviewed. All national/international documents on asthma (three guidelines; National Review of Asthma Deaths (NRAD)), recommended supported self-management, though there were differences in emphasis and priority attached to different aspects of supported self-management (action plans, shared decision-making). Implementation strategies were covered in detail in generic guidance on supported self-management in LTCs but with little specific to asthma. Supported self-management is currently not incentivised in the Quality and Outcomes Framework.

Conclusion: There is consensus about a pivotal role for supported self-management in asthma amongst all documents reviewed. To enhance the effectiveness of local implementation strategies, IMP 2ART may consider developing an “implementation resource” to consolidate existing guidance.

Funding: IMP 2ART is funded by NIHR PFGAR (RP-PG-1016-20008) with preliminary work supported by Asthma UK (AC-2012-01). The views expressed are those of the authors, not necessarily those of the NHS, NIHR or Department of Health.

Poster 14*

IMPlementing IMProved Asthma self-management as Routine Treatment: the IMP 2ART programme.

1 McClatchey K, 2Morrow S, 2Taylor S, 1Pinnock H for the IMP 2ART programme group.
Asthma UK Centre for Applied Research, 1The University of Edinburgh; 2Queen Mary University of London.

Background: Supported self-management, which helps people adjust their treatment in response to changes in symptoms, improves day-to-day control and reduces the risk of asthma attacks. However, supported self-management is not widely implemented; fewer than a quarter of people reporting to a recent Asthma UK web-survey own an action plan. Successful implementation of supported self-management requires attention to patient resources, professional motivation and training, and prioritisation and support from the organisation.

Aims: The IMP 2ART programme aims to develop an implementation strategy that will improve the implementation of supported self-management in routine clinical practice.

Methods: Building on preliminary findings, and working with six general practices, Asthma UK, PRCS-UK and Education for Health, we will develop components of an implementation strategy:

1. Patient resources to support self-management (e.g. a range of action plans; flexible access to professional advice; digital options)
2. Professional education to motivate and train practice teams (e.g. online, team-based modules to raise awareness and provide specific skills)
3. Organisational strategies to facilitate adoption (e.g. audit/feedback; review templates; electronic action plans)

Progress Made: Each of the three components are under development by the IMP 2ART programme team, with input from patient and public involvement (PPI), and a professional advisory group. Feedback on the developed components will be sought using qualitative interviews, and staff and patients from six practices are being recruited as participants.

Points for Discussion: Feedback generated from the interviews will be incorporated into the components, which will then be pre-piloted in four practices to assess feasibility. Following a pilot trial, the implementation strategy will be evaluated in the IMP 2ART UK-wide trial cluster-RCT (n=144 practices). This will evaluate the impact and cost-effectiveness of the IMP 2ART implementation strategy on unscheduled care (assessed from routine data) and ownership of action plans. A mixed-methods process evaluation will explore potential for scaling up and sustainability.

Funding: IMP 2ART is funded by NIHR PFGAR (RP-PG-1016-20008) with preliminary work supported by Asthma UK (AC-2012-01). The views expressed are those of the authors, not necessarily those of the NHS, NIHR or Department of Health.

Poster 15*

Learning Health Systems: Translating current approaches into a chronic disease management framework.

1 Sengupta M, 1Sheikh A, 1Simon C
1 University of Edinburgh, UK; 1University of Edinburgh, UK; 1University of Wellington, NZ.

Background: The American healthcare system consists of costly, inefficient and unsafe care. Spiralling health care costs, latency between best practice knowledge and actual application in practice, inefficient public health infrastructure, and other factors make the Learning Health System (LHS) an important need. There is an urgent need for continuous and rapid learning from various patient and clinical experiences to advance better quality care and improve as a by-product of every interaction; to protect and improve the health of individuals, communities and populations. It aims to be an integrated ecosystem of scientific progress, informatics, and care culture, generating knowledge from the care experience; delivering best practices for continuous improvement in healthcare.

Aim: Systematically search relevant theoretical, empirical literature to document a comprehensive review of existing studies and work done in Learning Health Systems. To identify gaps in current knowledge and thinking and to recommend areas for future research. Identify potential learnings, key lessons emerging from the management of acute diseases that can be translated and applied to the management of chronic diseases, especially asthma. To develop a Learning Health System framework that can be applied to the management of chronic disease. To identify learnings from the US Learning Health System movement and identify lessons applicable to the United Kingdom healthcare context.

Methods: The scoping review protocol as developed by Arksey and O’Malley.

Progress made: Currently developing and executing a scoping review protocol that surveys the healthcare landscape and the work done on various aspects of the LHS, inclusive of knowledge management, infrastructure, trust and validation.

Points for discussion: The scale of an LHS requires consideration of multiple social, technical and environmental variables. How does one prioritise and choose?

Funding: College of Medicine and Veterinary Medicine PhD (eHERC/Farr Institute) Studentship.

*Eligible for competition
Investigating the Burden of Asthma coMorbidities (IBAM): a retrospective cohort study.

Karim El Ferkh,1 Bright I. Nwaru1−2, Chris Weir1, Chris Griffiths1, Aziz Sheikh A.1

1Asthma UK Centre for Applied Research, Centre for Medical Informatics, Usher Institute for Population Health Sciences, The University of Edinburgh
2School of Health Sciences, University of Tampere, Finland
3Asthma UK Centre for Applied Research, Centre for Primary Care and Public Health, Blizard Institute, Queen Mary, University of London

Background Asthma is a common long-term disorder with a number of related co-morbid conditions, which may impact asthma outcomes. In the UK, it is largely unknown how these conditions affect the patient and the healthcare.

Aim:
- To provide reliable estimates of annual period prevalence of asthma comorbidity, and describe how these vary by age, sex, socioeconomic status, and geography.
- To provide reliable estimates of the healthcare utilisation associated with each asthma comorbidity including GP consultations, prescriptions, attendances at A&E services, ambulance services, outpatient consultation, and inpatient care.

Methods: A national longitudinal retrospective observational study between 2009 and 2018 using The Secure Anonymised Information Linkage (SAIL) Databank. We will calculate the number of patients who reported/were diagnosed to have asthma with one or at the end of the 5 years (95% confidence intervals will be presented for prevalence rates). The prevalence and healthcare utilisation estimates will be multiplied by 1000 to give estimates per 1000 of the population. We will also compare the number of non-asthma consultations between asthma patients and non-asthma patients, between 2009 and 2018, in terms of GP visits, accident and emergency attendance, and prescriptions.

Progress made: We have our database ready and we are starting to extract the data needed to start cleaning and analysing. Study protocol has been developed and registered. The study is expected to be completed by April 2019.

On-going challenges: Working out the cost of each event (GP visit, prescriptions, hospital admission etc.) across all patients.

Funding: This work is supported by the Chief Scientist’s Office of the Scottish Government and Asthma UK as part of the Asthma UK Centre for Applied Research [AUK-AC-2012-01].

BN is supported by the Farr Institute and Asthma UK Centre for Applied Research.

Please note that posters 17-23 are the same as oral presentations 01-07. See pages 5 to 9 for full details.