Aim: Investigating the effectiveness of interventions that improve medication adherence in school-aged children with asthma

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Background: The scale of non-adherence to inhaled corticosteroids is a widespread issue, where it is estimated that 50% of asthma patients are non-adherent to their inhalation therapy. Patients with poor adherence are at greater risk of severe asthma attacks, and are therefore more likely to require unscheduled care and hospital admissions. In the UK, it is estimated that 1.1 million children and young people currently receive asthma treatment (NHS, 2020), making it the most common long-term condition among this population in Europe (Ferrante and La Grutta, 2018). However, there is a lack of research that explores the relationship between medication adherence and asthma exacerbations in children in the UK.

Objectives:

- To construct a multiple linear regression model to identify determinants of medication adherence
- To develop a health economic decision modelling framework to inform the relationship between asthma medication adherence and unscheduled medical contacts
- To determine what thresholds of medication adherence are considered effective in existing interventions
- To inform the development of new interventions that improve asthma medication adherence

Study Design: Retrospective secondary analysis using cohort of school-aged children with asthma aged 4-16 from 2022-2024.

Study Population: School-aged Children aged 4-16 with Asthma. Patient characteristics: Age (calculated from year of birth in patient's demographic table), Sex, Ethnicity, Index of Multiple Deprivation (IMD).

Exposure definition and measurement: Adherence measured using Medicines Possession Ratio (MPR). Calculate MPR using data columns in dosage table. Medications include low dose of an inhaled corticosteroid (Beclomethasone, 500 mg/day) as first-line maintenance therapy to patients.

Outcome definition and measurement: Unscheduled care and asthma exacerbations. Measured using related asthma Quality and Outcomes Framework (QOF) SNOMED/READ codes relating to out of hours care, hospitalisation and emergency department visits. Further unscheduled care events to be extracted from hospital letters attached to the patient's electronic healthcare record as part of quality improvement programme.

Explanatory Variables: Asthma QOF codes relating to decision model parameters including asthma control measures - Categories of control or validated questionnaire scores from annual review, RCP-3, ACT, ACQ.

Methods:

To determine what factors are associated with adherence, a multiple linear regression model will be constructed. The risk of asthma exacerbations and unscheduled medical contacts amongst patients with low adherence will be calculated through an observed odds ratio. A systematic review will be performed to inform parameters for the decision model, including health states, clinical events, resource use and quality of life (QoL) weights or utilities.

Data Source: Large observational electronic healthcare record (EHR) dataset of routinely collected primary care data from 2022 onwards.

Limitations: The adherence outcome variable is not directly coded within the dataset, therefore the outcome variable will need to be coded from prescription uptake through calculation of a medicines possession ratio.

Ethical/data protection issues: Data management plan outlining data storage, access and security to be submitted. The project must also adhere to The University of Sheffield's ethics policy governing research and Information Governance policy involving anonymised patient data.

Dissemination of Results: To provide open access to the results of this research through publishing with Wellcome Open Research. The results will also be of interest to asthma/respiratory primary and secondary care physicians.

Plans regarding patient and public involvement: To approach PPI experts such within Asthma UK Centre for Academic Research (AUKCAR) for guidance at a later stage within the project. Potential PPI may include: Ascertaining patient's views on adherence interventions, Approaching University of Sheffield School of Health and Related Research Methods panel for perspective on adherence model, Engaging with Asthma+ Lung UK expert patient panel.

Anticipated Impact: This research will enable the identification of interventions that are cost-effective in achieving full adherence, thus informing decision makers about interventions which should be implemented in the future.

References:

- Ferrante, G. and La Grutta, S. (2018) 'The burden of pediatric asthma', *Frontiers in Pediatrics*, 6. doi:10.3389/fped.2018.00186.
- NHS (2023) *Childhood Asthma, NHS England*. Available at: https://www.england.nhs.uk/childhood-asthma/ (Accessed: 10 April 2024).