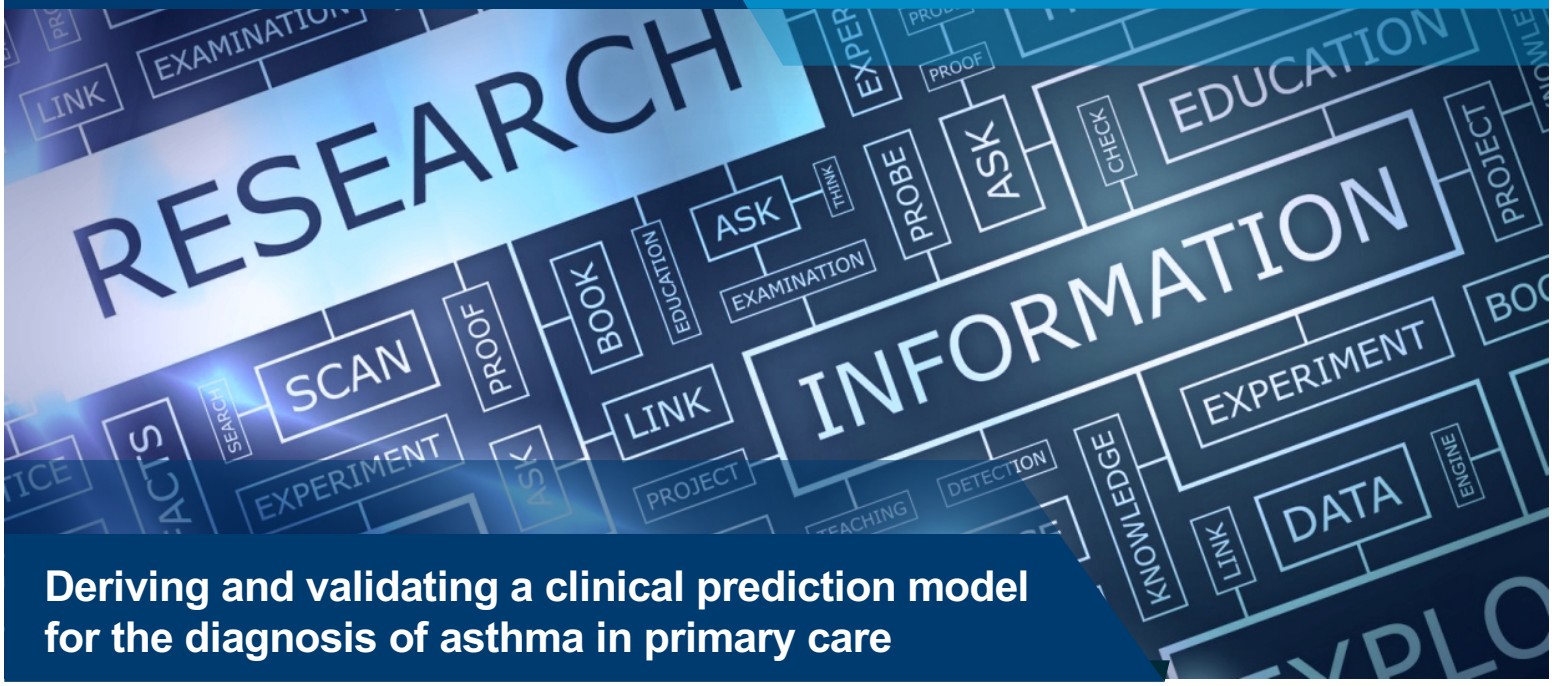
CHIEF SCIENTIST OFFICE

CODE: CAF/17/01

RESEARCH PROJECT BRIEFING



Deriving and validating a clinical prediction model for the diagnosis of asthma in primary care

AIMS

I wanted to make it easier for doctors and nurses to weigh up the likelihood of asthma by identifying the most important bits of information that can be gathered and use them to make a mathematical 'model' to predict asthma.

KEY FINDINGS

- My systematic review identified seven clinical prediction models to support asthma diagnosis in primary care, but all were at high risk of bias and unsuitable for clinical practice.
- Therefore, I derived and validated a prediction model which allows doctors or nurses to weigh up the likelihood of asthma in children and young people. When I tested the prediction model in the research dataset it worked well. The model was good identifying the children with asthma from those that didn't have asthma.
- The items included in the final model were wheeze, cough, breathlessness, hay fever, eczema, food allergy, childhood exposure to cigarette smoke, social class, maternal asthma, previous prescription of a short acting beta agonist and the recording of lung function/reversibility testing in the past.
- Finally, I interviewed 16 GPs and nurses, to understand the barriers and facilitators for implementing the prediction model into practice. The participants were clear that to be adopted, the prediction model must be proven to work, embedded in the practice computer system and easy to use.

WHAT DID THE STUDY INVOLVE?

Stage 1. Understand the current situation by:

- Searching published papers to find out if there were other prediction models for helping to diagnose asthma in general practice.

Stage 2. Prediction model development:

- Identifying the features that can be used to predict who has asthma by developing a mathematical model using a research dataset with information from 11,972 children and young people (up to 24 years old).
- Testing the model in anonymous data available from routine general practice consultations to check the model worked in other children/young people.

Stage 3. Hear the views of GP practice staff:

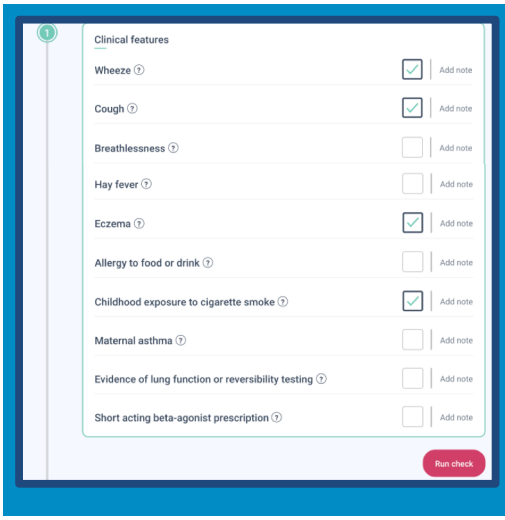
- Asking doctors and nurses in general practice for their views on the model and how it might be used to help them in their day-to-day practice.

Patient and public involvement:
One PPI member was involved throughout the research. Toward the end of the research, 5 PPI members evaluated the usability of the prediction model.

WHAT WERE THE RESULTS AND WHAT DO THEY MEAN?

It can be difficult for healthcare professionals to be sure if someone has asthma (or not). Unlike other conditions, there is no single test to prove, or disprove, a diagnosis of asthma. Consequently, asthma is commonly mis-diagnosed.

In my research, I found that few prediction models for asthma diagnosis existed, and all were unsuitable for use in clinical practice. The prediction model I created provides an evidence based approach for doctor and nurses to weigh up the likelihood of asthma. If the prediction model is adopted into practice it could improve the accuracy with which asthma is diagnosed.



The prediction model has been developed into a software ready for use in general practice.

In this example, the probability of asthma is low

WHAT IMPACT COULD THE FINDINGS HAVE?

For patients: using the prediction model could help reduce variation in the way that asthma is assessed in primary care and improve the experience of people with undiagnosed asthma.

For health professionals: the prediction model identified the most important bits of information to help doctors or nurses weigh up the likelihood of asthma. Using the prediction model could contribute toward asthma being more accurately diagnosed in primary care.

For policymakers: achieving diagnostic tests for asthma in a timely fashion can be difficult. The prediction model could help determine which people would benefit most from further tests.

HOW WILL THE OUTCOMES BE DISSEMINATED?

- **Peer-reviewed publications**: I have published 4 papers so far and have 2 more planned.
- **Conference presentations**: I presented my research findings at 6 conferences. I won the best abstract prize at the Primary Care Respiratory Society Conference in 2020. I was invited to deliver presentations on asthma diagnosis at 2 international conferences.
- **End of project workshop:** In the final year of this research, I invited patients, health professionals, policy makers, researchers and charities to hear about and discuss the outcomes. I wrote a blog series about the workshop which is available here
- **Asthma UK video:** Asthma UK asked me to feature in a video explaining my research.
- **Teaching/National asthma initiatives:** I regularly deliver post-graduate teaching to health professionals. I also advise health policy initiatives including the National Asthma Audit and the Children and Young people transformation programme (asthma diagnosis sub-group).

CONCLUSION

Using 11 predictors available in primary care, the prediction model work can support primary care clinicians assess the probability of an asthma diagnosis in children and young people.

RESEARCH TEAM & CONTACT

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Additional Information

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