

# The development of a web-based application to predict the risk of GI cancer in IDA

Orouba Almilaji<sup>1,2</sup>, Vegard Engen<sup>3</sup>, Peter Thomas<sup>1</sup>, Jonathon Snook<sup>2</sup>

1. Clinical Research Unit, Bournemouth University, Bournemouth, UK
2. Gastroenterology Unit, Poole Hospital NHS Foundation Trust, Poole, UK
3. Department of Computing and Informatics, Bournemouth University, Bournemouth, UK

## Introduction:

Gastrointestinal (GI) malignancy is a common finding in iron deficiency anaemia (IDA), with a prevalence of about 8%. We have previously reported and validated an algorithm for predicting the risk of GI malignancy in IDA – the IDIOM score. This was derived by logistic regression analysis based on four independent and objective clinical parameters - age, sex, mean corpuscular volume (MCV), and haemoglobin concentration (Hb). To facilitate the clinical use of this algorithm, a software application has been developed, with a view to providing free and simple access to healthcare professionals in the UK.

## Methods:

A detailed requirements analysis for intended users of the application revealed the need for an automated tool in which anonymised, individual, patient data is entered and GI cancer risk is calculated and displayed. The solution needed to be user-friendly and platform independent, and needed to facilitate future communication with the development team. Human-centred design (HCD) was employed to develop the solution, focusing on the users and their needs, whilst ensuring that they are provided with sufficient details to appropriately interpret the risk score. To evaluate usability, standard usability questionnaire applied. Participants include healthcare professionals such as IDA nurse specialists, gastroenterologists, etc.

## Results:

*Predict GI Cancer in IDA* has been developed using R Shiny as a web-based application enabling access from different platforms with central updating. The application has been evaluated and tested through literature search, internal validation exercises, code testing, risk analysis, and usability assessments. Usability assessments (n=7) has shown mean user subjective satisfaction of 8.5 out of 10. A screenshot from the application is shown in Figure 1. Plans for post-production maintenance and surveillance have been established. A technical file for the application has been written according to Medical Devices Directive (MDD) and all other relevant harmonised standards. The process of registering the application with the MHRA and for CE marking is underway.

## Conclusions:

The application *Predict GI Cancer in IDA* generates an estimate of GI cancer risk (with 95% confidence interval), following the insertion of data for the four key variables. The whole process takes just a few seconds, which lends itself to use in busy clinical settings. Legal notices, contact system and all the supportive information for the application such as description of the population, intended users, safety information have been embedded within the application interface.