

Title:

Patterns in haemoglobin levels over 10 years to predict diagnosis of colorectal cancer by Duke's staging: preliminary findings using UK primary care routine blood test data

Authors:

Pradeep S. Virdee¹, Tim Holt², Julietta Patnick³, Jacqueline Birks¹

¹Centre for Statistics in Medicine, University of Oxford, UK

²Nuffield Department of Primary Care Health Sciences, University of Oxford, University of Oxford, UK

³Nuffield Department of Population Health, University of Oxford, UK

Objective:

Colorectal cancer is the fourth most common cancer and second most common cause of cancer death in the UK. Cancer (Duke's) stage at diagnosis heavily influences 5-year survival: over 94% at stage A, but approximately 7% at stage D. Detecting and treating the cancer earlier can save lives.

Tumour growth causes subtle changes in levels of some blood components, such as haemoglobin. Such changes may go unnoticed by clinical investigators. We explored patterns in haemoglobin levels up to 10 years before a diagnosis of colorectal cancer, by tumour staging.

Methods:

This retrospective study used data from the UK Cancer Registry and Clinical Practice Research Datalink. Patients with a colorectal cancer diagnosis or no diagnosis of any cancer were included. Blood test data was longitudinal (multiple over time). For those without a diagnosis, haemoglobin levels before their study end date were used. Fractional polynomials were used to model haemoglobin levels over time.

Results:

68,301 patients were included. 798 had a diagnosis of colorectal cancer: 76 at stage A, 180 at B, 193 at C, 57 at D, and 292 with missing staging. Median age at diagnosis was 73.1 years and 52.8% of were males. On average, haemoglobin levels declined at a higher rate at 3 years before diagnosis, but remained steady among those without a diagnosis. At stage A, the rate of decline in average haemoglobin levels was greatest within 1 year before diagnosis. However, at stage D, it was greatest within 2 years before diagnosis, with the decline commencing at 3 years. Data will be presented graphically.

Conclusion:

Compared to those without cancer, those diagnosed showed an increase in rate of decline and this was detected earlier in those with Dukes D. Sudden decreases in haemoglobin levels over time may identify colorectal cancer in the early stages. Patterns in other blood components, such as platelets, will be explored to determine predictability of diagnosis. Findings will be incorporated into a joint prediction model for early detection of colorectal cancer.