

## **Study of infection rates after cancer therapy and its correlation with long term survival**

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The clinical informatics unit at the Queen Elizabeth Hospital Birmingham (QEHB) has one of the largest patient information datasets in the world. This includes all records of hospital admissions in the UK over the last 15 years, associated blood laboratory test results from patients admitted at QEHB and comparator clinical datasets from patients admitted to hospitals in many other countries.

This project will focus on the rate of infectious episodes that occur in patients after admission to hospital for treatment of cancer. In particular we will be assess the timing of these episodes in relation to the original surgery or chemotherapy, the duration of treatment in hospital, and the importance of infection in terms of the overall survival of the patient. This is particularly important for two reasons. Firstly, such episodes are distressing for the patient and costly for the NHS. In addition it has been suggested that infection may act to increase the immune response against cancer and therefore increase survival from cancer. This is an area of great interest at the current time.

- All patients admitted to UK hospitals over the last 15 years will potentially be available for assessment
- Patients will be investigated where there is an initial diagnosis of cancer
- We will correlate these diagnoses with any subsequent admissions for the treatment of infection over the next 12 months
- The survival of patient subgroups will be examined using information from the Office for National Statistics (ONS) dataset which is currently available
- Mathematical analysis will be used to correlate individual measurements with clinical survival at 3 months, 1 year and 5 years after admission
- Methods such as Principle Component Analysis will be used to correlate measurements into appropriate groups
- In this way we will be able to assess infection may impact, in a positive or negative way, on survival of patients after treatment

The aim is that this information will uncover novel features that may be able to predict who may go on to develop infection after treatment. In addition we may observe if infection reduces rates of cancer recurrent in the longer term.

The aim will be to publish this information in a leading journal and to develop novel mathematical tools that may be appropriate to interrogate this dataset.

**Required Skills** This project would suit students who have an interest in mathematical complexity within biological systems. In particular it will focus on health informatics which is a growing area of interest as demonstrated by >£50 million recent investment from UK research councils. The creation of the Farr Institute is one such recent investment (<http://www.farrinstitute.org/>).