EPD/24/07 - Multimorbidity, frailty and an ageing cancer population – utilising health data to personalise decision-making.

The number of older adults with a diagnosis of cancer is increasing – by 2035, two in every three patients diagnosed with cancer will be aged 65 and older. As individuals age, they tend to experience an increase in health issues (co-morbidities) along with a decline in physical fitness and resilience, commonly referred to as frailty. It is important to note that not all older adults will experience this.

Older age, underlying health conditions, and frailty are all linked to lower cancer survival rates as well as a higher chance of side effects from treatments. Currently, there is a lack of data on the prevalence of side effects in this cohort, making it difficult to accurately predict the risks and benefits of treatment. This lack of information is primarily due to the exclusion of older adults and those with co-morbidities or frailty from clinical trials that inform treatment decisions. As a result, both healthcare providers and patients face significant challenges in determining the most appropriate course of action. This project seeks to address this unmet research need by making use of existing electronic healthcare data along with stored blood samples, in two large Scottish regions – NHS Tayside and NHS Lothian. Specifically, the aim is to use existing health data to create personalised decision aids that doctors can use in clinical practice to improve patient outcomes and health service efficiency; both in general practice and hospital settings.

Firstly, to achieve this we will look in detail at what effect frailty and co-morbidity have in predicting the cancer outcomes of survival and treatment side effects. We will investigate whether the electronic frailty index (a score created from GP records), can predict outcomes in different types of cancer. We will then use machine-learning (a computer process which uses data to learn and improve results), to produce a score that can predict the risk of side effects from treatment, based on an individual patients' details. Together, these findings will help inform treatment decisions throughout their cancer journey. Secondly, we will look at the role of two specific blood tests related to the most common co-morbidities in a cancer population – heart disease and diabetes. The first blood test is 'BNP' and measures the level of a substance released by the heart when it is under stress. We have shown in 241 patients with stomach cancer that a higher-than-normal BNP at diagnosis can predict a lower survival rate. We wish to confirm the findings using stored blood along with electronic health records and establish if the same effect can be seen in other cancer types. Testing for BNP could help shape treatment discussion but could also lead to new treatment options e.g. using particular heart drugs.

The other blood test is HbA1c – a measure of average blood sugar over a period of time, which is not usually measured prior to oncology treatment. Therefore, there is very little data on the impact this level has on cancer outcomes. However, in our NHS Tayside population, where we have started to test, a high HbA1c appears to be linked to a poorer survival. We want to investigate this further, again using both electronic health records and stored blood samples. Like BNP, this may provide a

simple way to improve patient outcomes – in this case by improving sugar control during treatment.

This research project will help improve our understanding of the impact of age, co-morbidity and frailty on cancer outcomes in older adults. It will also help to better design future clinical trials more suited to the older patients we see in clinic.