**University of Leicester**

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| **Project Reference** | BRC Studentships |

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**Section 2 – *Project Information***

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| **Project Title** | Enabling fair comparisons of the impact of long-term health conditions on life expectancy in multimorbid populations: development and enhancement of statistical methodology | |
| **Project Highlights:** | 1. | Develop methodology to provide more tailored and fairly comparable life expectancy estimates for individuals with multiple long-term health conditions (MLTCs) |
| 2. | Use life expectancy measures to quantify the impact of cancer and cardiovascular disease on survival at both an individual and population level |
| 3. | Further develop software and tutorials to ensure that these methods are widely available and thus transferred to impact clinical practice |
| **Project Summary** | | |
| **Background**: In survival analysis it is common to use death certificates to determine the cause of death. However, as there are well-known inaccuracies in cause of death this can lead to biased estimates of survival, particularly for MLTCs. One approach to avoid using cause of death information, that is routinely used in population-based cancer studies, is to use relative survival methods which instead use expected mortality rates from lifetables. Relative survival requires the assumption that the lifetables are appropriate and provide an accurate estimate of the expected mortality of each individual if they didn’t have the health condition (e.g. cancer). However, for patients with MLTCs, this assumption is not valid since these patients likely have a lower life expectancy than the general population. In addition, lifetables are often not stratified by ethnicity and therefore do not provide sufficiently detailed estimates of expected mortality across ethnic groups. Therefore, more detailed lifetables are required to accurately estimate the impact of MLTCs on survival.  **Research Plan:** Building on the work by Schmidt et al., more detailed population lifetables will be constructed using data from the Clinical Practice Research Datalink (CPRD) database through the development of novel statistical methodology. These lifetables will account for MLTCs and be stratified by ethnicity to create more detailed and accurate estimates of expected mortality for different population groups. An extensive simulation study will be undertaken to assess the performance of the lifetables in a range of scenarios.  This project will focus on estimating life expectancy measures for individuals with cancer and cardiovascular disease. The Virtual Cardio-Oncology Research Initiative (VICORI) has linked cancer registry data and national cardiovascular disease audit data which will be used to develop and assess the methods in novel applications. Producing more detailed lifetables will enable fair comparisons of cancer survival by ethnicity and for the impact of a cancer diagnosis on individuals who already have an LTC to be assessed. Using more detailed lifetables will also allow unbiased, more accurate and realistic estimates of the risk of cardiovascular events to be estimated.  **Expected outcomes and impact:** The work in this project will lead to journal publications and be presented at international conferences. The lifetables developed in this project will be widely applicable across multiple research projects and disease areas allowing improved understanding of long-term survival outcomes in many clinical applications. Software and tutorials will be developed to allow others to implement the methods. | | |
| **References**  Andersson TM-L et al. Reference-adjusted loss in life expectancy for population-based cancer patient survival comparisons with an application to colon cancer in Sweden. Cancer Epidemiology, Biomarkers & Prevention, American Association for Cancer Research. 2022;31:1720–6.  Syriopoulou E et al. Estimating the impact of a cancer diagnosis on life expectancy by socio-economic group for a range of cancer types in England. Br J Cancer. 2017;117(9):1419-1426.  Bower H et al. Life Expectancy of Patients with Chronic Myeloid Leukemia Approaches the Life Expectancy of the General Population. J Clin Oncol. 2016;34(24):2851-2857. | | |