**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** | Integrating cancer genomics data to support clinical decision making in the era of precision medicine | |
| **Project Highlights:** | 1. | Explore how data and 'omics is currently integrated and used in the clinical management of blood cancers |
| 2. | Integrate complex data into clinical decision support processes |
| 3. | Create clinically focussed tools to support innovative decision making approaches which are transferrable across different specialities. |
| **Project Summary** | | |
| **Background:** Genomic data is one of the most powerful tools available to facilitate precision medicine (1). Advances in understanding the genetic basis of haematological malignancies, have improved disease classification, risk stratification and facilitated the identification of new therapeutic targets (2). However, practical use of genomic information is suboptimal due to multiple factors, including accessibility, knowledge gaps (e.g. rare cancers), and poor integration of genomic data with clinical information (3,4,5). Consideration also needs to be given to how best to use and present this information to clinicians and patients and in what context such clinical decision support (CDS) tools should exist (6). This project will explore how we could better use genomic and clinical data in combination to drive advances in clinical care and research.  **Research Plan:**  The project has three stages:   1. Explore how data and 'omics is currently used in clinical care of haematological cancers and healthcare systems that surround it. This will involve a comprehensive literature review for 'omics driven clinical decision support; focus groups with stakeholders (local clinicians, allied healthcare providers and patients); and assessing handling and access to data. Focus groups will concentrate on how ‘omics is used in clinical practice and how it could be improved or changed. 2. Use learnings from stage 1 and our existing CDS framework to develop decision support algorithms/processes which integrate existing models, data processing and patient clinical and genomics data. This tool would have the potential for use in clinical and research settings. Existing anonymised data will be used to carry out evaluation/testing of processes. 3. Co-design a pilot front-end for CDS based on Stage 2, which will effectively support decision making and generate research hypotheses. Run clinician-based focus group and undertake qualitative analysis using simulations based on example anonymised data.   **Expected outcomes and impact:** This project will produce a data-driven CDS tool which could personalise cancer care and research across the UK and Europe. Through this and continuing development of the underlying CDS framework, it should be generalisable for other specialities and embeddable within/interoperable with electronic patient records. Publications will include a systematic review of genomics in the context of cancer care; and technical/evaluation papers related to the introduction of CDS. More broadly, CDS application within the clinic, has the potential to reduce costs and burden within healthcare services through prevention, earlier diagnosis and access to precision treatments. It will also better inform clinicians and patients about disease trajectory. | | |
| **References**   1. Collins FS, Varmus H. A new initiative on precision medicine. N Engl J Med. 2015 Feb 26;372(9):793-5. doi: 10.1056/NEJMp1500523. Epub 2015 Jan 30. PMID: 25635347; PMCID: PMC5101938. 2. Jakobsen NA, Vyas P. From genomics to targeted treatment in haematological malignancies: a focus on acute myeloid leukaemia. Clin Med (Lond). 2018 Apr 1;18(Suppl 2):s47-s53. doi: 10.7861/clinmedicine.18-2-s47. PMID: 29700093; PMCID: PMC6334029. 3. Williams MS, Taylor CO, Walton NA, Goehringer SR, Aronson S, Freimuth RR, Rasmussen LV, Hall ES, Prows CA, Chung WK, Fedotov A, Nestor J, Weng C, Rowley RK, Wiesner GL, Jarvik GP, Del Fiol G. Genomic Information for Clinicians in the Electronic Health Record: Lessons Learned From the Clinical Genome Resource Project and the Electronic Medical Records and Genomics Network. Front Genet. 2019 Oct 29;10:1059. doi: 10.3389/fgene.2019.01059. PMID: 31737042; PMCID: PMC6830110. 4. Fountzilas E, Tsimberidou AM, Vo HH, Kurzrock R. Clinical trial design in the era of precision medicine. Genome Med. 2022 Aug 31;14(1):101. doi: 10.1186/s13073-022-01102-1. PMID: 36045401; PMCID: PMC9428375. 5. Ahmed Z. Practicing precision medicine with intelligently integrative clinical and multi-omics data analysis. Hum Genomics. 2020 Oct 2;14(1):35. doi: 10.1186/s40246-020-00287-z. PMID: 33008459; PMCID: PMC7530549. 6. Sutton, R. T., Pincock, D., Baumgart, D. C., Sadowski, D. C., Fedorak, R. N. & Kroeker, K. I. An overview of clinical decision support systems: benefits, risks, and strategies for success. *npj Digit. Med.* **3**, 1–10 (2020). | | |