An intelligent online platform to predict adverse outcomes from cancer-related malnutrition using the GLIM criteria

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Description of the initiative

- **Background / context:** The Global Leadership Initiative on Malnutrition (GLIM) criteria are proposed as an international consensus for diagnosis of malnutrition. The GLIM leadership recommend validation of the criteria, including studies that investigate which combinations of the criteria are most predictive of adverse outcomes to aid in identifying and intervening in patients at high risk.
- **Rationale:** This project will develop an intelligent online platform, using decision trees, to predict adverse outcomes from cancer-related malnutrition. The platform will utilise machine learning models to determine which phenotypic and etiologic combinations of the GLIM criteria are predictive of adverse outcomes (30-day mortality and unplanned hospital admission) in an existing cohort of 2492 oncology patients. Models with and without phenotypic and etiologic criteria for which there are often barriers to assessment within health services (e.g. inflammation, muscle mass) will be assessed.
- **Objectives and scope:** 1) To develop an intelligent web-platform for health professionals to predict oncology patients at high risk of adverse outcomes and in need of intervention; 2) To identify the most important subset of GLIM combinations for accurate outcome prediction.

Planned activities & deliverables

- **Steps:** Machine learning models will be developed using an existing oncology cohort. Performance metrics (accuracy, sensitivity, specificity, and precision) and the importance of each GLIM combination to predict adverse outcomes will be comprehensively studied. Developed machine learning models including decision trees will be visualized to provide insights to health professionals. A web-platform will be built to house the predictive machine learning models as well as educational resources.
- **Deliverables and achievements in the next 12-24 months:** An understanding of the relative importance of different GLIM combinations in predicting adverse outcomes will be published in a series of papers. A web-platform will be built for use by health professionals internationally to enable the identification of oncology patients at high risk of adverse outcomes, along with educational resources.

Resources & enablers

- **Personnel, financial needs:** A multidisciplinary team of dietitians, researchers, and machine learning engineers from Australia and the Netherlands will develop the machine learning models, decision trees, web-platform and educational resources. Funding of €30,000 is required to support researcher time.
- **Specify how the grant will be spent:** Funds will be spent on dedicated researcher time to develop the models, web-platform and educational resources.
- **What factors will make it successful?** The development of the web-platform housing several decision trees underpinned by machine learning models with a high degree of accuracy. Broad uptake and use of the web-platform by health professionals. Multiple peer reviewed publications of the findings to support clinician confidence in the science underpinning the intelligent online platform.

Results/outcomes & expected impact

- **How will the findings be implemented?** The findings will be used to develop the web-platform and educational resources to support health professional use and implementation of the web-platform.
- **How will this project advance patient care / contribute to optimal nutritional care?** The resources developed through this project will be freely available to all health professionals internationally, enabling real time assessment of the risk of adverse outcomes for individual patients and timely intervention.
- **What makes the project innovative?** Machine learning is a novel and growing field in healthcare.
- **Will the project be likely to influence national nutrition policy?** The publication of the project findings is expected to influence national nutrition policy. Furthermore, several members of the project team are members of national nutrition and oncology societies enabling the dissemination of findings.
- **Is the project transferable to other settings / countries?** The project is highly transferrable to other settings and countries. It is anticipated that following the development of the web-platform, as new data become available, both in oncology and other patient populations, that the decision trees and intelligent online platform will evolve to include other clinical populations.