

# **Time toxicity of cancer - the time demands of cancer-related activities and their impact on well-being and quality of life: Study Design and Protocol**

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Cancer care is becoming increasingly complex, with growing demands on patients' energy and time. As a result, patients often have to neglect their usual life activities and relationships. Such 'time toxicities' of cancer are rarely acknowledged and play little role in care considerations. Additionally, there are currently no standardized tools available to gauge the extent of the time commitment involved in cancer care. Having to weigh potential survival benefits of treatments against added time burdens especially affects those at risk of premature death. Therefore, there is a critical need to measure and mitigate the time-related challenges associated with cancer care.

The objectives of this research are to describe and quantify sources of cancer-related time toxicity among individuals receiving treatment for cancer and their effect on well-being, and to create time toxicity scores which can be used in future studies to identify opportunities to minimize time toxicity. To accomplish this, we will innovatively combine sensor-based objective data with subjective self-reported measures of time spent on healthcare-related activities to accurately measure the time burden of cancer care and identify areas for interventions related to treatment delivery to reduce this burden. We will conduct a 28-day prospective cohort study of 80 individuals with advanced stage ovarian cancer or metastatic breast cancer. Using a smartphone application, we will automatically track time spent on daily cancer activities, augmented by participant-reported details on specific activities and quality of life. We will estimate associations between objective time use and daily well-being, explore variations in these associations by patient characteristics, develop a multidimensional scoring system of time toxicity differentiating between sources of toxicity, and measure the associations of these scores with patient reported psychosocial outcomes.

Recruitment and data collection begins in October 2023. Upon completion, we will have developed objective measures of daily time use by cancer activity and patient characteristics, estimated associations with daily well-being and explored variations by patient characteristics, and developed a multidimensional time toxicity scoring system. This study will have a significant impact as it recognizes the importance of time for patients. Our measures of time burdens related to cancer care will facilitate future interventions to reduce time toxicity.