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## **Towards an Adaptive Framework for Longitudinal Survival Modeling in Clinical Decision Support: Case of the ISPY 1 Trial**

Clinical surveillance of cancer patients is necessary to ensure early detection of recurrence after curative treatment and to monitor patient progression. Although clinical guidelines commonly recommend fixed surveillance schedules for all patients, static intervals between follow-up visits may not be compatible with individual disease progression, increasing the risk of delayed recurrence detection for some cases as it may be burdensome for healthcare resources and patients for others.

Motivated by the idea of personalizing follow-up schedules based on each patient's prognosis, we introduce a generic framework for an intelligent cancer post-treatment follow-up. The framework enables the prediction of time to recurrence using patient-specific clinical longitudinal data along with survival modeling, which can be used to customize follow-up schedules for each patient.

The framework can enhance medical visits planning by incorporating evidence-based follow-up suggestions aligned with each patient's clinical development, thereby reducing under-surveillance risk, optimizing resource use and easing patient burden.

We illustrate the application of the proposed framework to a cohort of patients with locally advanced breast cancer undergoing neoadjuvant chemotherapy from the I-SPY 1 trial, a multicenter prospective study conducted across nine institutions and publicly available.

The approach, while validated for breast cancer, applies to other cancer types and diverse data modalities. Its application can support doctors in predicting relapse time, establishing optimal followup intervals, and enabling prompt treatment decisions, so improving the efficiency, efficacy, and tailoring of post-treatment care.

### **Special/ Invited session**

### **Classification**

Both methodology and application

### **Keywords**

Longitudinal survival modeling, customized Patient follow-up, ISPY 1 trial

**Primary author:** BERRADO, Abdelaziz (Mohammed V University, EMI)

**Presenter:** BERRADO, Abdelaziz (Mohammed V University, EMI)

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