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## **Predictive Analytics in Palliative Care- A Case Study**

Predicting patient outcomes is essential for optimising resource allocation and service delivery in the healthcare industry. For patients who are on palliative care or End of Life Hospice Care, that is typically with co-morbidities conditions, understand and predict the terminal time based on the available data to an accuracy of within weeks or days so the proper care can be given. The predictive focuses on a specific time window, which is crucial in hospice care. Accurate timing helps caregivers and families prepare for end-of-life care and ensures that necessary support and resources are provided during this critical period.

Aashaya has worked with HOSPICE database to predict the patient who is nearer to end-oflife. HOSPICE data for multiple agencies were used. Patient data was anonymised so there is no personal information, only Patient IDs, ICD codes, start of care information, CTI notes and visit summaries, etc., are used to identify patient episodes and the related events. The data set and its integrity has been checked and data preprocessing was done to resolve issues such as missing values, non-numeric values and imbalanced data samples, etc. Understanding of the data set with medical terminology, feature selection, etc., was done with expert advice of senior clinicians who closely work with patients in palliative care to ensure there is no loss of information.

An AI/ML model was developed that demonstrated the highest efficiency and was further optimised with the hyperparameters to deliver excellent performance. We have demonstrated 2 different models. Each of these models take different inputs and process it such as model 1 takes data related to Start of care (ICD codes + CTI notes + HIS) and predicted whether patient dies within a week or not, this model has achieved great accuracy, where model 2 takes data related to follow up (visit summary + Symptom management + adverse events and so on) and predicted the risk levels (in percentage) of dyeing in within 4 days, 8 days, 12 days and **above 12 days with up to 99.1% accuracy.** Finally developed API can be used to predict the risk for the new entrant to the palliative care so proper intervention can be done.

The business impact of this predictive model in hospice and palliative care is profound, improving patient care while optimizing healthcare resource utilization thus reducing costs. By accurately predicting terminal time, healthcare providers can ensure timely interventions, personalized care, and better emotional and logistical support for families. This leads to enhanced patient comfort, reduced unnecessary medical procedures, and improved hospice resource planning. For healthcare institutions, efficient resource allocation reduces operational

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costs and enhances compliance with care quality standards. The attribution of this impact lies in improved clinical workflows, proactive care planning, and the seamless integration of AIdriven insights into hospice management systems.

For any further information on this, please feel free to contact Dr. Mahesh Rao

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