Al-based methods for survival extrapolations: Findings of a literature review KODJAMANOVA P¹, JEWITI-RIGONDZA K², NEFF-BARO S², FRIEDRICH G³, GAUTHIER A³

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RESULTS (continued)

- Predictive modeling in healthcare involves using statistical techniques and machine learning algorithms to forecast patient outcomes, particularly survival rates, based on historical data and various clinical variables.
- Models leverage diverse data sources, including medical records, imaging data, genetics, and lifestyle factors, to **improve the accuracy and relevance of predictions**.
- These models play a crucial role in personalized medicine, helping healthcare providers identify at-risk patients, tailor treatment plans, and improve resource allocation in clinical

Figure 2, Number of citations per indication



AI METHODS

The most widely used methods included neural network survival

settings.



This review aimed to identify AI-based methods used to predict survival in oncology and evaluate their performance.





A search strategy was developed to identify relevant publications on **AI-based predictive modeling in FIGURE 3. AI METHODS USED oncology** published since 2020.



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The search was conducted in Embase and Medline via the EMBASE platform, and the retrieved citations were **screened** based on pre-specified selection criteria. models (n=10), random forest survival models (n=6) and support vector machine models (n=6; Fig. 3).

- The strengths in survival predictions of different machine learning approaches such as deep learning (DL) and multi-task logistic regression (MTLR) were compared to traditional Tumor Node Metastasis (TNM) staging systems and Cox regression.
- Additional methods included survival trees and neural multitask logistic regression, and gradient boosting methods were used to optimize the performance of the algorithm.



Neural network survival models

Random forest survival models

Support vector machine models
Other

Data from the selected articles were extracted using a pre-specified **data extraction** grid that included study objectives, AI methods used, and performance assessments.



STUDY CHARACTERISTICS

- A total of 1,127 citations were retrieved, of which 30 publications were selected for data extraction.
- Most studies included applications of survival prediction (n=28) and the review also included a systematic literature review of machine learning models for survival prediction in breast cancer, and a survey of methods used in predictive modelling (Fig. 1).
- Most applications related to breast cancer (n=7), lung cancer (n=5) and hepatocarcinoma (n=5; Fig. 2).

FIGURE 1. STUDY SELECTION DIAGRAM

Studies identified via databases and registers

PERFORMANCE ASSESSMENT

- Random survival forest models and deep learning systems demonstrated good performance in predicting survival outcomes according to AUC and C-index values.
- Compared to standard methods, AI methods frequently matched or exceeded performance, with random forest survival models often showing superior predictive accuracy.





health agencies will be essential in the cost-effectiveness assessments of new choices of healthcare interventions.



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Abbreviation: AI: Artifical Intelligence

Disclosures Authors have no conflict of interest to declare.

Presented at: ISPOR Europe 2024; 17-20 November 2024; Barcelona, Spain