

APPLICATION OF ARTIFICIAL INTELLIGENCE FOR THE COMPARISON OF NEW DRUGS AND MEDICAL DEVICES

Melania Rivano; Damuzzo V; Cancanelli L; Brunoro R; Gasperoni L; Ossato A; Colicchio A; Del Bono L; Di Spazio L; Celentano Fasano CN; Chiumente M; Mengato D; Messori A

1 Why was it done?

The clinical selection of available treatments and medical devices (MDs) is often hindered by the absence of direct efficacy comparisons between emerging therapies. This AI-tool aimed to address this challenge by employing advanced analytical techniques to facilitate informed decision-making in clinical settings

2 What was done?

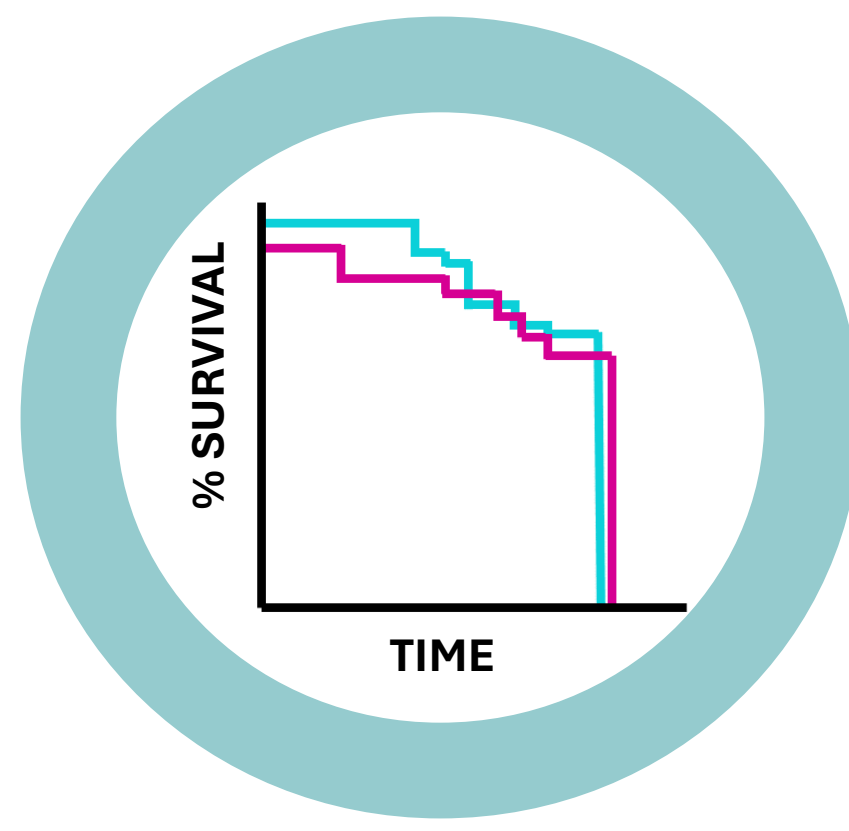
In 2016, the Italian Society for Clinical Pharmacy and Therapeutics (SIFaCT) launched the AVVICINARE project with the goal of training young hospital pharmacists to develop innovation in research based on non-original, already published data. We recently approached the field of indirect comparisons, applying the artificial intelligence (AI) technique 'IPDfromKM' to extract individual patient data (IPD) from Kaplan-Meier (KM) survival curves, enabling the indirect comparison of emerging pharmacological treatments and MDs

3 What has been achieved?

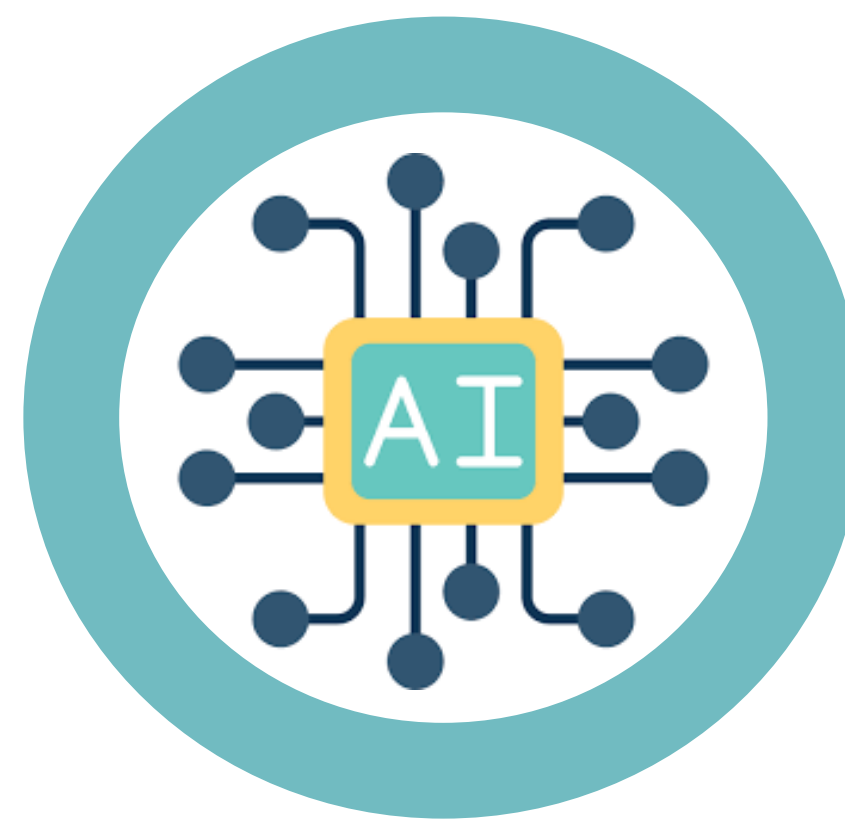
Drugs and technologies with similar therapeutic roles and efficacy assessed by time-dependent endpoints (Overall Survival, Progression-Free Survival) were identified. KM curves from relevant clinical trials were digitized, and the IPDfromKM application was used to reconstruct the IPD. Data from different studies on the same treatments were pooled to enhance sample size, and standard statistical techniques (Cox regression, inter-treatment comparison) were employed, considering long-surviving patients (restricted mean survival time [RMST]). A heterogeneity analysis ensured comparability of patient cohorts.



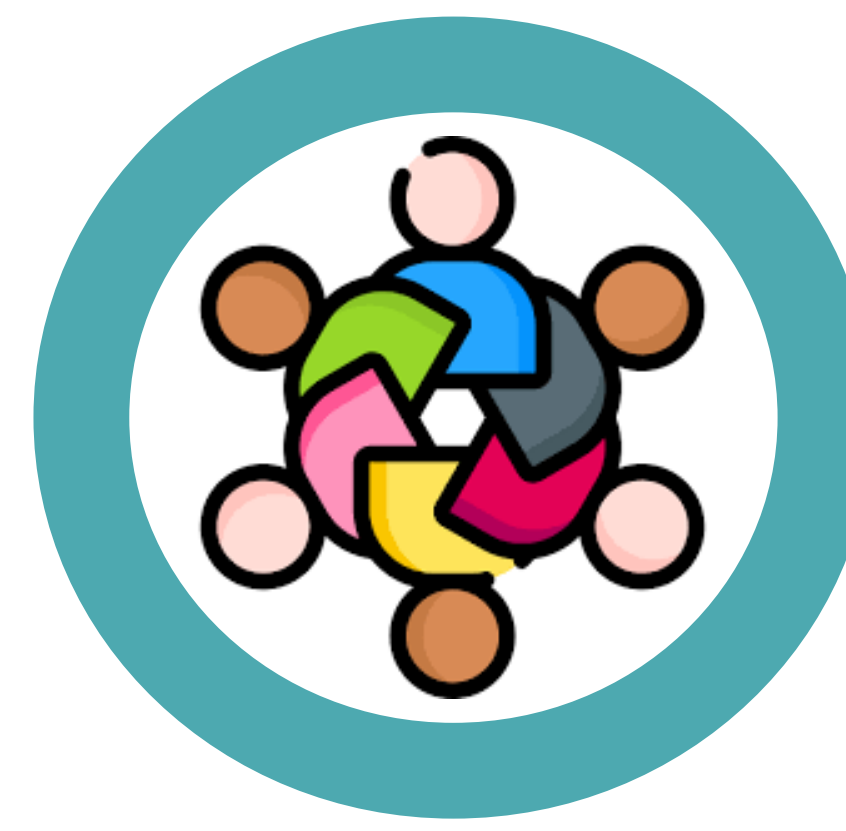
Selection of studies with drugs/DMs with same place in therapy and efficacy assessed on time-dependent endpoints



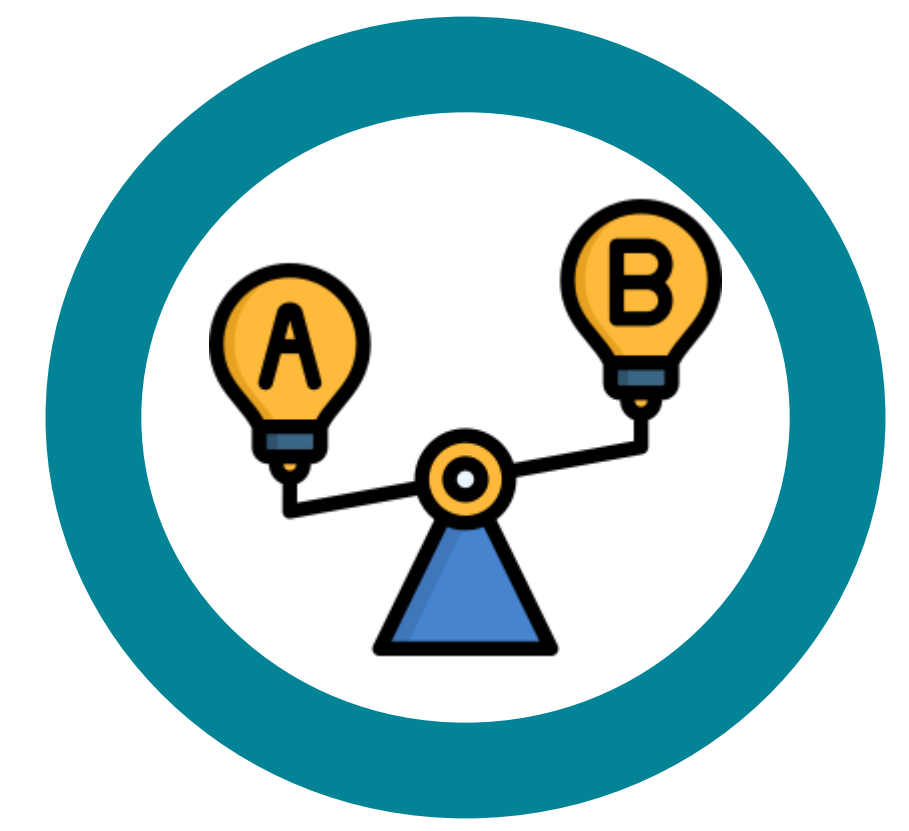
Digitisation of Kaplan Mayer (KM) curves



Reconstruction of individual patient data with the AI Algorithm IPDfromKM based on the (x;y) co-ordinates of the KM curves



Heterogeneity analysis to ensure comparability of patient cohorts



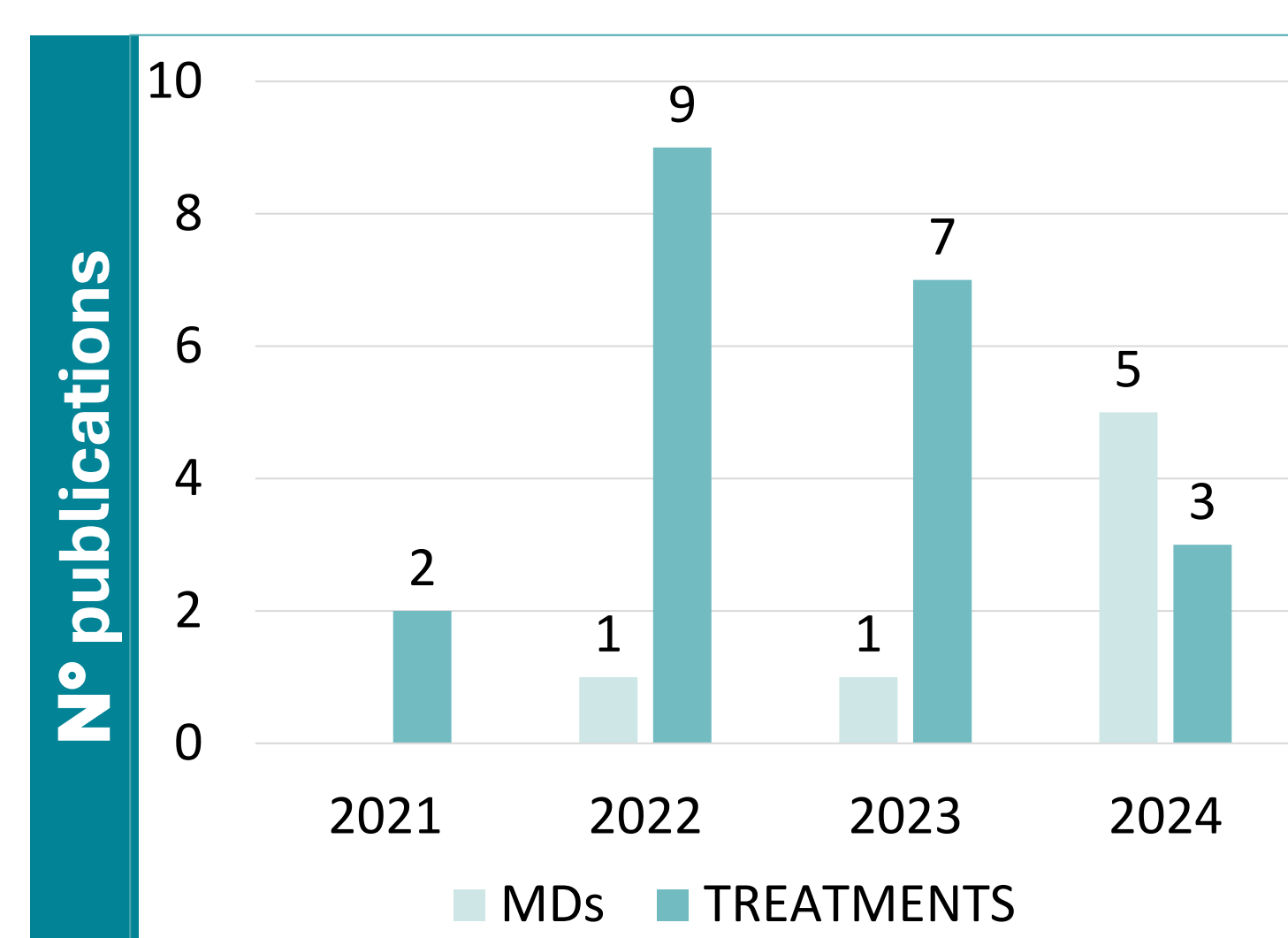
Indirect comparative analysis of the effectiveness of different treatments (HR, ITC, RMST)

4 Why was it done?

This methodology enables clear indirect comparisons, providing meaningful insights in contexts with limited data availability. Collaboration with clinicians has been initiated, enhancing the relevance of the findings. To date, 20 pharmacists have been trained, and the current research group comprises 10 pharmacists. Since 2019, 23 analyses of comparisons between onco-haematological treatments have been published. Additionally, a project on MDs launched in 2023 has resulted in 6 publications primarily in the cardiology field.

5 What next?

Given the increasing value of indirect comparisons in both clinical and pharmacoeconomic contexts, ongoing efforts will focus on refining the analytical techniques and expanding training programs for hospital pharmacists. Future work will also explore additional therapeutic areas to broaden the impact of evidence-based medicine and enhance the role of hospital pharmacists in clinical decision-making.



↑ Fig.1 Number of publications using the IPDfromKM method published by the Avvicinare Project

