

**O1185 Predicting multidrug-resistant Gram-negative infections in haematological patients with high-risk febrile neutropenia using neural networks**

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**Background:** In the current era of multidrug-resistant gram-negative bacilli (MDR-GNB) infections, empirical antibiotic treatment for patients with high-risk febrile neutropenia (HRFN) is a challenge for physicians, as inappropriate treatment is associated with higher mortality. We aim to predict those patients who will suffer MDR-GNB infection upon febrile neutropenia onset via the use of neuronal networks, a pre-artificial intelligence step.

**Materials/methods:** A large set of structured data (7 million) from patients with HRFN were extracted directly from electronic health records (EHRs) (January 2008-December 2017) at a tertiary hospital in Barcelona (110 SCT and 60 acute leukemia intensive chemotherapy per year). Patients were randomly selected for the learning stage (70% of the cohort, test set), as well as for the training stage (30%). A feed forward neuronal network consisting of 13 neurons in the intermediate hidden layer was used, integrating 14 input parameters previously selected by multivariate analyses. Afterwards, parameters used were determined whether to be significant or not for the network. The parameters that were not significant were eliminated and network was trained once again (Figure 1).

**Results:** 3235 episodes of HRFN in hematological patients were documented (median age: 57 [IQR 44-67] years: 56.9% males, 38% acute leukemia and 28% HSCT). Infections caused by MDR-GNB accounted for 180 (5.6%) episodes. The most frequent MDR-GNBs were MDR-*P. aeruginosa* (53%) and ESBL-GNB (46%). The calculation for object from the test set provides a prediction with an accuracy of 98%. The model predicts that 236 patients (7%) will have MDR-GNB infection (2% corresponds to false positives) and 2999 will not have MDR-GNB infection (3% regarding patients who present MDR-GNB infection correspond to false negatives). Calibration was excellent.

**Conclusions:** Neuronal networks are helpful in predicting which patients with HRFN will have MDR-GNB infections. This tool might analyze data from EHRs in real time and provide a revolutionary approach to be used as a decision support system for optimizing microbiological testing for faster diagnoses and antibiotic treatments.

**Figure 1. Neuronal network used in this study.**

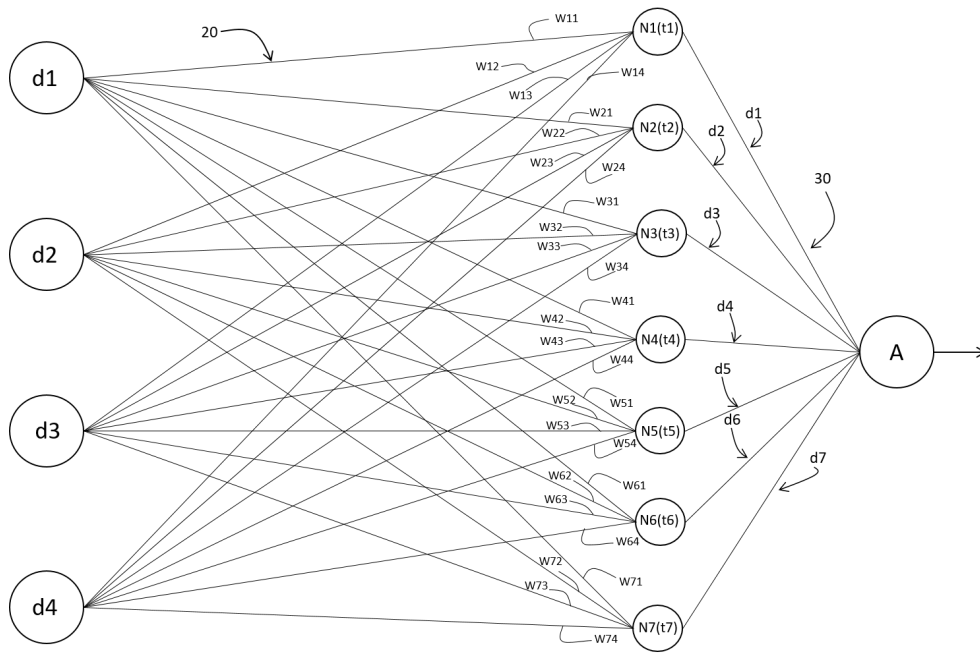


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