Knowledge based diagnostic and recommendations for therapy of patients with ARDS using the fuzzy set theory

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Objective: Since the treatment of patients with severe ARDS using the extracorporeal lung assist (ECLA) methods remains a cost intensive and speculative procedure, a knowledge based computersystem should be created and evaluated in order to support clinical decisions.

Methods: The model was based on the fuzzy set theory and therefore able to give also decisions between yes and no, that means that a criterion could also be fulfilled to 35% or 80% for example. The development of this computer program consists of two steps: first, the entry criteria for the ECLA therapy were established within a framework of an international evaluation of clinical data from 3 centres (Berlin, Marburg, Vienna). Here, inherent vagueness, uncertainty of the occurrence and limited availability of medical data are to be considered to establish a useful tool. Secondly this was done by grouping and weighting of parameters by the system and the status of each patient or patient group was assigned by the percentage of fulfilment of the criterion.

Results: By using a mixed sample of patients from these three centres, the fulfilment of entry criteria according either to definitions of Berlin or to definition of Marburg was different (68% versus 36%). Another differences (36% vs. 22% and 68% vs. 60%) were found between the fuzzy based score and the crisp score which represents the usually performed method.

Conclusions: This now preevaluated minimal data set to describe severe ARDS patients based on the fuzzy set theory may be useful to compare patients for ECLA therapy or for another controlled therapy.