

Effectiveness, safety and efficiency of the molecular adsorbent recirculating system MARS® for the treatment of acute and acute-on-chronic liver failure

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Introduction: Few treatment options are available for patients with acute liver failure (ALF) or acute-on-chronic liver failure (ACLF), with a liver transplant being the only truly effective treatment. For this reason, due to the lack of available organs and the high cost of transplants, as well as the high mortality rates in patients with liver failure, other alternatives have been explored such as MARS® (Molecular Adsorbent Recirculating System). Its purpose is to replace the liver functions that have failed, resulting in recovery of the liver or stabilisation of the clinical status, until the patient is in the same situation as prior to developing the condition, or in a position whereby transplantation may be carried out.

Aims: To evaluate the effectiveness, safety, and efficiency of the MARS® in the treatment of ALF and ACLF in comparison to standard medical treatment (TME).

Methods: A systematic search was carried out of the medical literature from January 2013 until September 2017 in the main biomedical databases: PubMed, Embase, ISI Web of Knowledge, Cochrane, etc. This was completed with a search in databases on studies currently underway, and a general Internet search. The studies were selected by two independent evaluators, based on a series of pre-defined selection criteria. The data were extracted using a form and summarised in evidence tables. The quality was evaluated using different scales, based on the type of study.

Results and discussion: Due to the existence of a systematic review prior to 2013, and the considerable amount of literature that describes the MARS® in studies of case series with a low number of patients, which provide the lowest evidence quality, it was decided to only included studies with a control group. A total of 2 meta-analyses of systematic reviews were located, 4 comparative primary studies, and 1 cost-utility analysis.

ALF and ACLF are different entities in terms of their aetiology, evaluation of severity, natural history, and prognosis, although the results for both pathologies revealed patients with different diagnoses and degrees of illness, which has implications for the generalisation of the results in both cases. The studies revealed that the MARS® does not provide statistically significant differences when analysing the safety of the system in comparison to TME. However, the as the main result in terms of effectiveness, the studies analysed the mortality rate or increase in the survival rate, with most of them reporting that there were no statistically significant differences in the risk of death between the intervention and control group, while providing contradictory results when analysing the survival rate of patients. One cost-utility analysis that studied patients with ALF found the MARS® to be a cost-effective treatment.

Conclusions: The mortality rate in patients with acute liver failure or acute-on-chronic liver failure is very high, and at present, the most effective treatment is liver transplant. The results obtained to date suggest that MARS® is safe, effective, and well tolerated by patients. The increased survival rate in patients treated with MARS® would be a result of identifying patients who would most benefit from the system. Given the extensive literature, that provides little evidence with regard to analyses of survival or mortality rates for the MARS®, further high-quality studies, controlled

clinical trials, or comparative multi-centre studies are required, which may shed light on these variables.

