Mannitol dosing errors made during transport of patients to tertiary hospitals

Researchers in Alberta, Canada, investigated the use of the drug mannitol before and during transportation of patients with intracranial emergencies from peripheral hospitals to tertiary facilities that house neurosurgery departments. The focus was on the appropriate use of the drug and the extent to which dosing errors may have occurred. The authors found a 22% dosing error rate, with slightly more patients receiving a dose smaller, rather than larger, than the dose range recommended by the Brain Trauma Foundation. Findings of this study are reported and discussed in "Mannitol dosing error during interfacility transfer for intracranial emergencies," by Cameron A. Elliot, MD, Mark MacKenzie, MD, and Cian O'Kelly, MD, MSc, published today online, ahead of print, the Journal of Neurosurgery.

Elevated intracranial pressure (ICP) can be caused by increased cerebrospinal fluid surrounding the brain and spinal cord, expanding hematoma or by a rise in pressure within the brain itself. Elevated ICP often accompanies intracranial emergencies (such as traumatic brain injury or spontaneous intracranial bleeding), and if sufficiently high, elevated ICP can, in itself, constitute an intracranial emergency that may lead to poor patient outcomes, even death, if left untreated. Mannitol is frequently used to reduce elevated ICP, and as the authors inform us, the drug can be used to bridge the gap between suspicion of ICP at a peripheral hospital and specialized treatment of ICP at a tertiary hospital.

The STARS database contains information on 120 patients who received mannitol infusions during the study period. The authors tell us that according to the study criteria, 86 patients (72%) had appropriate indications for mannitol bolus infusions. In 27 patients mannitol was administered incorrectly. Ten patients (8.3%) received underdoses and nine (7.5%) received overdoses. Nonbolus administration occurred in eight patients (6.7%). Due to privacy issues involving data collection and analysis, the authors could not follow up individual cases to report patient outcomes. However, they do inform us that given the dose-dependent effect of mannitol, the more worrisome potential error in mannitol dosing is underdosing, which occurred in 8.3% of cases. The authors point out that the mean dose in patients who received low doses was 0.07 grams per kilogram—far below the recommended amount. They also state that the 7% rate of nonbolus administration is of concern because continuous infusion, as opposed to bolus infusion, does not effect a rapid decrease in ICP.
Based on their findings, the authors plan to develop, with the STARS staff, a preflight checklist of mannitol dosing as well as medication error awareness sessions to lower the risk of mannitol infusion errors. The authors hope that their findings will increase awareness of the frequency of dosing error in mannitol administration. Physicians and other health care providers involved in interfacility transport may develop additional strategies to mitigate this issue. The authors plan to engage their local transport stakeholders on this issue and will assess the effectiveness of their interventions two years after engagement and implementation of strategies.


Provided by Journal of Neurosurgery

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