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NOVEL IV PUMP FOR SPACEFLIGHT

Abstract

Intravenous infusion (IV) pumps will become increasingly critical as lifesaving equipment with space travel involving more extended and more adventurous missions. The MedInfuze device is a fully programmable, miniature portable, easy to use medical intravenous infusion solution. It is battery-operated and powered via any USB C charger, phone, or tablet with a secure medical application. The MedInfuze study objectives are: 1) Evaluate the effectiveness of the operation of MedInfuze pump system in an in vitro microgravity environment; 2) Determine the flow rate accuracy of pre-selected flow rates; 3) compare with other IV pumps studies performed on previous space missions.

The primary goal of the space study is to validate the use of a new gravity independent intravenous fluid conveyer in a microgravity environment as in space. Intravenous infusion (IV) therapy is a common route to provide injured patients with solutions, medication, hydration, and blood products. In different medical scenarios fluid loss is one of the main issues and the therapy could reach high volumes (i.e., gastrointestinal losses, burns etc.). In some cases, patients who are unable to orally ingest or hold food or liquids may be depend on intravenous therapy as a lifesaving therapy. The MedInfuze device is the first of a kind device enabling continuous, accurate administration of the required volumes to patients through a remotely controlled device. The device is based on a disposable, battery operated, power-efficient gear pump mechanism that ensures accurate volume delivery pertinent to drug therapy.

MedInfuze represents an advancement beyond an earlier experimental system known as the Fluid Therapy System (FTS), which is part of NASA's Health Maintenance Facility that was designed to provide medical care to astronauts for up to 10 days. FTS includes the capability to supply intravenous (IV) fluids to sustain an ill or injured crewmember.

Evaluation of the FTS equipment has focused on the setting of the International Space Station, where the timeline for evacuation to medical facilities on Earth is typically a matter of a few hours, at most. In such a setting, medical operations are responsible for treating minor ailments, but also can intervene in the case of an emergency of a scale requiring transport of the injured or ill astronaut to Earth. FTS has been evaluated in terms of its ability to supply sterile water and IV solutions in space flight. rather as an experimental platform to demonstrate that IV infusion will be possible on future spaceflight. On-Earth studies using medInfuze showed promise towards exploring its use in zero-G and in spaceflight.