Public Abstract
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Title:Effects of temperature and handling conditions on lipid emulsion stability in centrally administered veterinary parenteral nutrition admixtures

This research centered on veterinary parenteral nutrition (PN) admixtures which are mixtures of amino acids, dextrose, and lipid emulsions designed for the intravenous provision of nutrition to small animal patients. Specifically the research focused on the duration that the lipid component of these admixtures can be administered safely to a patient. To that end, this project involved examining and measuring the diameter of lipid particles using transmission electron microscopy to determine when and if the lipid particles coalesced into particles of large enough diameter to lodge in pulmonary capillaries and cause pulmonary emboli. The end goal of the research project was to determine how long a PN admixture could be safely given to a patient before pro-embolic lipid particle development. Current recommendations from the Food and Drug Administration direct veterinarians using PN admixtures with lipid as a component to discard any un-used portions of the PN admixture after 24 hours. This project sought to provide data to definitively determine whether it is safe to administer a single formulation of PN for longer than 24 hours.

The goal of determining the duration of use of lipid-containing PN admixtures is three-fold. First, a substantial portion of the cost of administering PN to a veterinary patient is incurred when using a new PN bag each day (up to 33% of the daily cost at our institution). If proof could be found that a single bag and admixture can be used for longer periods, costs would decline substantially. Secondly, appropriate formulation of PN is performed by a pharmacist or other trained individual, making it difficult in many cases to procure PN over the weekend and on holidays. Again, if a single bag and admixture of PN can be used for two or more days, it would allow for greater ease of administration. Third, there is much disagreement among institutions regarding the duration that a single bag of PN can be given safely to a patient. Our project was designed to provide factual rather than simply anecdotal information to settle this dispute.

This research specifically tested the hypothesis that the lipid emulsion in commonly used veterinary PN admixtures is stable beyond 24 hours. It also evaluated the effects of manipulations to prolong lipid emulsion usefulness - refrigeration, continuous and intermittent agitation, and in-line filtering. Findings of this research showed that pro-embolic lipid particle formation did not occur within 96 hours of PN bag hang-time, a time frame much longer than anticipated. Additionally, refrigeration, filtering, and agitation were not found to significantly alter lipid particle diameters. Results of the research importantly indicated that the standard veterinary PN admixtures, as used in the study, can be administered to patients for more than 24 hours without pro-embolic lipid particle formation.