

New intravenous lipid nutrition cuts pediatric hospitalizations and infections

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A formulation for intravenous nutrition that includes four lipid sources, including fish oil, reduced hospitalizations and urinary tract infections among pediatric patients at Duke Children's Hospital.

The new multi-component lipid with [fish oil](#)—given to [young patients](#) with cancer, bowel conditions and other illnesses that prevent them from eating—has not been as widely used as expected after FDA approval a few years ago.

Prolonged use of the older formulation of pure soybean oil has been associated with an increased risk of liver dysfunction and impaired immune function, which can lead to infections and other serious complications.

The findings from the Duke team, published Sept. 5 in *JAMA Network Open*, is the first evidence in a pediatric population that switching to the newer multi-component lipid with fish oil can improve patient outcomes and significantly shorten patient length of stay.

"We noticed that despite recent FDA approval, many U.S. hospitals have not switched to utilizing this new, more balanced lipid in their patients, and if good evidence was what they needed, we were uniquely positioned to provide it," said senior author Paul Wischmeyer, M.D., professor in Duke's departments of Anesthesiology and Surgery and director of Duke University Hospital's Nutrition and TPN Team.

"After this new formulation was approved by the FDA, we immediately switched virtually all adult and [pediatric patients](#) at Duke University Health System hospitals on a single day in 2017," Wischmeyer said. "That enabled us to compare clinical outcome data before and after this single switch in care."

In their study, the Duke team focused on pediatric patients between 1 month and 17 years of age. The [retrospective analysis](#) included a total of 684 pediatric patients at Duke Children's, of whom 342 were patients in pediatric intensive care units; 30% of the children in the study received the older soybean oil-based lipid nutrition before the switch and 70%

received the new lipid with fish oil after the switch.

In addition to fish oil, the four-oil formulation includes soybean oil, [olive oil](#), and a medium chain triglyceride that attempts to balance lipid intake to more closely approximate a healthy diet. The combination of lipid or fat sources also reduces the potential negative effects of too much omega-6 in soybean oil, which is believed to contribute to the increased risk of infections and other complications.

Pediatric patients who received the four-oil lipid with fish oil had fewer complications and shorter hospital stays, and the benefits were especially profound among ICU patients. In that critical care group, the four-oil lipid was associated with a 13-day reduction in average length of stay, while the incidence of [urinary tract infections](#) dropped from 20.9% to 6% in the unadjusted data.

When the data were adjusted for potential differences between the groups, the benefit of the new four-oil lipid was the same or even stronger. Adjusted data showed a 20% reduction in length of stay and a significant reduction in urinary tract infections among children in general pediatric hospital units and pediatric ICUs.

Other benefits included trends towards reduced 90-day re-admissions to the hospital in all hospitalized children and those in the ICU who received the new four-oil lipid with fish oil.

"These data help make clear the four-oil lipid with fish oil should be the first choice for parenteral nutrition in pediatric hospitals and, given similar findings in adults, all hospitals," Wischmeyer said.

He noted that many hospitals have not made the switch from the older soybean oil formulation because of cost; the four-oil [lipid](#) with fish oil is typically a few dollars more per bag or day.

"But cost-analyses have shown that it's actually far less expensive and saves cost for hospitals given the reduction in hospital length of stay and lower infection risk," Wischmeyer said.

"IV nutrition keeps kids alive, but it can also have risks, and now we can do something to make it safer and more beneficial for all our patients," Wischmeyer said. "If there's a way to reduce risks and improve outcomes, we should do it."

More information: Krista L. Haines et al, Change to Mixed-Lipid Emulsion From Soybean Oil–Based Lipid Emulsion in Pediatric Patients, *JAMA Network Open* (2023). [DOI: 10.1001/jamanetworkopen.2023.32389](https://doi.org/10.1001/jamanetworkopen.2023.32389)

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