

Improving Pediatric Intestinal Failure Outcomes through Remote Patient Monitoring

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Introduction: Medically complex patients with Intestinal Failure (IF) require close monitoring to maintain adequate growth and hydration while promoting parenteral nutrition (PN) support reduction and bowel adaptation. Remote patient monitoring (RPM) has been shown to be safe and feasible for a variety of chronic medical conditions. However, the application of RPM to pediatric IF patients has yet to be explored. We present our pilot experience with RPM technology, which has shown the potential to improve patient management and outcomes by expediting PN support reduction.

Methods: Beginning March 2021, patients ≤ 3 years old with IF and PN dependence treated at Cincinnati Children's Hospital were enrolled in RPM upon hospital discharge. One patient who met criteria for PN dependence was later included (age 16 years). Patient-generated health data was collected and reviewed in real time with the care team referencing metrics gathered through RPM to advise treatment plans. Patient demographics and PN support values- volume (mL/kg/day) and calories (kcal/kg/day)- were collected via retrospective EMR review. Only outpatient data was used for analysis. We compared the rates of PN support reduction (change in PN volume or in PN calories over time) before RPM to rates during RPM for each patient and for the average of all patients.

Results: Thirty-one patients were enrolled and fourteen were excluded from analysis due to poor compliance or lack of sufficient RPM data. One patient successfully achieved complete PN independence with a PN support reduction rate over two times greater during RPM compared to before RPM enrollment. For all patients, the average percent reduction in PN volume/day before RPM was 11% compared to 21% during RPM. The average percent reduction in PN calories/day before RPM was 11% compared to 7% during RPM. Further, 41% of patients achieved a 20% reduction in volume of PN support over an average of 240 days during RPM compared to 35% over an average of 364 days before RPM. The percent of patients achieving a 20% reduction in calories of PN support was the same before and during RPM (41%) however the average time to achieve this reduction was 276 days while enrolled in RPM compared to 536 days before RPM.

Conclusions: Although several factors contribute to PN support reduction, the implementation of RPM may contribute to faster PN reduction rates and more proactive treatment approaches. Prolonged PN dependence is implicated in IF-associated liver disease amongst other complications and leads to poor prognosis in IF patients. Therefore RPM may have a role in improving IF outcomes by reducing the amount of time patients receive high rates of PN support. This project is ongoing and with time we hope to further characterize the role of RPM in the pediatric IF population.

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