

# Reducing Custom TPN Orders Via Utilization of Evidence-Based Nutrition and Enteral Feeding Strategies in NICU Patients

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## Background

While customized total parenteral nutrition (TPN) is necessary in many neonatal clinical circumstances, premixed formulations are suitable, cost effective, and safe for many neonates needing short term intravenous nutrition. Currently, customized TPN is \$407 versus \$45 for standard premixed TPN with cost projections predicted to increase. TPN can often be avoided in certain populations if enteral nutrition is started sooner. This project's global aim was to standardize the ordering criteria of custom mixed TPN via evidence based enteral feeding strategies. This project's smart aim was to achieve higher enteral feeding volumes in infant's <1500 grams and to improve the reliability of ordering < 18 custom TPN orders per day.

## AIM Statement

**Global AIM:** To standardize parenteral and enteral feeding practices that optimize feeding strategies for growth and minimize utilization of central lines, reduce NICU length of stay (LOS), improve outcomes, increase efficiency, reduce costs, and elevate safety for neonates.

**SMART AIM:** To achieve goal enteral feeding volume of 130 mL/kg/day within 11.68 days from first feeding advance (a 10% reduction) in 80% of infants of birthweight < 1500 grams requiring nasogastric or orogastric feeds by October 2020. We also wanted to improve the reliability of ordering ≤ 18 custom TPN orders per day from a mean 62% of days monthly to 80% of days monthly and sustain that performance for at least 3 months consecutively by October 2021.

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## Methodology

The Model for Improvement and rapid plan, do, study, act (PDSA) cycles were used for this project. Through these techniques and team-based interventions, we aimed to affect positive change in the care provided to our patients with parenteral and enteral feeding.

## Team Members

- William Minor, MHA
- Julie Gooding, MD
- Suzanne Smith, MS, RD, LDN, IBCLC
- Gail Harris, DNP, NNP-BC
- Jenna Anderson, BSN, RNC-NIC
- Jennifer Barnes, PharmD
- Karen Lessaris, MD
- James Jones, DO
- Jodi Amador, DNP, NNP-BC
- Alexandria Cremeans, MD
- Lisa Clevenger, NNP
- Matthew Saxonhouse, MD
- Eugenia Pallotto, MD

## Measures

**Outcome measures:** Achieve goal enteral feeding volume of 130 mL/kg/day within 11.68 days from first feeding advance (a 10% reduction) in 80% of infants of birthweight < 1500 grams requiring nasogastric or orogastric feeds by October 2020.

Reduce NICU Average Length of Stay by 10%

Reduce Central Line days by 10%.

**Process measure:** Reliably order ≤ 18 custom TPN orders per day from a mean 62% of days monthly to 80% of days monthly and sustain that performance for at least 3 months consecutively by October 2021.

**Inclusion criteria:** For the 2020 AIM of improving time to goal feeds, we included neonates < 1500 grams, with requirements for enteral feeding. For the 2021 AIM of reducing customized TPN orders we included all inborn infants of all birthweights, gestational ages, and clinical conditions.

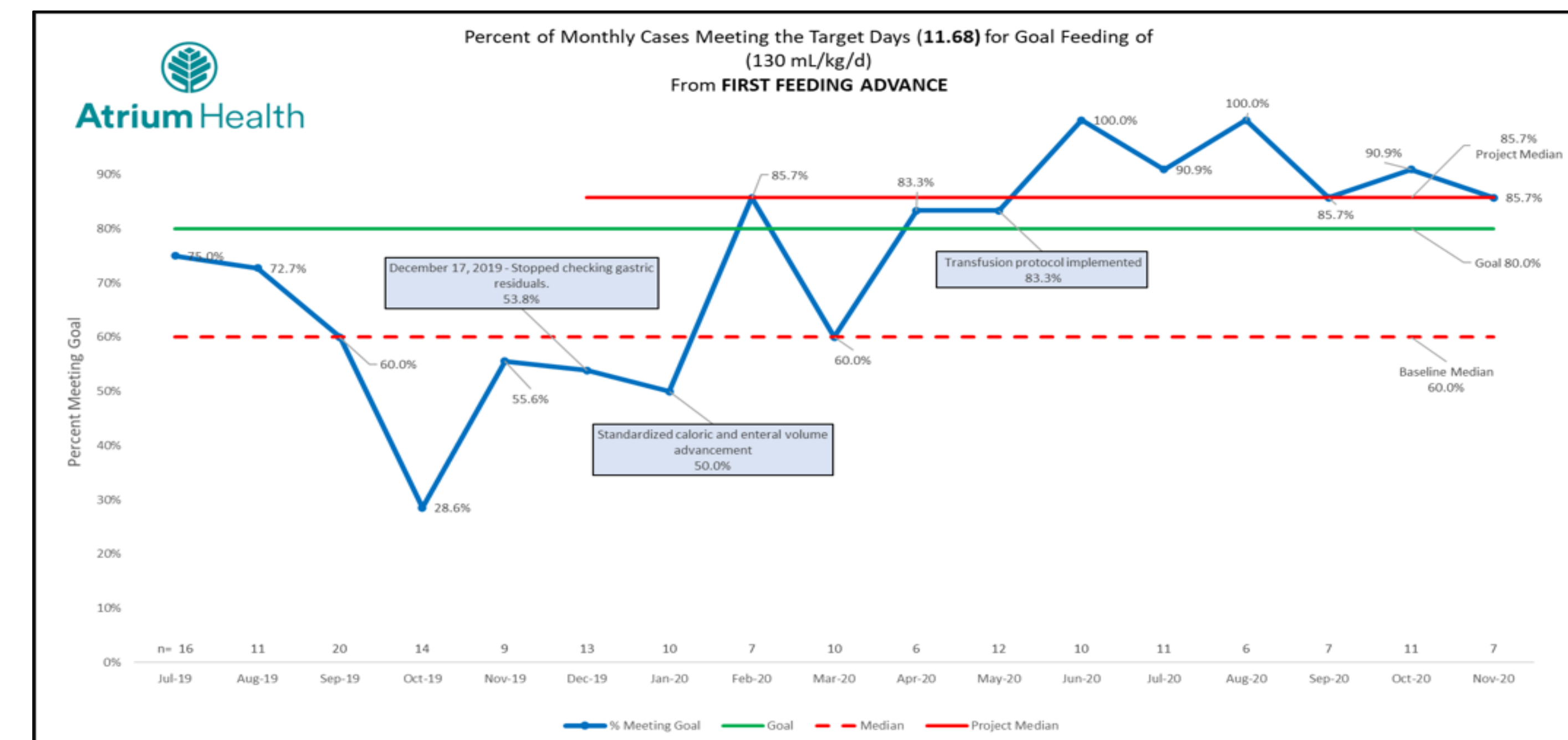
**Exclusion criteria:** For the 2020 AIM, we excluded outborn infants whose feeds were initiated prior to admission. We excluded infants with genetic syndromes, cardiac defects, congenital anomalies, and severe clinical illness that inhibits successful feeding advancement. For the 2021 custom TPN order and feeding strategy AIM we only excluded outborn infants.

**Balancing Measure:** Reduce or maintain incidence of NEC

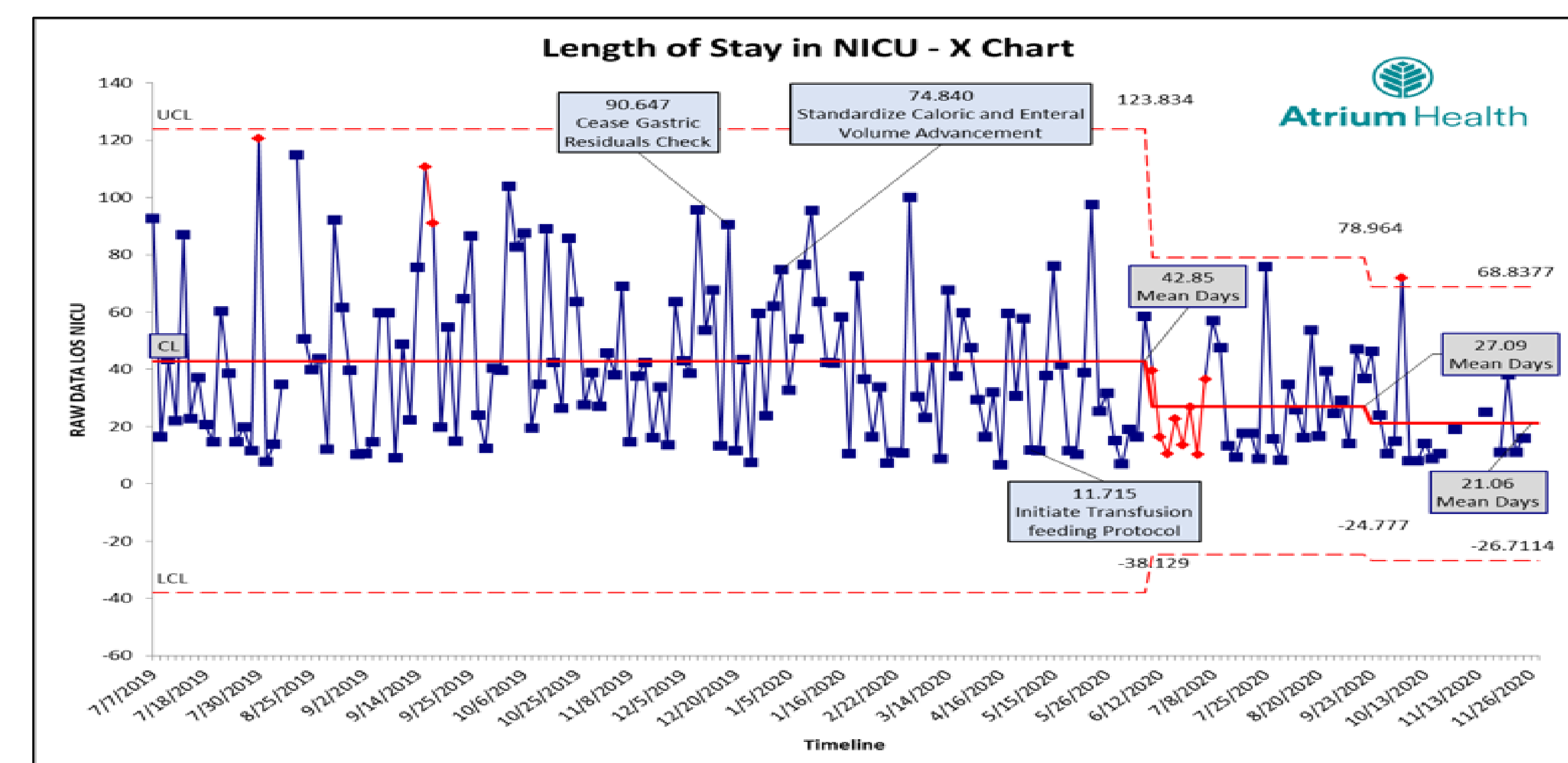
## Changes Tested and Implemented

- December 2019 - Nursing staff instructed to no longer check gastric residuals of patients. Instead, they will measure abdominal girth to assess for feeding intolerance until full feeds achieved.
- December 2019 - Protocol flowchart and posters distributed
- May 2020 - Standardized cessation and readvancement of enteral feeds during blood transfusion
- November 2020 – Premixed parenteral nutrition solutions available; customized TPN for infants <2000g and/or infants with clinical conditions warranting customized TPN
- January 2021 - Standardized caloric and enteral volume advancement with providers; expand donor milk criteria to infants ≤2000g. Adjustments were made to guidelines throughout the project timeline.

## Quantifiable Results

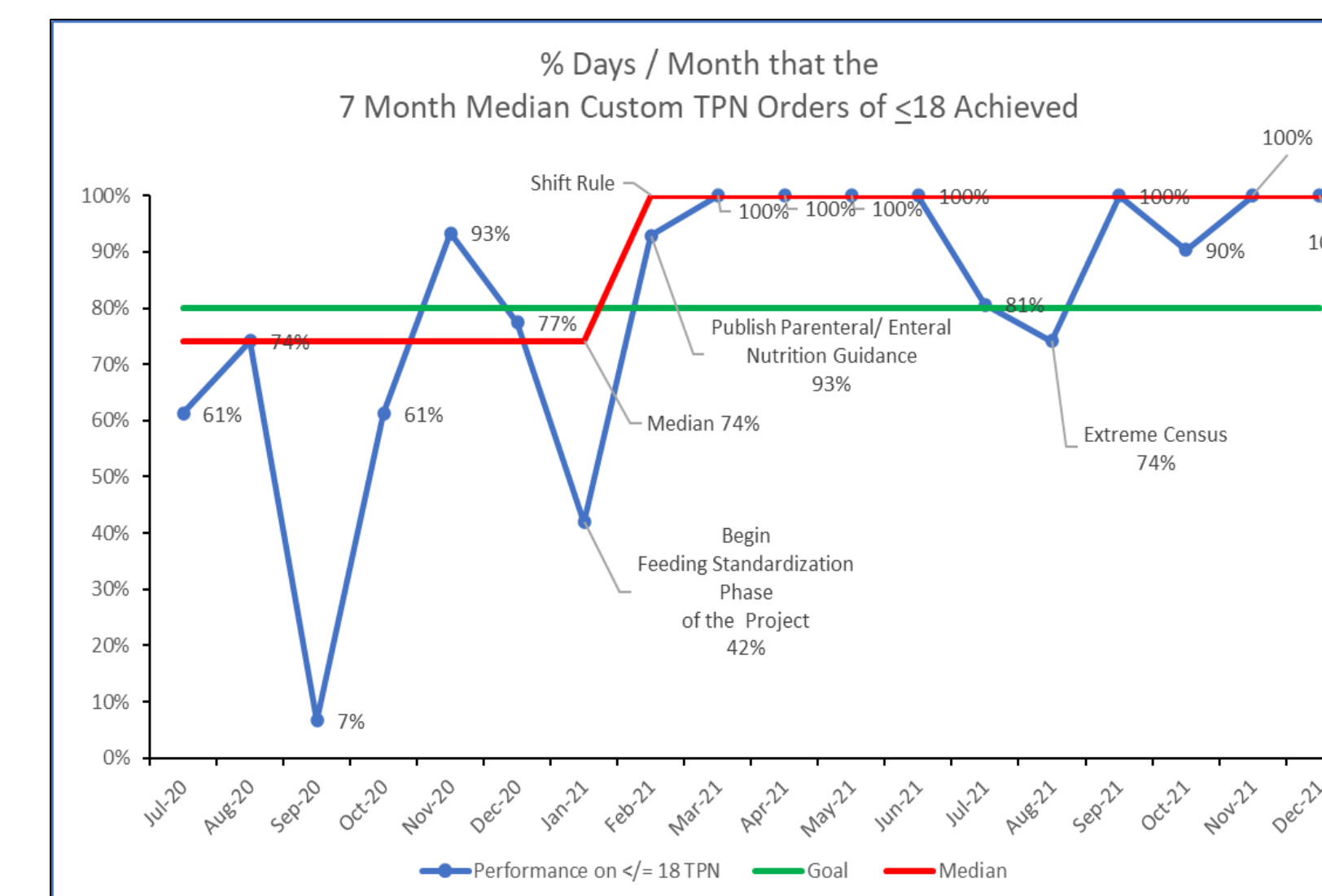


**Figure 1:** Run Chart Signal of change shows new median of 85.7% of neonates reaching goal enteral feeds in 11.68 days

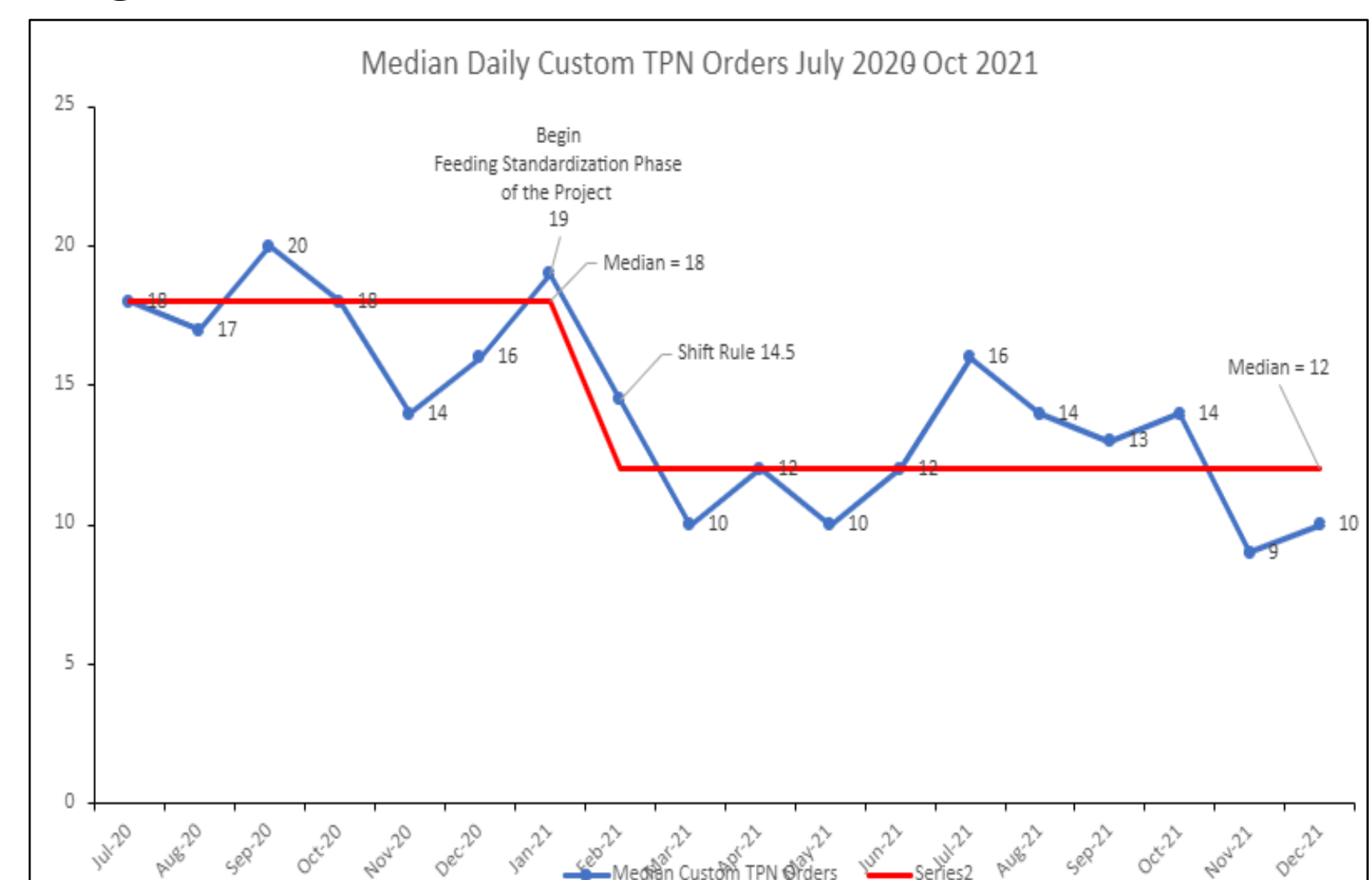


**Figure 2:** Control Chart looking at length of stay in the NICU. LOS was decreased by 43% after implementation of new transfusion protocol.

**Figure 3:**



**Figure 4:**



**Figure 3:** Run chart looking at the percent of days per month in which ≤18 custom TPN orders occurred

**Figure 4:** Run chart showing daily custom TPN orders showing a 33% reduction

- Feeding goal: 130 mLs/kg/day <11.68 days achieved and sustained >80% of the time
- Target population ICU Average Length of Stay decreased by 19 days or 43%
- Central Line days decreased from 14.6 to 9.9 days, 32% reduction
- Improved reliability of ordering ≤ 18 custom TPN orders per day on >80% of the days each and sustained for 6 months consecutively, exceeding goal
- 33% reduction in mean daily custom TPN orders achieved
- No increase in NEC rates were noted

## Conclusions

The discontinuation of checking gastric residuals, standardizing caloric and enteral volume advancement, and initiating a new blood transfusion enteral feeding protocol, resulted in decreasing time to reach enteral feeding goals, decreased LOS, and decreased central line days in neonates with birthweight < 1500 grams. Sustaining reduction in custom TPN orders will result in an annual savings of approximately \$628,992/year without detrimental impact on patient care.

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