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# Improving Nutritional Delivery to Pediatric Patients on Continuous Renal Replacement Therapy

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# Improving Nutritional Delivery to Pediatric Patients While Using Continuous Renal Replacement Therapy

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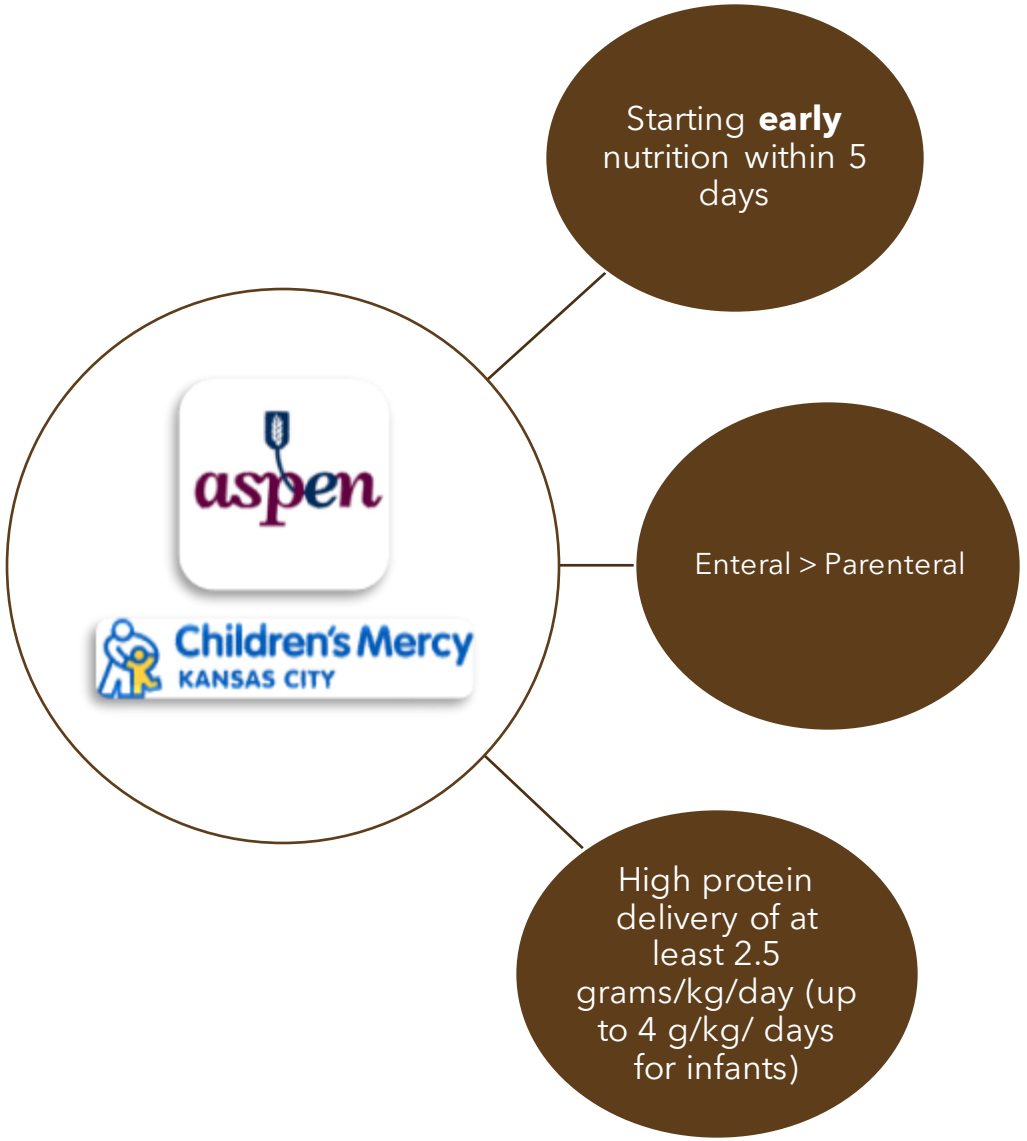
# Background

Children with acute and chronic renal failure face high rates of malnutrition with a higher deficit of protein intake when compared to caloric intake due to increased fasting rates while on therapy.

Use of CRRT is associated with increased risk of malnutrition by removal of essential proteins and micronutrients.

Malnutrition in critically ill children

- ↑ ICU stay
- ↑ Ventilation days
- Mortality




Et al. Kyle, 2013 highlighted

Examination of nutrition delivery in CRRT patients at CMH in 2021 revealed **sub-optimal adherence to the guidelines**

# Baseline Data

**Baseline Patient Data (year 2021)**

All CRRT ≥ 5d 2021 (n = 18)

Parenteral Nutrition (PN) (n = 2), Enteral Nutrition (EN) (n = 2), PN + EN (n = 14)

**72%** (13/18) received 75% goal **protein** by day 5 of CRRT

**61%** (11/18) received 75% of goal **calories** by day 5 of CRRT

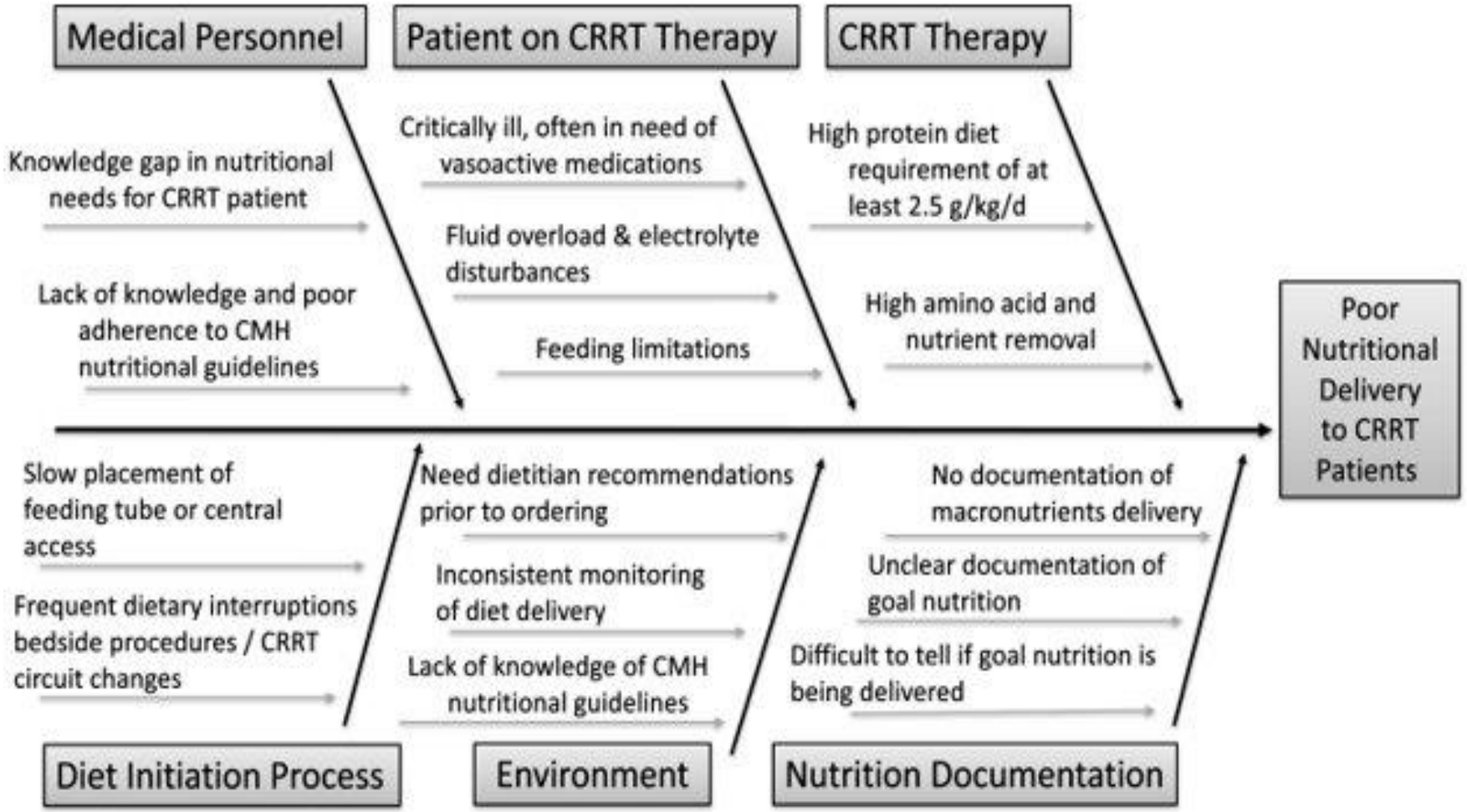
# Project Goals & SMART Aim

- The goal is to improve **early** nutrition by optimizing calories and protein delivered to CRRT patients in the first five days.

- **This QI project aims to increase the percentage of patients achieving 75% of their goal protein and caloric intake by day 5 of CRRT initiation by at least 15% by May 2024.**

Multidisciplinary Stakeholders: Dieticians, bedside nurses, CRRT specific nurses, nephrologists and intensivists

- **Biggest areas of opportunity:**
  - Lack of knowledge about nutritional guidelines for CRRT patients.
  - Difficulty understanding if goal nutrition is ordered and delivered to the CRRT patient by the clinical team.



# Interventions

**Intervention #1:**

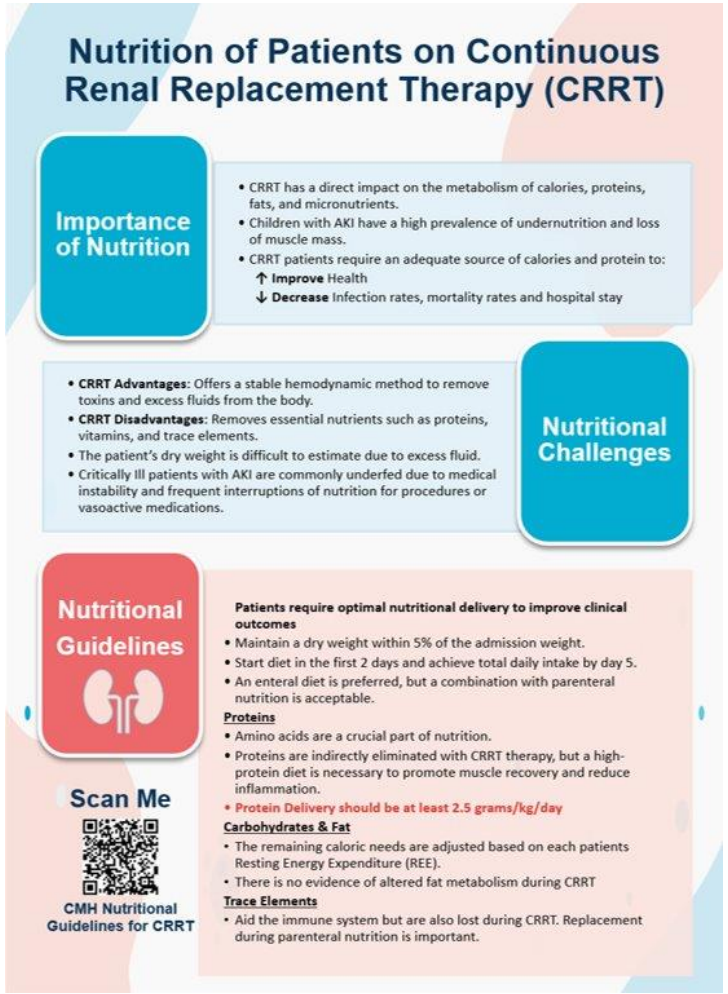
Education and Implementation of CRRT Nutrition Checklist

**Intervention #2:**

Implementation of new EMR documentation note completed by dietitian "CRRT Nutrition Summary"

# 1st Intervention

## Education and Implementation of CRRT Nutrition Checklist




Printed Educational Material

# 2nd Intervention

## New EMR documentation "CRRT Nutrition Summary"

### Nutritional Goal

- Total Caloric Goal Needs (Kcal/kg/d)
- Total Proteins Goal Needs (g/kg/d)

### Nutrition Ordered

- Total, Enteral and Parenteral Ordered Protein (g/kg/d)
- Total, Enteral and Parenteral Ordered Calories (Kcal/kg/d)

### Nutritional Delivery

- Protein Delivered
  Enteral, Parenteral & Total (g/kg/d)
- Calories Delivered
  Enteral, Parenteral & Total (Kcal/kg/d)
- Percentage of Protein Goal Delivered
  (Daily Protein Intake /Goal Protein) %
- Percentage of Caloric Goal Delivered
  (Daily Caloric Intake /Goal Calories) %

# Measures

- **Outcome:**
  - Percentage of goal protein and calories delivered withing day 5 of CRRT initiation

- **Process:**
  - Percentage completion of the Nutrition Checklist for CRRT Initiation
  - Percentage completion of the CRRT Nutrition Summary Note as documented in the EMR

- **Balancing:**
  - GI complications, Feeding Intolerance (i.e. Necrotizing enterocolitis or significant ileus requiring making the patient NPO).

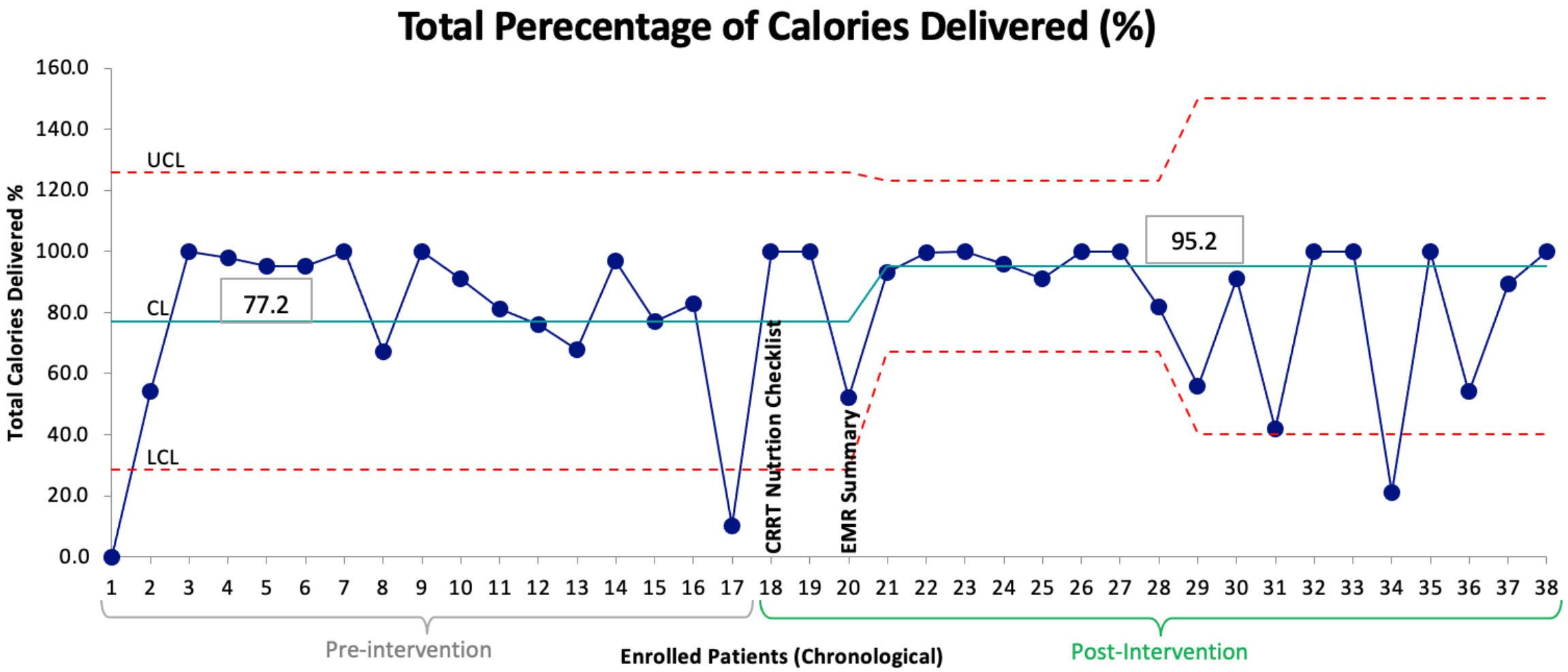
# Demographics

| Patient Population Characteristics | Pre-Implementation<br>January - December 2021 | Post-Implementation<br>October 2022–December 2023 |
|---|---|---|
| **Patients on CRRT therapy > 5 days, n** | 18 | 20 |
| **Mean age, years (± SD)** | 6.4 (± 6.8) | 5.2 (± 6.1) |
| **Female (%)** | 33 | 30 |
| **CRRT indication, n** | | |
| Acute Kidney Injury | 12 | 16 |
| Fluid overload | 3 | 10 |
| Metabolic, Genetic, Liver Failure | 3 | 6 |
| **Total days of CRRT, mean (± SD)** | 46 (± 76) | 30 (± 24) |
| **Feeding modality, n** | | |
| Parenteral (PN) only | 2 | 12 |
| Enteral (EN) Only | 2 | 3 |
| PN & EN | 14 | 5 |

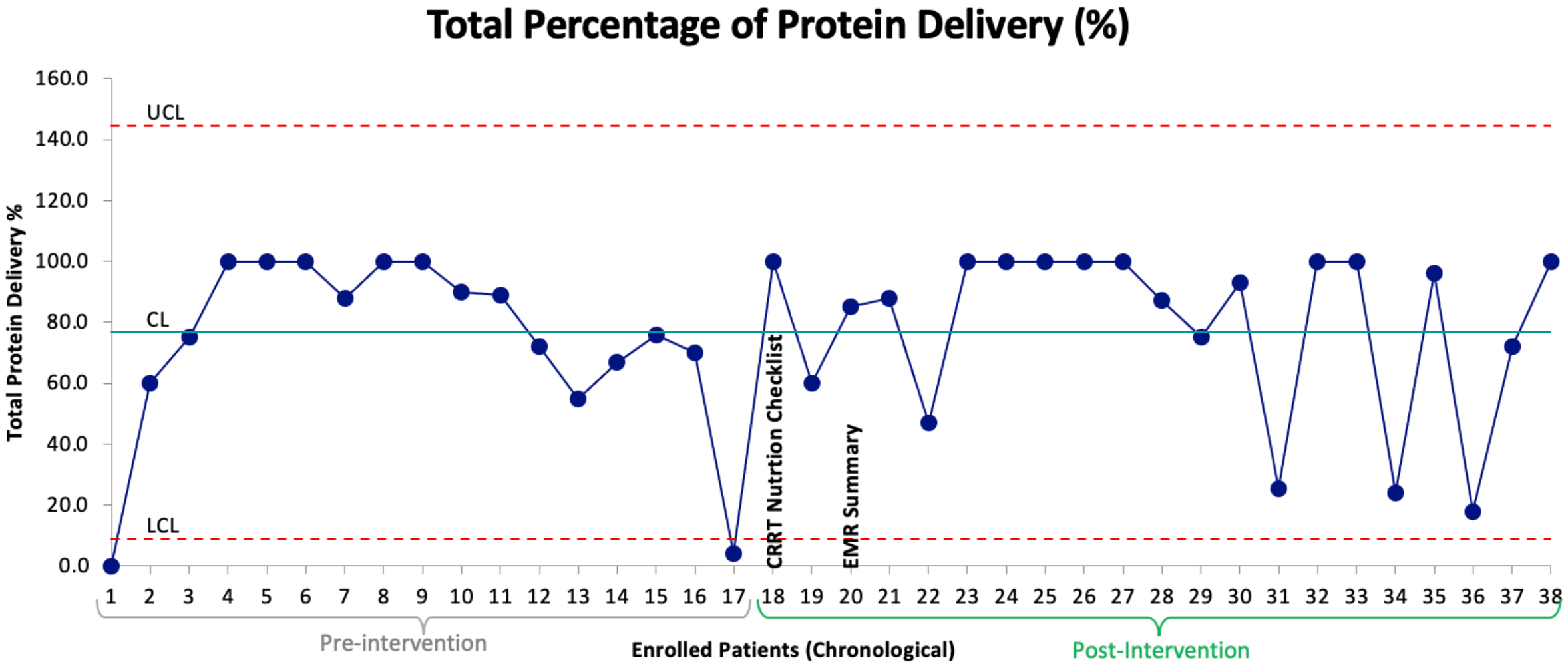
The post-intervention population is younger and has a prolonged median of ICU & hospital stay (45 days and 62 days, respectively).

- 95% of patients required mechanical ventilator support and 75% used vasoactive medications.
- 30% mortality
- 30% required ECMO support

# Results


Total Perecentage of Calories Delivered (%)
Total Calories Delivered %
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
UCL
CL
LCL
77.2
95.2
CRRT Nutrtion Checklist
EMR Summary
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Pre-intervention
Enrolled Patients (Chronological)
Post-Intervention

# Results


Total Percentage of Protein Delivery (%)
Total Protein Delivery %
160.0
140.0
120.0
100.0
80.0
60.0
40.0
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0.0
UCL
CL
LCL
CRRT Nutrtion Checklist
EMR Summary
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Pre-intervention
Enrolled Patients (Chronological)
Post-Intervention

# Process Measures Results

The CRRT Initiation Nutritional Checklist was completed 76% of time.

The CRRT EMR Nutrition Summary Documentation completed 100% of the time.

# Conclusion

- This project highlights the positive impact of multidisciplinary discussion and the active role of a dietitian in the ICU.
- **Caloric Delivery**: Significant center line shift from 77% to 95% for total caloric goal delivery.
  - This showcases the positive influence of a dietitian who fosters multidisciplinary dietary discussion by utilizing a CRRT initiation checklist. The EMR-specific documentation helps providers understand the actual nutritional delivery for quick interventions.
- **Protein Delivery**: No center line change for total protein goal delivery.
  - Common obstacles identified include heavy reliance on enteral nutrition and dependence on dextrose-containing fluids during up-titration of such.
- Increasing protein intake will be our focus for future interventions
  - Interruptions of Enteral and Parenteral nutrition for surgical interventions
  - Escalation of enteral nutrition with just dextrose-containing fluids

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# Thank you for your time!

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