

Measuring the Impact of Clinical Nutrition on High Risk Pregnancy

Partnership between Medical Associates, a multi-specialty provider in Iowa, Illinois, and Wisconsin, and Season Health, a leading clinical nutrition solution. March 4, 2024.

WHY CLINICAL NUTRITION?

Today, eight percent of pregnancies in the US are categorized as high-risk, with pregnancy complications increasing the average cost of delivery by 16 to 18%¹. Complications can include a stay in the NICU, which on average costs \$3,500 per day² with an average stay of 13 days³. Nutrition has been cited by the NIH as the main determinant of fetal development⁴, and malnutrition can lead to complications such as preeclampsia and preterm delivery that are associated with NICU stays. While the medical community supports improved nutrition to alleviate risk factors for patients with high-risk pregnancy, clinical research has historically been lacking and few robust programs exist to address the problem.

Given this disparity in outcomes and lack of dedicated research, Medical Associates and Season Health partnered together to measure the impact clinical nutrition has on patients with high-risk pregnancy.

STUDY GOALS

Medical Associates was interested in addressing the lack of research in clinical nutrition on pregnancy outcomes and in improving pregnancy outcomes for its patients. Therefore, Medical Associates structured a clinical study with its patients that were diagnosed with high-risk pregnancy (see page 3 for definition). Medical Associates selected Season Health as a partner for the study, to administer its clinical nutrition program and food-as-medicine platform to patients enrolled in the study.

Through this clinical study, Medical Associates and Season Health wanted to accomplish the following:

1. Contribute to historically understudied research measuring the impact that clinical nutrition has on outcomes for patients with high-risk pregnancy.
2. Measure the effectiveness of a clinical nutrition program through tracking targeted clinical outcomes for this population, including reduction in NICU admissions, tertiary referrals, and pre-term birth.
3. Demonstrate the positive impact of clinical nutrition on high-risk pregnancy outcomes, highlighting the potential for future programs and research.

STUDY OVERVIEW & STRUCTURE

The clinical study was conducted over a 1 year time period. Patients were enrolled in the study through provider referrals from Medical Associates and participated for 6–9 months, depending on the status of their pregnancy at the time of enrollment. Patients were enrolled into the study through provider referrals from Medical Associates.

Referred patients were stratified into two cohorts:

1. Intervention arm: Patients who were enrolled in the Season Health clinical nutrition program during their pregnancy
2. Control arm: Patients who did not use Season Health during their pregnancy.

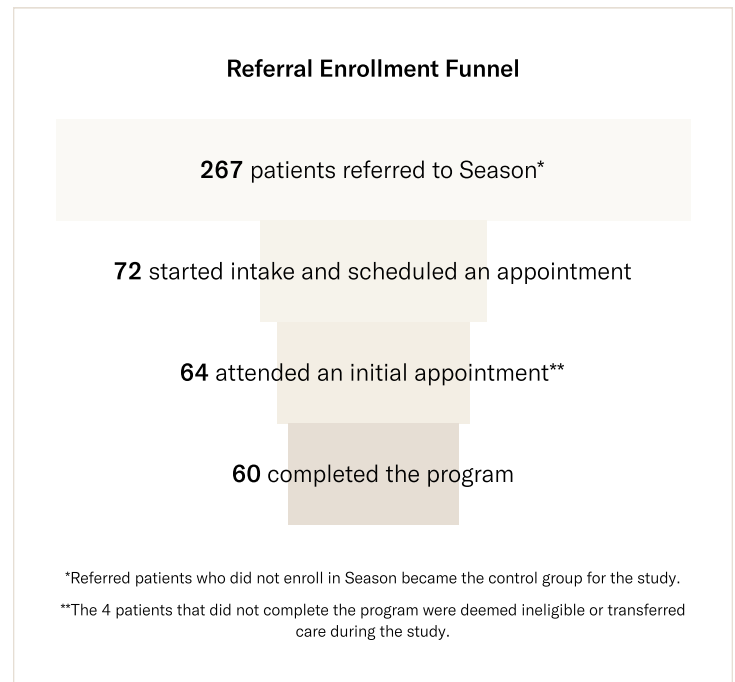
We provide study demographics and outcomes based on this stratification later in the report.

ENROLLMENT FUNNEL

Patients with high-risk pregnancy were referred to Season Health by Medical Associates providers.

Members that were part of the intervention group received full access to the Season Health platform, which included:

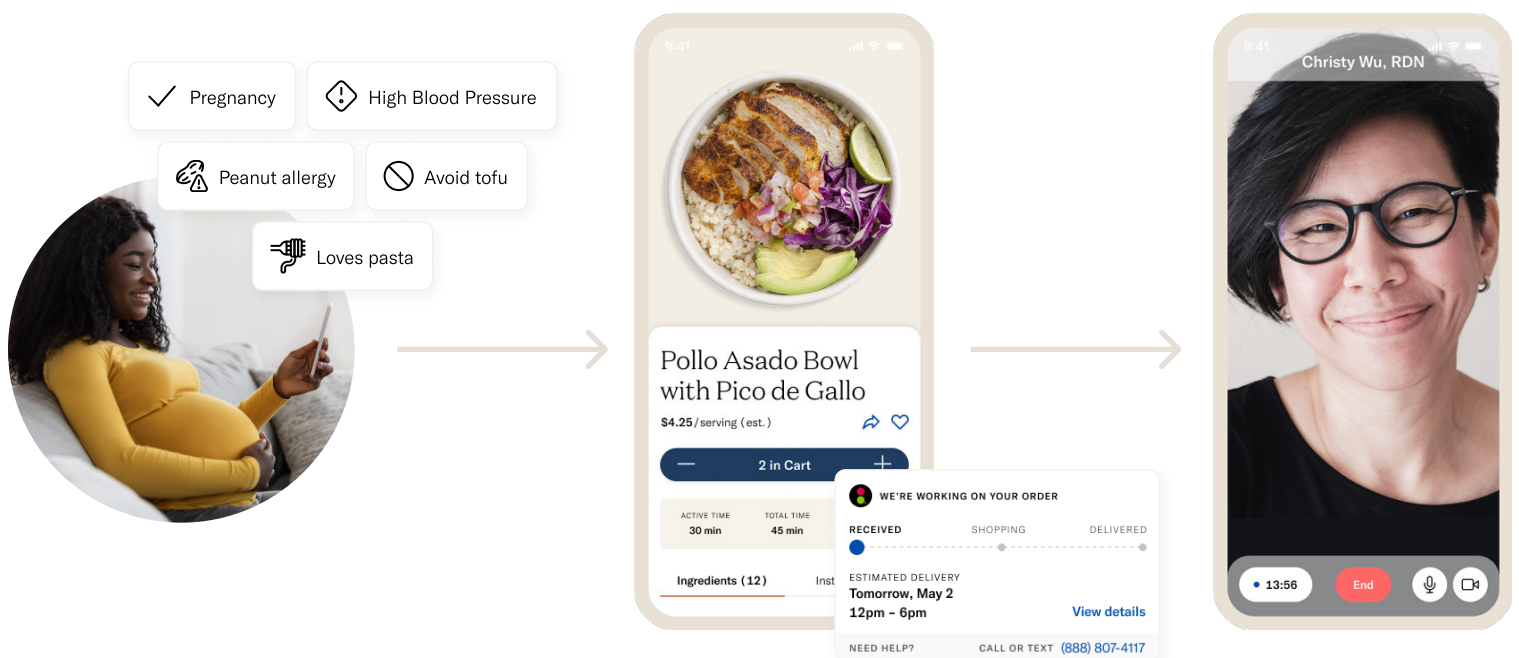
- Virtual visits and chat with a Registered Dietitian
- Access to the Season Market, a curated network of grocery & pre-made meal partners
- Monthly food subsidy to spend on medically tailored meals and groceries



PATIENT JOURNEY

Season takes a comprehensive approach to serving patients, ensuring that members get access to appropriate guidance from the support of a registered dietitian, while leveraging their existing food environment.

When Medical Associates patients onboarded to the Season platform, they completed a detailed questionnaire on their conditions, goals, and preferences which informs a personalized nutrition prescription. After onboarding, patients could choose from meals and groceries that fit their nutrition prescription. Adhering to the nutrition prescription was reinforced through regular visits and messaging with a personal registered dietitian to check in on progress and deliver guidance in order to achieve sustainable habits and results.



STUDY POPULATION

In order to be enrolled in the study, members had to have been diagnosed with high-risk pregnancy. For the purpose of the study, high-risk pregnancy was defined as having one or more of the following:

- Advanced maternal age (>= 35)
- History of prediabetes, diabetes, or gestational diabetes
- Current diagnosis of gestational diabetes
- History of high blood pressure, preeclampsia, or eclampsia
- BMI >= 30
- Current diagnosis of preeclampsia
- Previous delivery of a baby weighing less than 5 lb. 8 oz. or greater than 9 lbs.
- History of depression
- History of miscarriage or stillbirth
- History of preterm delivery
- Pregnant with multiples
- Identified as food insecure
- Have smoked cigarettes, or used electronic nicotine products in the last 2 years

DETAIL ON POPULATION DEMOGRAPHICS

Season collected demographic data at the onset of the study to ensure a similar patient mix between the Season group and the Control group. The distribution of age, race, and reason(s) for referral are comparable across the control and intervention groups, suggesting that any notable differences in patient outcomes are likely not associated with any of these characteristics.

Table 1. Demographic characteristics of Medical Associates patients stratified by patients who did and did not use the Season Health application during their pregnancy

Variable	Season (n=60)	Control (n=189)	p-value
Mean ± S.E. age, years	31.8 ± 0.52	31.0 ± 0.38	0.303
Race, no. (%)			0.505
Asian	1 (2)	1 (1)	
Black	0 (0)	2 (1)	
White	59 (98)	179 (95)	
Other	0 (0)	3 (2)	
Not Specified	0 (0)	3 (2)	
Referring provider, no. (%)			0.566
Berger, Joseph	8 (13)	35 (19)	
Holste, Tara	13 (22)	30 (16)	
Kilburg, Jodi	16 (27)	44 (23)	
Kramer, Lisa	13 (22)	35 (19)	
O'Donnell, Erika	10 (17)	44 (23)	
Not Specified	0 (0)	1 (1)	
Reason for referral, no. (%)			
AMA	16 (27)	27 (14)	0.027
Anxiety/Depression (and/or history of)	17 (28)	70 (37)	0.218
BMI ≥ 30.0	30 (50)	111 (59)	0.235
Crohn's Disease	0 (0)	1 (1)	0.573
Gestational Diabetes (and/or history of)	6 (10)	14 (7)	0.520
History of Ectopic	0 (0)	6 (3)	0.162
History of HELLP Syndrome	1 (2)	1 (1)	0.390
History of Hypertension	6 (10)	11 (6)	0.263
History of Intrauterine growth restriction	1 (2)	0 (0)	0.075
History of Miscarriage	19 (32)	65 (34)	0.698
History of Postpartum Depression	0 (0)	4 (2)	0.256
History of Preeclampsia	4 (7)	12 (6)	0.933
History of Preterm Labor/Delivery	0 (0)	3 (2)	0.326
History of LGA	5 (8)	11 (6)	0.489
Twin Pregnancy	1 (2)	3 (2)	0.975
Type 1 Diabetes	0 (0)	2 (1)	0.424
Type 2 Diabetes	1 (2)	1 (1)	0.390

Notes: "Season" refers to the patients who used the Season Health application during their pregnancy; "Control" refers to the patients who did not use the Season Health application during their pregnancy; S.E. = standard error; no. = number; AMA = discharge against medical advice; BMI = Body Mass Index; HELLP = Hemolysis, Elevated Liver enzymes and Low Platelets; LGA = large for gestational age; patients may have reported multiple reasons for referral.

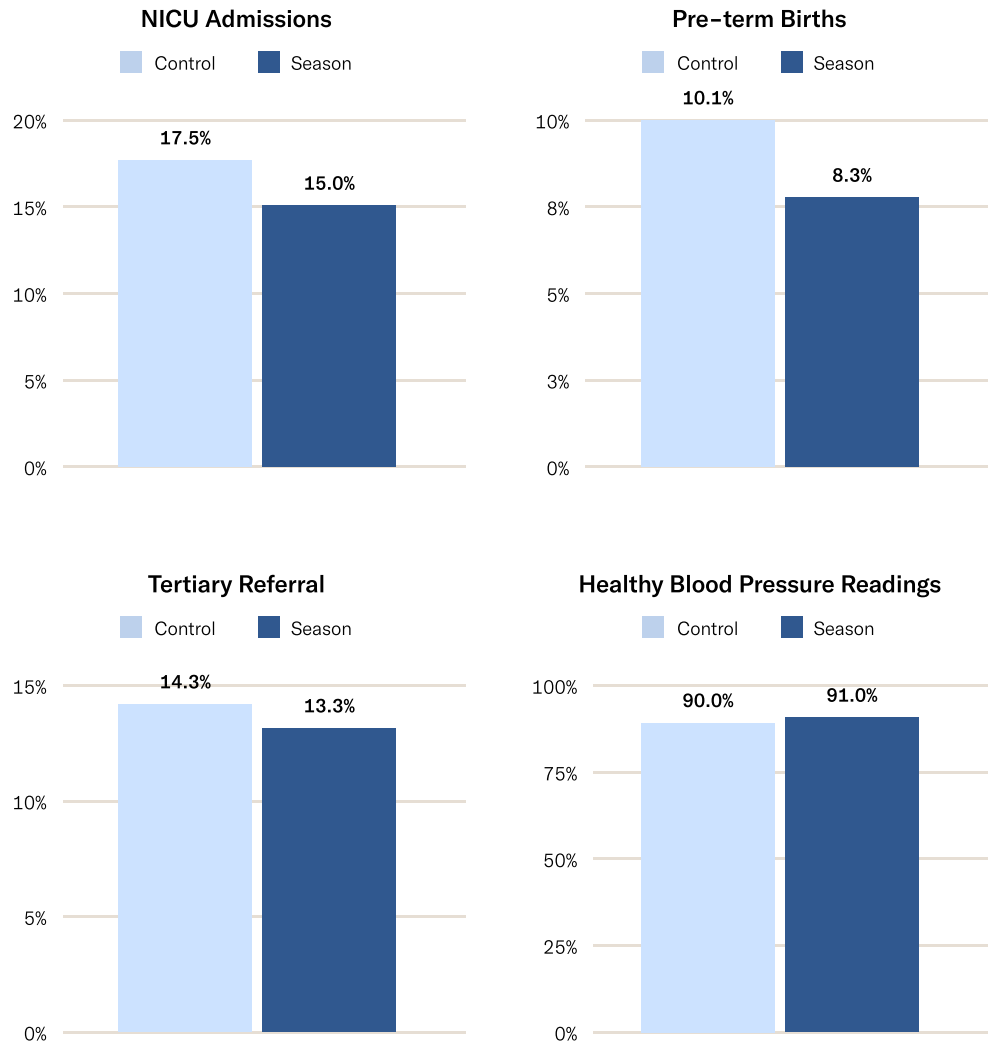
CLINICAL OUTCOMES

The clinical outcomes from this study were generated by analyzing each patient’s chart data and validated by Piedmont Research Strategies, a group of third-party statisticians.

The clinical metrics of interest for this study are directly or indirectly linked to pregnancy and childbirth complications:

- NICU admission
- Pre-term births
- Tertiary referrals
- Healthy blood pressure measurement

Outcomes indicate positive results across all metrics.



ECONOMIC IMPACT

Season utilized a third-party actuarial service, Accorded, to project cost savings for a look-alike population.

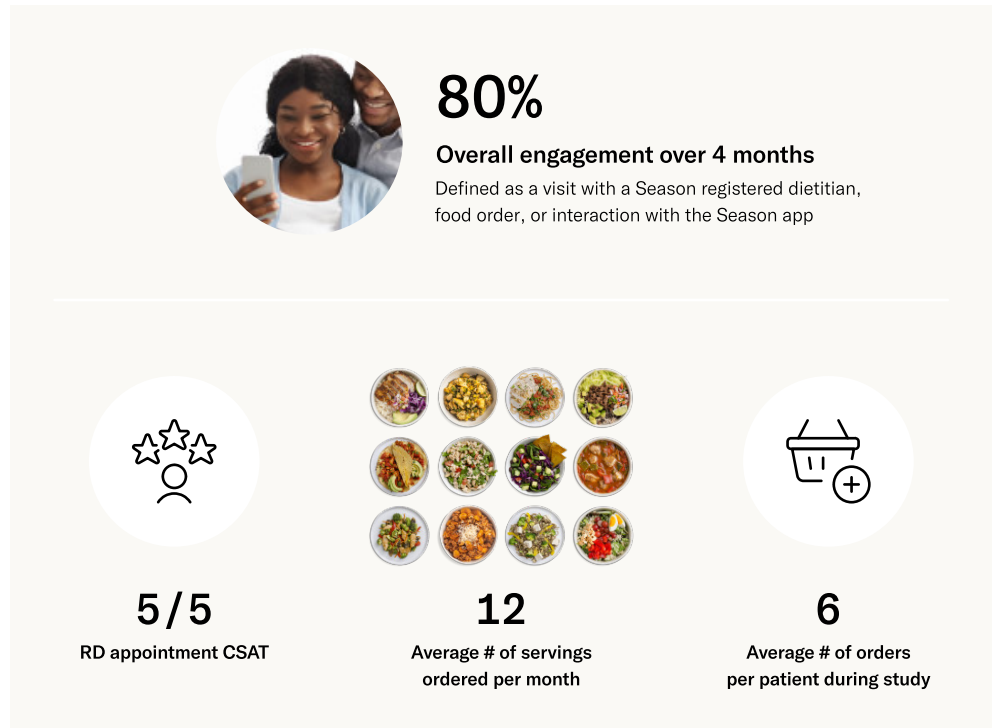
	Control	Season	Savings
NICU admission*	17.5%	15.0%	\$1723
Pre-term births*	10.1%	8.3%	\$1373
Tertiary referrals	14.3%	13.3%	- **

*There may be overlap in these populations and therefore some confounding in the sum of the savings per member.

**The price of childbirth varies across hospitals. According to the Health Care Cost Institute, across 17 metro areas, the price of childbirth at the most expensive hospital was over 5x the price of childbirth at the least expensive hospital.⁵ A reduction in tertiary referrals therefore is likely associated with additional cost savings.

STUDY ENGAGEMENT

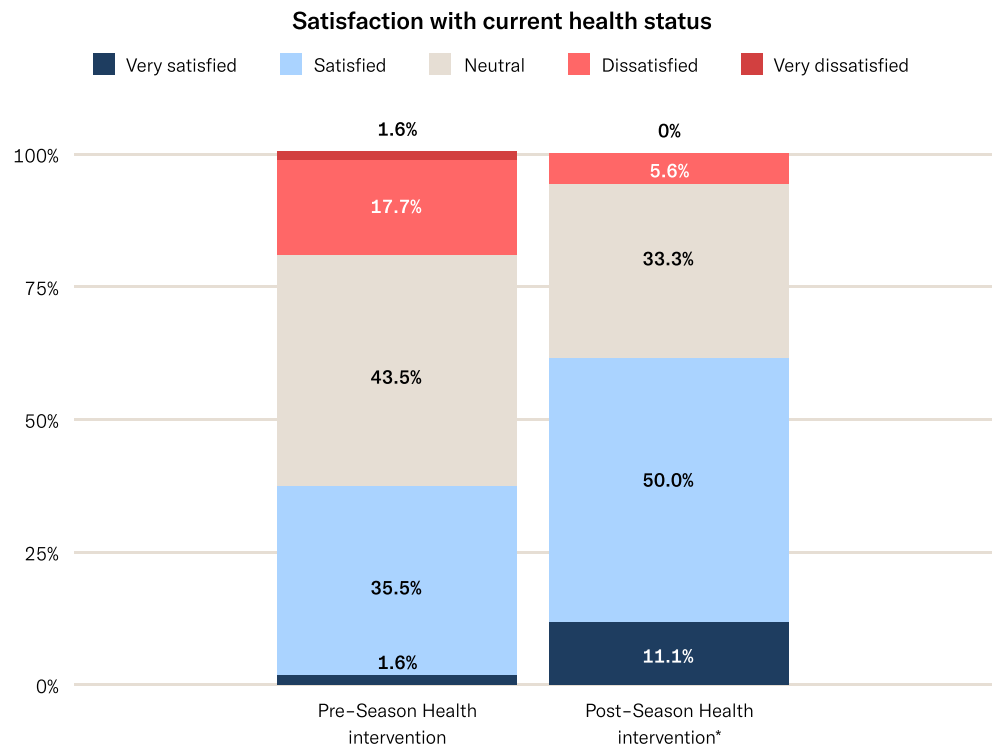
Season measured patient engagement over the course of the study. Season defines engagement as a visit with a registered dietitian, ordering food off of the Season platform, or leveraging the Season platform (e.g., completing an education module, messaging with a registered dietitian).



Members on Season were given a one-question Health Satisfaction survey before and after the intervention.

When asked, “How satisfied are you with your current health status?” **the number of members who reported they were ‘Satisfied’ or ‘Very Satisfied’ with their health increased by 65%.**

*Note: not all members responded to the survey question post-intervention.



CONCLUDING THOUGHTS AND OPPORTUNITIES FOR FUTURE RESEARCH

The results from this study indicate that a targeted clinical nutrition intervention improves outcomes for patients with high-risk pregnancy.

While this study was a positive first step forward in showcasing the impact of clinical nutrition on high-risk pregnancy, there were some limitations with study design. Future opportunities to expand upon current research and further study outcomes include:

- Marrying claims data with patient chart data – This study included members from across a number of health plans; Therefore, the estimated economic impact is not as robust as a single payer claims analysis.
- Expanding breadth of the clinical study – This study followed 60 patients with high-risk pregnancy. While clinically significant, expanding the size of the study population will demonstrate more statistically significant outcomes.

As pregnancy and childbirth complications continue to rise⁶, finding viable solutions to address challenges associated with high-risk pregnancies, including preeclampsia and gestational diabetes, is critical. Therefore, partnership between health plans, providers, and vendors in seeking out research opportunities is essential to generate sufficient evidence on improved outcomes. Medical Associates and Season Health are excited to have contributed to this momentum, and to see positive results.

About Medical Associates

Medical Associates is a multi-specialty provider practice that supports patients in Iowa, Illinois and Wisconsin. Additionally, Medical Associates offers health insurance as a health maintenance organization, covering 45k members.

Learn more at www.mahealthcare.com/

About Season Health

Season Health is the only integrated clinical nutrition solution that drives engagement, outcomes and cost of care reduction across populations powered by its food-as-medicine platform. With one of the largest networks of registered dietitians and curated food market of national and local grocery and meal vendors, Season empowers individuals and their families to make informed, sustainable choices, measurably improving both health outcomes and quality of life.

Learn more at www.seasonhealth.com

1. <https://www.forbes.com/health/womens-health/pregnancy/pregnancy-statistics/>

2. <https://www.google.com/url?q=https://journalofethics.ama-assn.org/article/cost-saving-tiniest-lives-nicus-versus-prevention/2008-10&sa=D&source=docs&ust=1702925049188530&usg=AOvVaw1hD4W9f7U9O3Ee6EK4BinM>

3. https://imh.oakbendmedcenter.org/wp-content/uploads/2018/05/nicu_summary_final.pdf

4. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6355947/#:~:text=Maternal%20nutrition%20is%20the%20main,%27%20nutritional%20status%20%5B3%5D.>

5. <https://healthcostinstitute.org/hcci-originals-dropdown/all-hcci-reports/childbirth-price-twice-as-high-in-the-same-hospital>

6. https://www.bcbs.com/the-health-of-america/reports/trends-in-pregnancy-and-childbirth-complications-in-the-us?utm_source=prnw&utm_medium=&utm_content=&utm_campaign=hoa_trends_preg_birth_complications2020&utm_term=#key-findings