QUALITY IMPROVEMENT ARTICLE

Three is Better Than Two: Dose-related Efficacy of Dextrose Gel for Neonatal Hypoglycemia in At-Risk Infants, a Quality Improvement Initiative

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OBJECTIVE: Using a quality improvement (QI) framework, we aimed to use dextrose gel (DG) to reduce admissions for neonatal hypoglycemia by 20% and IV dextrose fluid needs by 10% in at-risk infants.
METHODS: This is a prospective QI study using the Model for Improvement and planned sequential experimentation through three Plan-Do-Study-Act (PDSA) cycles: pathway creation, EMR implementation, and dose increase. Data were analyzed using Shewhart P-charts and chi-square tests.
RESULTS: Our interventions increased the percentage of at-risk infants with hypoglycemia who received DG from 67% to 98%. Implementing three doses of DG caused a special cause variation, reducing neonatal hypoglycemia admissions from 3.7% to 2.0% and IV dextrose fluid rates from 2.7% to 1.7% (46% and 37% reduction, respectively).
CONCLUSION: Three doses of dextrose gel administered to at-risk infants with neonatal hypoglycemia reduced the need for additional intervention, suggesting the dose-related efficacy of dextrose gel in mitigating the consequences of neonatal hypoglycemia.

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INTRODUCTION

Neonatal hypoglycemia is a frequent condition that affects up to 15% of all infants in the immediate postnatal period [1] and may be associated with neurological injury, developmental delays, and considerable costs to the healthcare system [2]. Infants at risk for early neonatal hypoglycemia include infants of diabetic mothers (IDM), infants large (LGA, >90th percentile) or small (SGA, <10th percentile) for gestational age, and late preterm infants (LPT, 35 to <37 weeks).

Neonatal hypoglycemia can present with identifiable symptoms or be asymptomatic and usually presents within the first 48 h of life. If not promptly addressed, neonatal hypoglycemia has harmful long-term consequences, including poor neurodevelopmental outcomes and learning disorders [3–6]. Studies suggest that even asymptomatic neonatal hypoglycemia is associated with neurodevelopmental impairment at 2–4 years, including increased risk of poor executive function, decreased visual motor function, and lower IQ scores [7–9].

The American Academy of Pediatrics (AAP) and the Pediatric Endocrine Society (PES) have published guidelines on the screening and management of asymptomatic neonatal hypoglycemia [2, 10–12]. The AAP recommends identifying all at-risk infants at birth and screening regularly in the first 48 h of life for low blood glucose levels [12]; intervention is recommended for glucose levels <25 mg/dL from birth to 4 h of life and < 35 mg/dL after the first 4 h of life [13]. When identified, neonatal hypoglycemia is traditionally treated with enteral feedings, increasing feeding frequency, formula supplementation, and intravenous dextrose fluids (IV dextrose). These traditional methods may be expensive, may interrupt breastfeeding efforts, lead to separation of the mother-infant dyad, increase the risks of complications (blood stream infections, thrombophlebitis), and are not gut-protective for the infant [2, 14–16].

Since the publication of the most recent 2012 AAP guidelines [11], research has demonstrated that 40% oral dextrose gel is a non-invasive and economical treatment that may reverse neonatal hypoglycemia in at-risk neonates [17, 18]. Dextrose gel is a concentrated simple carbohydrate in liquid form that can be directly administered to the buccal surface of the infant's mouth for rapid absorption [18]. Multiple studies demonstrate that dextrose gel is safe in newborn infants, decreases need for IV dextrose and reduces the separation of the mother-baby dyad by reducing higher acuity unit admission rates [19–25]. The use of dextrose gel has been demonstrated to be more effective than feeding alone in reversing neonatal hypoglycemia in at-risk infants [26].

Dextrose gel usage showed similar neurodevelopmental outcomes when compared to IV dextrose [27–29]. Additionally, long-term follow-up of infants receiving dextrose gel for neonatal hypoglycemia demonstrated no change in risk of neurosensory

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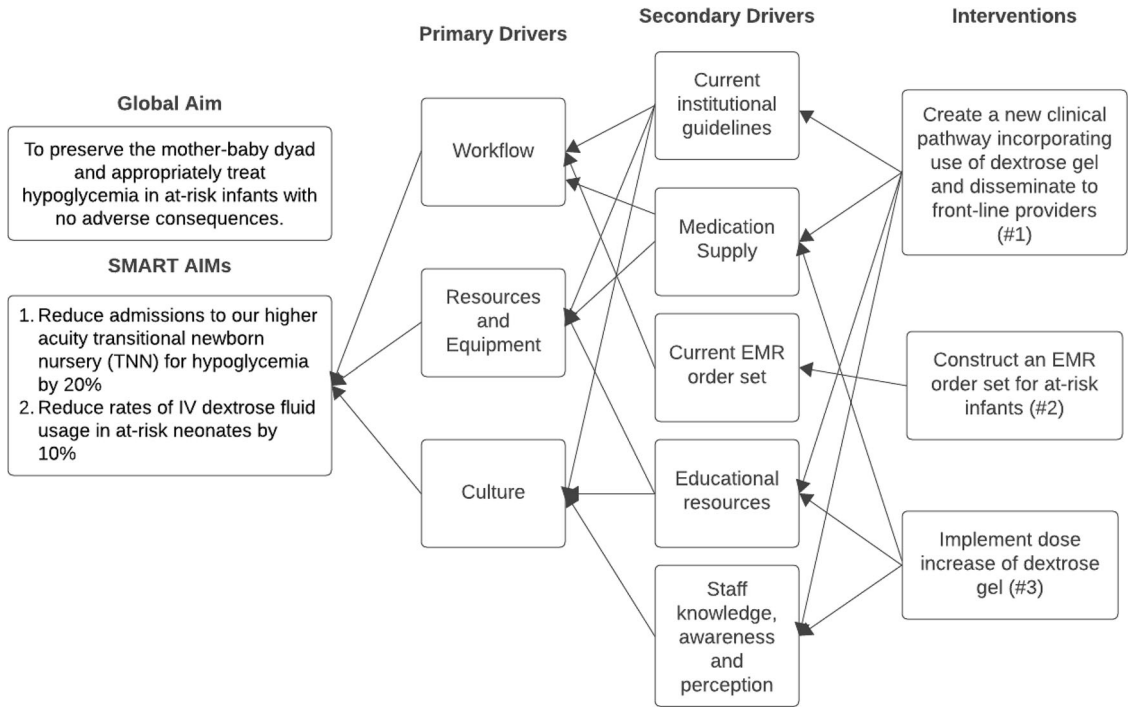

Fig. 1 Driver diagram for using 40% buccal dextrose gel to reduce high acuity Transitional Newborn Nursery (TNN) admissions and rates of IV dextrose usage in at-risk infants.

impairment [30] and no change in neurodevelopment or executive function [31] at 2 years old compared to placebo. However, prophylactic dextrose gel may be associated with lower Bayley-III composite scores for cognitive and motor function, likely due to prophylactic usage delaying hypoglycemia treatment [30, 32]. Furthermore, literature suggests that the same risk factors that increase the risk of neonatal hypoglycemia (such as being born SGA, LPT, LGA or IDM) may also increase the prevalence of developmental difficulties independent of hypoglycemia, likely due to the impacts of growth restriction or other perinatal insults [32]. While the usage of prophylactic dextrose gel requires further research, the efficacy and safety of dextrose gel for neonatal hypoglycemia is supported by multiple randomized trials and meta-analyses. Current investigations vary in the total number of dextrose gel doses given. Doses of dextrose gel range from two doses [23, 26, 33] to up to the six doses in 48 h given in the landmark Sugar Babies Study [17].

In 2021, our institution introduced the use of oral dextrose gel to our neonatal hypoglycemia clinical pathway for at-risk infants in our Well-Baby Nursery (WBN). Our primary SMART aims were (1) to reduce admissions to our higher acuity Transitional Newborn Nursery (TNN) for hypoglycemia by 20%, and (2) to decrease rates of IV dextrose usage in at-risk neonates by 10%.

METHODS

Setting

The Newborn Nursery Division at NewYork Presbyterian-Weill Cornell Hospital is located at an academic children's hospital in New York, New York, with over 7000 births a year. Over the past 4 years, due to the growth of the Maternal-Fetal Medicine Division, the number of yearly deliveries has increased to close to 9000 births. The division includes a WBN that cares for all healthy newborns and a higher acuity TNN that cares for infants who require additional medical care but do not meet neonatal ICU level care. Admission to the TNN is commonly due to IV dextrose or IV medication administration. Admitted infants require frequent vital sign monitoring by medical staff and separation from the mother. This QI initiative focused on at-risk infants admitted to the Newborn Nursery and TNN. At-risk infants included IDM, infants small (SGA) or large (LGA) for gestational age, and LPT born 35 to <37 weeks. We excluded all WBN infants with congenital anomalies, infants with intolerance of feeds, and infants transferred to the neonatal ICU for any reason (respiratory concerns, sepsis, neurological issues, anatomical anomalies, etc.).

Improvement team

We formed a multidisciplinary pediatric QI team in 2020 that included neonatologists, pediatric physician assistants, pediatric residents, quality and patient safety specialists, clinical pharmacists, registered nurses, and clinical nurse managers from the units affected (Labor & Delivery (L&D), WBN, and TNN). Participation was voluntary and no funding was applied to the design and implementation of the program. We used the Model for Improvement to define study aims, design measures, and interventions. We tested interventions via Plan, Do, Study, Act (PDSA) cycles. The multidisciplinary QI team created a key driver diagram (Fig. 1) as a visual tool representing our shared understanding of what must change, and which interventions may result in improved outcomes [34]. Our primary drivers included changes in workflow, environment, and culture; our secondary drivers included efforts to change current institutional guidelines, medication supply access, electronic medical record (EMR) access, improving educational resources, increasing staff education and awareness, and data monitoring (Fig. 1). The team met monthly to review dextrose gel data, monitor implementation issues, and to design and test interventions in each PDSA cycle.

Study of the interventions

Baseline (October 2020–September 2021). Our institution regularly screens at-risk infants for asymptomatic hypoglycemia using modified AAP guidelines from 2011 [11], requiring an intervention for blood glucose ≤40 mg/dL in the first 4 h of life and ≤45 mg/dL after 4 h of life [12]. The WBN, TNN, and L&D used mandatory online modules for neonatal hypoglycemia to standardize medical staff education: including topics such as timing of first feed, timing of glucose checks, and signs and symptoms of neonatal hypoglycemia. Nursing staff were taught to measure blood glucose levels for all at-risk infants by heel stick using a point of care (POC) glucometer (Roche Accu-check® Inform II System). All infants were fed within 1 h of birth, with the first glucose check within 30 min of the first feed. Prior to the QI initiative, our interventions for neonatal hypoglycemia included breastfeeding, formula supplementation, or IV dextrose for persistent hypoglycemia.

PDSA cycle 1: pathway creation with incorporation of dextrose gel (September 2021). During the first PDSA cycle, our multidisciplinary QI team developed a new neonatal hypoglycemia clinical pathway using up to two doses of dextrose gel in conjunction with an enteral feed as the primary treatment modality for our target population of at-risk infants (Supplementary Fig. 1). By changing institutional guidelines, developing educational resources, and creating a medication supply, the team established a new clinical workflow, adapted novel resources and publicized the knowledge needed to achieve our SMART aims (Fig. 1).

Nursing staff in L&D and the WBN were educated on the new clinical pathway, with a focus on dextrose gel administration. For blood glucose levels ≤40 in the first 4 h or ≤45 after the first 4 h, infants were treated with 40% dextrose gel. Our nursing staff accessed dextrose gel through the Pyxis™ dispensing cabinet when an order as written. We targeted a weight-based dextrose gel dose of 200 mg/kg (0.5 ml/kg, rounded to the nearest 0.2 ml). Infants were always fed after administration of dextrose gel with either breast milk or formula supplementation, with guidelines on volumes on quantifiable feeds. We obtained a repeat glucose level 30–60 min after providing dextrose gel with feeds to ensure resolution of hypoglycemia, with a target recovery blood glucose ≥40 in the first 4 h or ≥45 after the first 4 h.

In this cycle, we identified and trained QI champions (including nursing staff, neonatology fellows, pediatric residents, and pediatric physician assistants) to promote knowledge by developing original educational resources and to streamline workflow based on the newly developed institutional guidelines (Fig. 1). Pharmacy champions were engaged to ensure adequate supply of dextrose gel.

Prior to the initiation of dextrose gel at our institution, QI champions attended interdisciplinary huddles and daily unit and nursing huddles to educate staff on the new dextrose gel clinical pathway. QI champions distributed tip sheets and informational pamphlets and organized small group education and training sessions at hands-on skills fairs. In addition, our QI champions created an instructional video about dextrose gel, readily available via QR code, that was circulated among unit staff. Lastly, they attended regular data updates and improvement team meetings.

PDSA cycle 2: EMR order set implementation (June 2022). Feedback obtained by our multidisciplinary team of QI champions from involved provider and nursing staff from the L&D, WBN, and TNN units from September 2021 to June 2022 highlighted the safety of dextrose gel use given no adverse events, the successful education of involved staff, and the ease of dextrose gel administration. However, feedback also revealed the difficulty of nursing to obtain dextrose gel in a timely manner, including frequent overrides of the medication dispensing machine to obtain dextrose gel. In June 2022, our QI team implemented a new EMR order set for all at-risk infants addressing ease of obtaining the medication supply. The order set included criteria for when to administer dextrose gel, instructions on how to administer, the order for as needed (PRN) doses of dextrose gel, and an escalation pathway to inform providers of concerning blood glucose values. Nursing staff were thus able to give up to two doses of dextrose gel to all hypoglycemic at-risk infants without waiting for a real-time physician order and no longer needing to override the medication dispensing machine. No other changes to the dextrose gel clinical pathway were made.

PDSA cycle 3: dose increase of dextrose gels (September 2022). Upon review of data and feedback collected from September 2021 to September 2022 during the first year of dextrose gel implementation, the QI team revised the dextrose gel clinical pathway to accommodate a maximum of three doses of dextrose gel per infant as it was noted that there was not yet a decline in IV dextrose fluid usage or TNN admissions. The new algorithm was instituted in September 2022.

Methods of evaluation and data collection

We collected data through the EMR with the support of our institution's analytics and bioinformatics team. We collected infant characteristics including gestational age, mode of delivery, time of delivery, birth weight, and IDM status. We reviewed the EMR of at-risk infants who fit our study criteria for incidence of low blood glucose levels, administrations of dextrose gel, number of doses, and admission rates to the higher acuity unit TNN for IV dextrose. We collected baseline data including hypoglycemia rates, admission rates to the TNN for IV dextrose, breastfeeding (BF) rates from October 2020 to September 2021.

Measures

Process measures. We used the percentage of infants in our target population that received dextrose gel over the total target population as our process measure.

Outcome measures. We included the following outcome measures: (1) the number of admissions to our higher acuity TNN unit for hypoglycemia and (2) the number of at-risk infants requiring IV dextrose.

Balancing measures. We identified two balancing measures including exclusive BF rates and hospital length of stay (LOS).

Statistical analysis. We used Statistical Process Control (SPC) charts to analyze our process, outcome, and balancing measures. A center line (CL), upper control limits (UCL), and lower control limits (LCL) were calculated using QI Charts (licensed by Richard Scolville, Scolville Associated, 2009). We applied API rules to detect special cause variations. We used descriptive statistics and chi-square tests to analyze demographic data.

RESULTS

Clinical characteristics

Over the 3-year study period, 3241 at-risk infants above 35 weeks were identified and screened for hypoglycemia. Our baseline cohort (EPOCH I, $n = 925$ infants) and our interventional cohort (EPOCH II, $n = 2316$ infants) had similar percentages of LGA and LPT infants (Supplementary Fig. 2); our interventional cohort (EPOCH II) had more SGA and less IDM patients (Supplementary Fig. 2) compared to baseline cohort (EPOCH I). Similar C-section rates were observed in the baseline (EPOCH I, 40.2%, $n = 372$) and interventional (EPOCH II, 41.1%, $n = 953$) cohorts. Of all 3241 at-risk infants screened, 1314 (40.5%) were noted to have hypoglycemia. In the interventional cohort (EPOCH II), 874 infants received dextrose gel.

Process measures

We increased the number of at-risk infants who received dextrose gel from 67% to 98% (Fig. 2) following the introduction of a clinical pathway in September of 2021. We maintained these high rates with the introduction of a new EMR order set (June 2022) and with the addition the third dose of dextrose gel to the pathway (September 2022).

Outcome measures

Our QI study included a series of interventions including dextrose gel pathway creation, EMR order set optimization, and an increase in the maximum dose of dextrose gel to three doses. The final intervention to three maximum doses decreased the percent of at-risk infants admitted to our higher acuity unit, the TNN, from 3.7% to 2%, representing a 46% decrease in admissions secondary to hypoglycemia (Fig. 3).

We also noted a decrease in the percent of at-risk infants requiring IV dextrose from 2.7% to 1.7%, resulting in an overall 37% reduction of IV dextrose rates (Fig. 4). We noted the special cause variation only after the dextrose gel dose increased to three doses.

Balancing measures (see above)

LOS remained consistent throughout the course of the study period, with the CL close to 2.5 days (Fig. 5). We noted a change in our rates of exclusive breastfeeding over the course of the study period, with a decline in exclusive BF rates from 47% to 38% (Supplementary Fig. 3). The CL change occurred in February 2022 which was distinct from and did not correlate with any study intervention.

DISCUSSION

We successfully developed and implemented a new clinical pathway for neonatal hypoglycemia in at-risk infants that

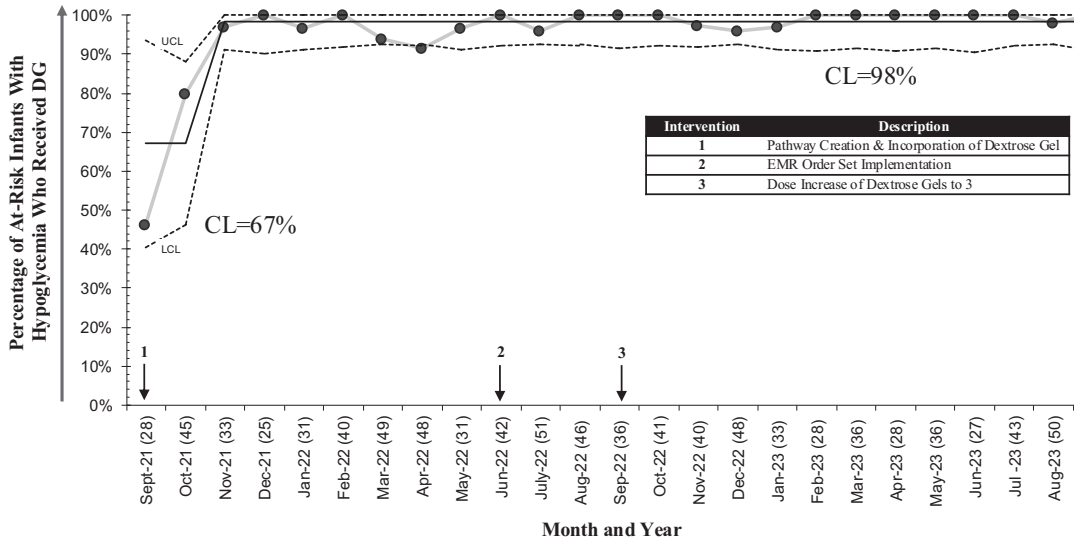

Fig. 2 At-risk infants with hypoglycemia: Shewhart P-chart showing percentage of at-risk infants who received dextrose gel (DG) from September 2021 to August 2023. CL: mean percentage. Dotted lines: control limits. UCL not shown when calculated > 100%. Number of monthly evaluations included on *x*-axis in parentheses. Annotated with specific PDSA cycles and associated interventions.

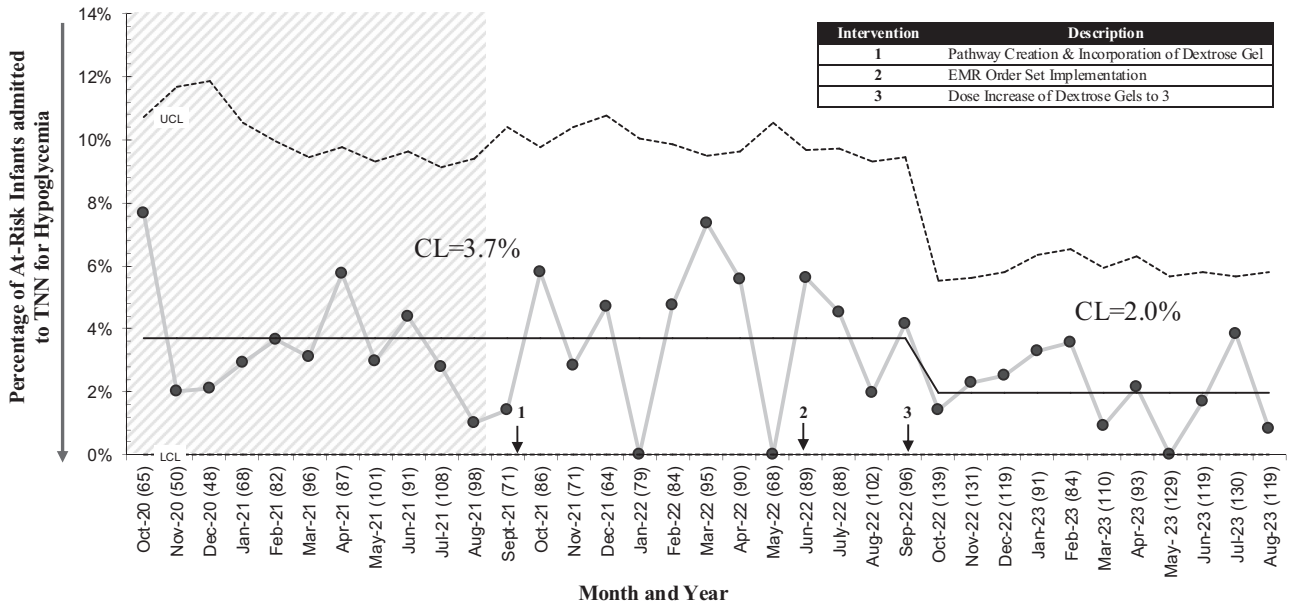

Fig. 3 At-risk infants admitted to the higher acuity Transitional Newborn Nursery (TNN) for hypoglycemia: Shewhart P-chart showing percentage of at-risk infants admitted to the TNN for hypoglycemia from October 2020 to August 2023. CL: mean percentage. Dotted lines: control limits. LCL not shown when calculated around 0%. Number of monthly evaluations included on x-axis in parentheses. Annotated with specific PDSA cycles and associated interventions.

incorporated the use of 40% buccal dextrose gel in conjunction with enteral feeding as a first-line treatment. The multidisciplinary collaboration that led to the development of the new pathway and the recruitment of QI champions allowed for rapid and effective implementation. In our QI study, administering a maximum of two doses of dextrose gel to infants did not yield any observable changes in outcome measures. However, increasing the dosage to a maximum of three doses (PDSA Cycle 3) resulted in a significant reduction in the total number of higher acuity admissions to the TNN for neonatal hypoglycemia and decreased the total number of at-risk infants admitted to the TNN. While the rate of TNN admissions for IV dextrose was low at baseline at our institution, our QI interventions demonstrated a further decrease in rates of IV dextrose with the addition of the third dose of dextrose gel (PDSA Cycle 3). Our results suggest the efficacy of dextrose gel in preventing hypoglycemia in at-risk neonates is dose-related, with the incremental maximum dose of three associated with a decreased need for further invasive interventions, such as IV dextrose or admission to a higher acuity TNN unit.

Previous literature has underscored the efficacy of 40% oral dextrose gel as a non-invasive, safe, and cost-effective intervention for reversing neonatal hypoglycemia in at-risk neonates, but has not assessed the utility of multiple doses of dextrose gel on neonatal hypoglycemia. Harris et al. [17] conducted a landmark randomized, double-blinded, placebo-controlled trial

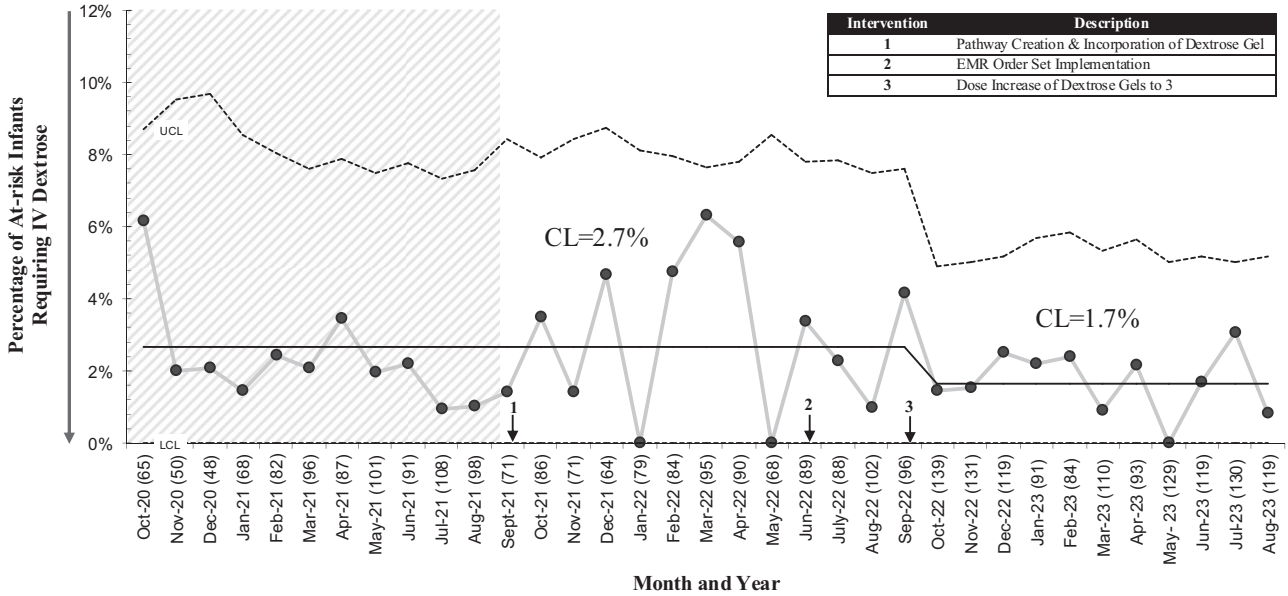

Fig. 4 At-risk infants requiring IV Dextrose. Shewhart P-chart showing percentage of at-risk infants requiring IV Dextrose from October 2020 to September 2023. CL: mean percentage. Dotted lines: control limits. LCL not shown when calculated around 0%. Number of monthly evaluations included on *x*-axis in parentheses. Annotated with specific PDSA cycles and associated interventions.

that established dextrose gel as a simple to administer, inexpensive treatment with no serious side effects that was more effective than feeding alone for the treatment of neonatal hypoglycemia. The study used up to six doses of dextrose gel [17]. A Cochrane 2016 systematic review [18] concluded that dextrose gel is a safe and effective treatment for neonatal hypoglycemia and decreased rates of IV dextrose, but similarly did not evaluate the dose-response of dextrose gel in preventing the need for further interventions. Gupta et al. [23] similarly demonstrated that dextrose gel reduces the need for IV dextrose and NICU admission, but did not delineate data based on number of dextrose gels received. Romald et al. [35] demonstrated in a single-center study that oral dextrose gel could stabilize infants and prevent NICU admission, and used up to three doses of dextrose gels. A recent dextrose gel QI initiative by Walravens et al. [24] determined that dextrose gel decreased the need for IV dextrose and used up to four doses. Thus, a wide range of number of dextrose gels have been published in the literature with limited analysis of the dose-responsive impact of dextrose gel on reducing an infant's need for further invasive interventions.

Previous studies have also investigated the appropriate milligram dose of dextrose gel. Hegarty et al. [36] did not notice a significant difference between 200 mg/kg and 400 mg/kg in reducing further need for interventions but did determine that dextrose gel decreased admission for hypoglycemia compared to placebo. Desai et al. [37] noted no difference between a weight-based dose and standard dosing of dextrose gel in reducing admission rates and need for IV dextrose. The dose of 200 mg/kg (0.5 ml/kg) dextrose gel has been frequently documented in the literature to be effective in treating neonatal hypoglycemia with no reported adverse effects [16, 34, 35]. This dose is equivalent to the same amount of dextrose given with a 10% dextrose IV fluid bolus of 2 ml/kg. Consistent with prior studies, we adopted the standard dose of 200 mg/kg (0.5 ml/kg) of dextrose gel for each dose given. Similarly, there is limited data on the cumulative pharmacological effect of multiple doses of dextrose gel. In a cohort analysis, Harris et al. [38] demonstrated that infants who received additional doses of dextrose gel experienced a similar change in blood glucose concentration between one and two doses of dextrose gel. As observed in our study, multiple doses over time significantly changed need for further interventions for neonatal hypoglycemia compared to one or two doses of dextrose gel.

Our QI study uniquely trended changes in rates of TNN admission and need for IV dextrose over incremental dose increases of dextrose gel. With a large sample size and data collected over 3 years and three PDSA cycles, our study used SPC charts to display process, outcome, and balancing measures and to identify special cause variation over time. Monitoring these measures on a regular basis with a multidisciplinary QI team helped inform which interventions had the desired impact over time (Fig. 1). We postulate that the quick adaptation of the dextrose gel in our unit (Fig. 2) was made possible by the development of a multidisciplinary QI team, the ease of following the clinical pathway, and the effective education of unit staff through the recruitment and training of QI champions. Our subsequent outcome findings of the dose-dependent changes of dextrose gel are novel but also indicate sustained implementation and education over a period of 3 years. Our data identifies more at-risk infants in the latter half of the study, likely reflecting the overall increase in the number of deliveries and patient census in our hospital.

Our balancing measures of LOS and exclusive BF rates support ongoing evidence that dextrose gel is a safe and non-invasive treatment option for neonatal hypoglycemia in at-risk infants. Our LOS remained stable over the period of 3 years during all interventions (Fig. 5). Our exclusive BF rates had a CL decrease (Supplementary Fig. 3) that did not correlate with any of our study interventions and could reflect unit lactation staffing changes.

We further investigated whether an infant's risk factor (SGA, LGA, LPT or IDM) impacted need for additional doses of dextrose gel (Supplementary Fig. 4). We noted that LPT infants are more likely to require a third dose of dextrose gel before resolution of hypoglycemia, while SGA, LGA and IDM infants had similar rates of requiring a third dose of dextrose gel. Our percentage of LPT infants are similar pre-QI (EPOCH I) and post-QI (EPOCH II). While the longer duration of hypoglycemia monitoring for LPT infants could contribute to this difference (24 h for LPT and SGA infants, 12 h for LGA and IDM infants per institutional policy), LPT and SGA infants were monitored for the same amount of time, suggesting

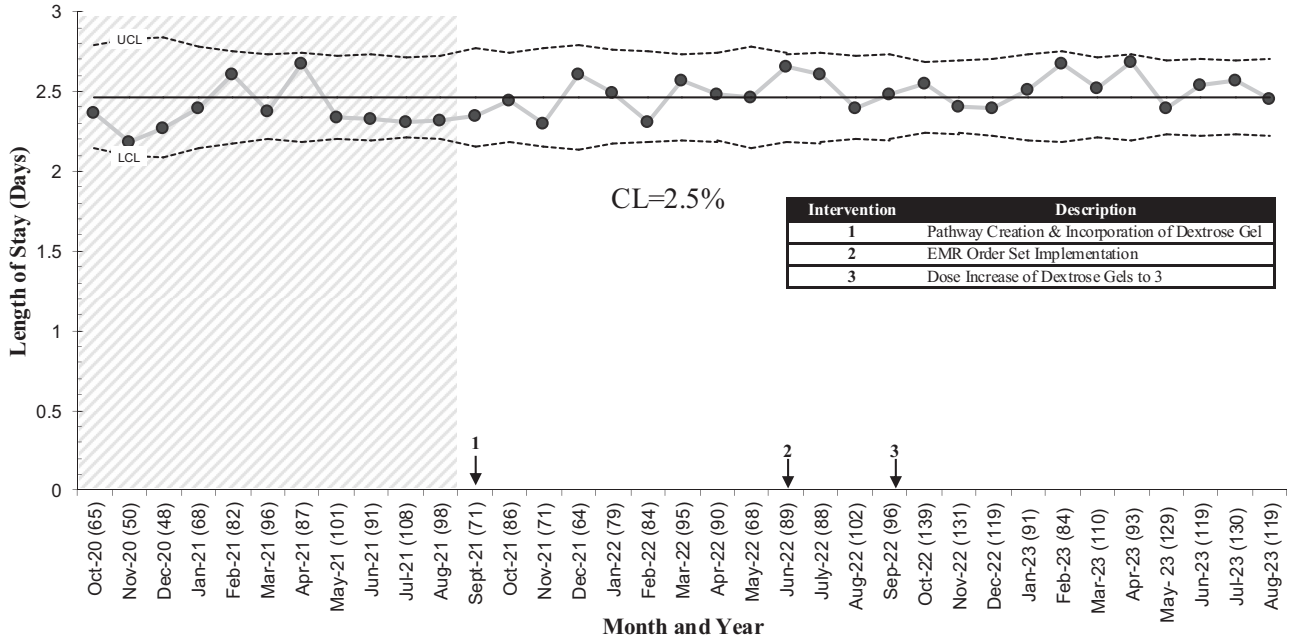

Fig. 5 Length of Stay (balancing measure): X-chart displaying the average length of stay in days for at-risk infants with hypoglycemia from October 2020 to August 2023. CL: mean percentage. Dotted lines: control limits. Number of monthly evaluations included on x-axis in parentheses. Annotated with specific PDSA cycles and associated interventions.

the increased need for a third dose of dextrose gel for LPT infants cannot be explained by prolonged monitoring alone.

Given initial data suggesting the efficacy and safety of up to three dextrose gels in treating neonatal hypoglycemia for at-risk infants at NewYork-Presbyterian Weill Cornell, data were presented to hospital administration June 2023. Hospital administration recognized the value of this QI initiative and expanded the use of dextrose gel to other academic and community-level hospitals within the NewYork Presbyterian Hospital enterprise (for a total of seven additional hospitals). Our multidisciplinary QI team coordinated efforts to ensure medication supply delivery to these institutions along with dissemination of the standardized educational materials.

Limitations

This is a single-center study at a large hospital system associated with a level four NICU in a large urban area with a high-risk perinatal population, which may limit the study's generalizability. However, the successful expansion of the project to other hospitals within the enterprise (including community-level urban and suburban hospitals) suggests the potential for adaptation not only locally but to other hospitals outside our network. Additionally, this study used our institution's established guidelines and thresholds for neonatal hypoglycemia, which differ from nationally published AAP and PES guidelines thresholds for hypoglycemia treatment. Our institutional guidelines are more conservative than the AAP guidelines (AAP has a lower glucose threshold for treatment), but not as conservative as the PES guidelines. If PES hypoglycemia thresholds were used, our study would likely include more infants. Our study could also benefit from partnering with parents/caregivers to enhance their understanding of risks associated with neonatal hypoglycemia in at-risk infants in the antepartum period, and from greater involvement by L&D obstetric providers.

CONCLUSION

Our QI study reveals that dextrose gel exhibits a dose-related effect in preventing neonatal hypoglycemia among at-risk neonates, with the administration of three doses of dextrose gel significantly reducing the need for additional intervention compared to administration of one or two doses. We further demonstrate the importance of a multidisciplinary QI team in developing and executing QI initiatives, and the ease of a clinical pathway in staff education and QI implementation. Future directions include assessing the implementation of dextrose gel across our hospital system to improve outcomes on a broader scale, delineating the role of infant risk factors and the need for dextrose gel supplementation, and examining the utilization of dextrose gel through a lens of equity and accessibility.

DATA AVAILABILITY

Datasets generated during and/or analyzed during the current study are not publicly available to protect patient privacy, however de-identified data are available from the corresponding author, MG, upon reasonable request.

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AUTHOR CONTRIBUTIONS

MG assisted with the study design, performed data collection, data analysis, drafted the initial manuscript and critically reviewed and revised the manuscript. JJ, JS, and EK contributed to study design, data preparation and collection, and critically reviewed the manuscript. SO assisted with study conceptualization, data analysis and preparation, and critically reviewed the manuscript. RH, AI, and JP contributed to study design and critically reviewed the manuscript. PT conceptualized and designed the study, performed data collection and preparation, analyzed the data, and critically reviewed and revised the manuscript. All authors reviewed and approved the final manuscript and agree to be accountable for all aspects of the work.

COMPETING INTERESTS

The authors declare no competing interests.

ETHICAL CONSIDERATIONS

The Weill Cornell Medicine Institutional Review Board (IRB) approved this study with a waiver of informed consent, and it was considered exempt by the IRB since it represented QI. Parents of infants who received dextrose gel were informed about the need for dextrose gel prior to administration and consented to the administration of dextrose gel to address their infant's hypoglycemia by nursing and pediatric providers.

ADDITIONAL INFORMATION

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