

A Trainee-Led Quality Improvement Pilot Study: Reducing Environment-Associated Temperature Instability During Transports to Nursery

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BACKGROUND

Newborns being transferred from Labor & Delivery (L&D) to Nursery units in open cribs are at risk of hypothermia secondary to changes in environmental temperatures during transport. Environment-associated temperature instability can lead to unnecessary sepsis workups and empiric antibiotic administration.

OBJECTIVE:

We sought to reduce environment-associated temperature instability via a practical and relatively low-cost intervention. In doing so, we hoped to prevent unnecessary sepsis workups and empiric antibiotic administration.

DESIGN/METHODS:

A pediatric trainee-led quality improvement “double hat double blanket swaddle” protocol was implemented on all newborns transferred from L&D to Nursery. Nursing leadership provided educational sessions to L&D nurses conducting the transports, and pediatric trainees reassured protocol adherence. The protocol was implemented on March 12, 2018. Data such as birth weight, gestational age, pre- and post-transfer temperatures, and sepsis workups were collected on newborns two months prior and two months post-intervention; the two groups were compared using paired t-test and one way ANOVA test. This study was approved by institutional IRB (#Pro00054893).

RESULTS:

The pre-intervention cohort (n=911) had a statistically significant difference in temperature before and after transfer (98.5 ± 0.6 and 98.2 ± 0.6 , respectively; $p < 0.01$), whereas the post-intervention cohort (n=933) did not have a statistically significant difference (98.4 ± 0.6 and 98.2 ± 0.6 , respectively; $p = 0.41$). The proportion of hypothermic babies upon arrival to the nursery decreased from 6.4% in the pre-intervention group to 4% in the post-intervention group ($p = 0.015$). Compared to the pre-intervention cohort, the post-intervention group received fewer sepsis workups (7.3% vs 5%, respectively; $p < 0.01$) and fewer empiric antibiotics (2.9% vs 2%, respectively; $p < 0.01$).

CONCLUSION:

A practical and relatively low cost “double hat double blanket swaddle” intervention led to a decrease in environment-associated temperature instability during transport, resulting in a reduction in sepsis workups and antibiotics given. This intervention may lead to decreased overall hospitalization costs and unnecessary concern to practitioners and families. Future areas of research include examining how our intervention affected overall length of hospitalization as well as stratifying newborns by gestational age (term vs. late preterm infants).

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Temperature Instability of Newborns Pre and Post Intervention

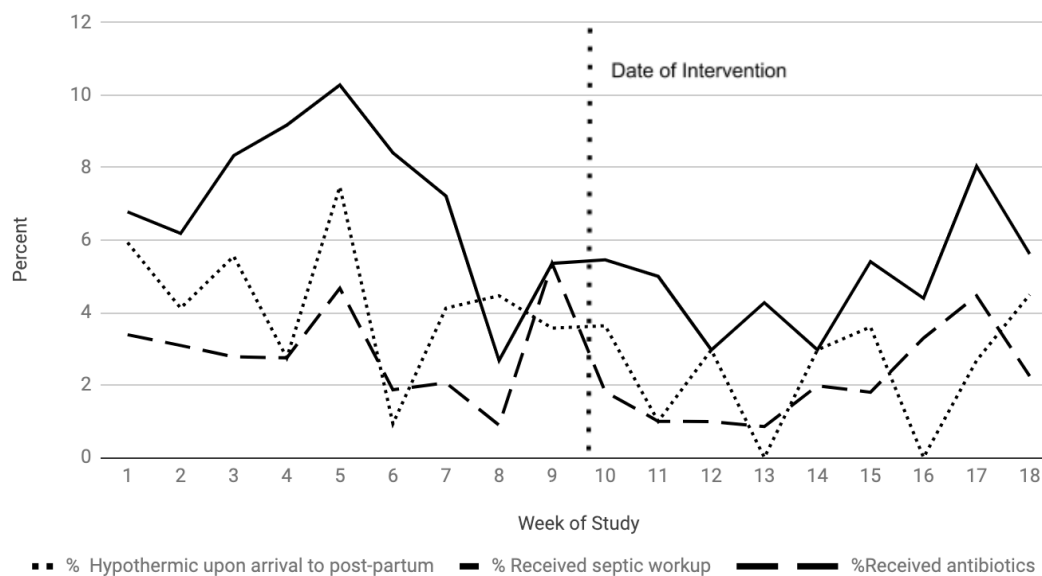


Figure 1: Graphical representation over time of how our intervention affected the frequency of hypothermia, number of septic workups, and number of babies receiving antibiotics.

Reducing Abdominal X-Rays to Diagnose Constipation in the Pediatric Emergency Department

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Constipation is one of the most common diagnoses in children, accounting for 2.5 million healthcare visits annually in the United States. The estimated medical cost and number of emergency department (ED) visits for children with constipation is 3 times higher than that of children without constipation. Despite expert consensus (ROME IV Criteria) recommending that constipation be diagnosed solely on the patient's history and physical examination (H&P), physicians often obtain abdominal radiographs (AXRs) in the diagnostic workup. Studies have shown that AXRs are unreliable for the purpose of diagnosing constipation, can be potentially misleading, and can add unnecessary healthcare costs and radiation exposure. The aim of our study is to decrease the percentage of AXRs obtained in otherwise healthy patients (aged 6 months to 18 years) presenting to the ED, where H&P suggest a diagnosis of constipation.

This is a quality improvement (QI) project based at a large urban quaternary care children's hospital ED. The primary outcome was percentage of AXRs performed on healthy patients aged 6 months to 18 years discharged home with a final diagnosis of constipation. Interventional components of the QI project consisted of educational presentations at staff meetings (February-March 2018) to review diagnostic criteria and indications for AXR, and individualized data reports by email (March and October 2018) to inform ED providers about their personal AXR metrics. A brief questionnaire (October 2018) assessed ED providers' reasons for ordering AXRs and their recall and perceptions of the educational content and personalized metrics.

Baseline total percentage of AXRs was 36% (895 of 2457 ED patient encounters during October 2016-September 2017). Following QI interventions, the total percentage of AXR ordering decreased to 19% (111 of 580 ED patient encounters during April-June 2018). This 17% decrease was significant ($p < 0.001$). Providers reported ruling out obstruction, associated vomiting, and parental reassurance as common reasons for ordering AXR in their practice. 41% of ED providers found the individualized data reports most impactful, while 33% found the educational presentation most impactful.

During the 3-month period after presenting educational content and sending personalized metrics to ED providers, the percentage of AXRs to diagnose constipation was significantly lower compared to baseline. We anticipate this decrease will be sustained (July 2018-present) through periodic delivery of ROME IV Criteria reminders and personalized metrics.

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Improving Surfactant Administration Timing in the NICU

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Background: Surfactant plays a vital role in neonatal lung function by reducing surface tension in the alveoli, decreasing atelectasis and establishing functional residual capacity shortly after birth, thus increasing pulmonary compliance. However, adequate endogenous in-utero surfactant levels needed to prevent lung collapse are not achieved until 35 weeks gestation. Thus, in the case of infants born <35 weeks gestation, or in infants with Respiratory Distress Syndrome (RDS), early surfactant administration becomes important in preventing lung injury. Preterm infants who demonstrate symptoms of RDS should be given surfactant as soon as possible, ideally within 1 hour of intubation¹. Early surfactant administration has been shown to significantly reduce the risk of clinical outcomes including pneumothorax and chronic lung disease².

Objective: Our objective was to optimize the time from intubation to surfactant administration to ≤ 1 hour over a 6-month period in the UCLA NICU. Current data from the California Perinatal Quality Care Collaborative (CPQCC) reports pneumothorax rates as high as 8.7% in infants <32 weeks gestation born at UCLA, compared to CPQCC average of 4.5%. In addition, inhaled nitric oxide rates were as high as 18.6%, compared to CPQCC average of 5.6%. This data prompted evaluation of surfactant administration timing in the UCLA NICU. Our analysis revealed that the average time for surfactant administration was 3.3 hours from intubation.

Methods: Chart review was performed to obtain the baseline state. Inclusion criteria included infants of all gestational ages who were admitted to Ronald Reagan and Santa Monica UCLA NICU for 1 year who received surfactant. Average surfactant administration time was found to be 3.3 hours. A root cause analysis found two major factors that were contributing to this delay. Firstly, surfactant was stored in the pharmacy instead of the NICU, leading to delays in medication dispensation. In addition, delays in x-ray completion to confirm endotracheal tube placement lead to further postponement in surfactant administration. During the following 6 months, surfactant was moved from the pharmacy to a fridge in the unit so that nurses could access it at any time. In addition, a designated order in the electronic medical record (EMR) system was created to alert radiology technologists to arrive within 30 minutes to complete the chest x-ray. A repeat chart review was conducted at the end of 6 months.

Results: Average time from intubation to surfactant administration after implementation of interventions decreased from 3.3 to 1.8 hours. Average time for x-ray completion decreased from 51 to 30 minutes. Average time from pharmacy verification of surfactant medication to administration decreased from 1.7 to 1 hour.

Conclusion: Availability of critical medications such as surfactant in the NICU can greatly decrease medication administration time. In addition, utilizing the EMR for effective communication can further facilitate timely intervention. Differences in management practices within providers may account for the continued delay in surfactant administration. Next steps include implementing a standardized clinical pathway to serve as a guideline for all practitioners to identify the 'at risk' patient early and to ensure surfactant administration in a timely manner.

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Figure 1

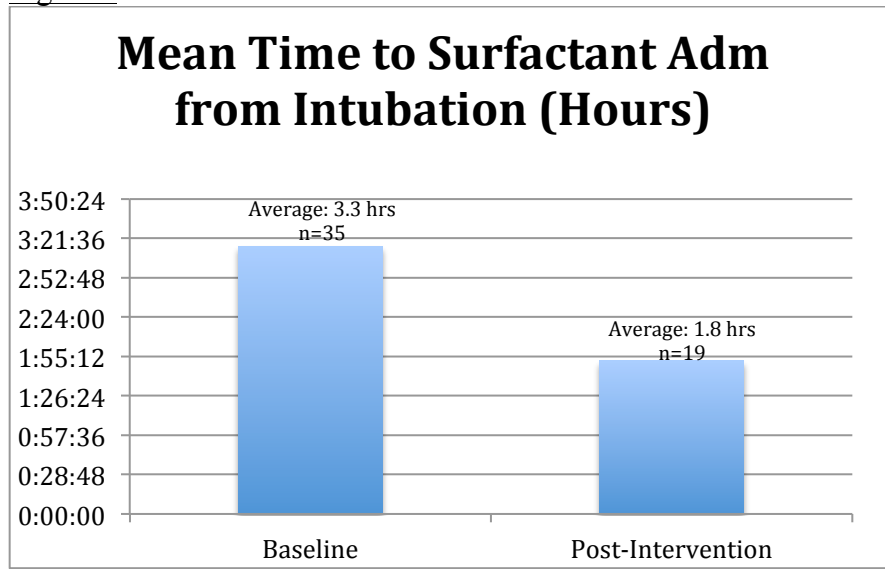
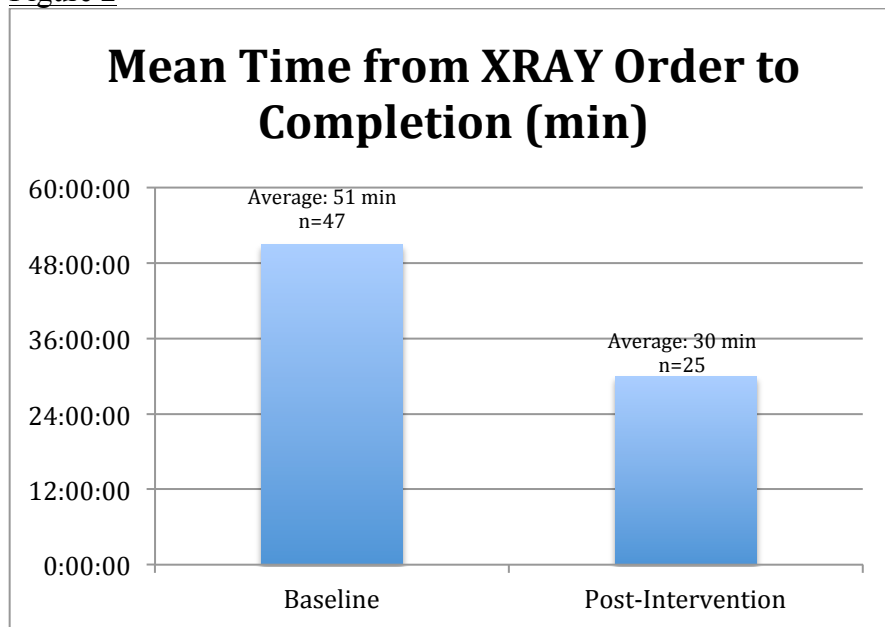


Figure 2



References:

¹Sharma, Deepak. "Golden 60 Minutes of Newborn's Life: Part 1: Preterm Neonate." *The Journal of Maternal-Fetal & Neonatal Medicine*, vol. 30, No. 22, 2017, pp 2716-2727

²Bahadue, Felicia & Roger Soll. "Early versus Delayed Selective Surfactant Treatment for Neonatal Respiratory Distress Syndrome." *Cochrane Library*, Wiley/Blackwell (10.111) 14, Nov. 2012

Measuring Interest in Clinic-Based Financial Services, Financial Strain, and Social Need at an Urban Safety Net Pediatrics Clinic

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Background: Poverty is a key social determinant of health and a dominant driver of worse pediatric health outcomes, yet financial hardship can be reduced through financial services. Medical-Financial Partnerships co-locating financial and medical services have been proposed as a care model to address children's health and financial risk.

Objective: To measure interest in financial services, financial strain, and social need among families at an urban safety net pediatrics clinic serving uniformly low-income, publicly insured patients.

Methods: Based on a review of existing literature and financial strain measures, we constructed a survey to assess interest in common financial services (financial counseling, tax preparation, employment assistance, job training/adult education, debt consolidation, credit counseling, savings/budgeting, and legal advice), finalized by consensus with study colleagues and pediatric clinicians. Survey domains included financial strain (measured by the Consumer Financial Protection Bureau [CFPB] Financial Well-Being Scale, range 19[least strain]-82[most strain]), social need, interest in social and financial services, and demographic questions. Between June and July 2018, the survey was administered to family members at the Harbor-UCLA Pediatrics Clinic in Torrance, California.

Key Results: The 542 participants were mostly female (88%), Hispanic (67%), and many were between ages 22 and 41 (70.3%, *Table 1*). There was a high degree of variability in perceived financial strain (mean CFPB scale score 56.9, SD 13, range 19-82, *Figure 1*). Sixty-nine percent of participants had interest in at least one financial service and on average expressed interested in 3.7 services (SD 3.3). The services eliciting the greatest interest were employment assistance (61%), job training/adult education (58%), and savings/budgeting support (58%). Perceived financial strain was positively and significantly associated with interest in any of the financial services participants were asked about, with a coefficient of 0.936 (0.919, 0.954). Sixty-seven percent of participants expressed difficulty paying for living costs generally, with the most difficult costs being emergency expenses (77%), rent/housing (65%), utility bills (56%), and transportation (49%). Fifty-three percent of participants were interested in services to help with living costs, with the greatest interest in assistance with rent/housing (35%) and food (23%).

Conclusion: There is a clear need for and interest in financial and social support services amongst families in our study. A substantial majority of families demonstrated perceived financial strain and expressed a desire for financial services (especially assistance with employment, job training, and savings/budgeting). A wide range of financial well-being scores was found, demonstrating that safety net clinic families have varying experiences of financial stress despite being uniformly low-income. Screening tools that measure financial strain and need beyond financial metrics like income may help providers discern more financially stressed families that would benefit most from financial and social services. Clinics should consider integrating financial services into clinical care models, termed Medical-Financial Partnerships.

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Table 1. Participant Characteristics

	Number	Percentage
Total Participants	542	100.0
Gender		
Female	409	88.0
Male	54	11.6
Non-binary	2	0.4
Race		
American Indian/Alaska Native	4	0.8
Asian	32	6.7
Black/African American	61	12.8
Native Hawaiian/Pacific Islander	3	0.6
White	353	74.2
Other/Mixed	23	4.9
Ethnicity		
Hispanic	320	67.2
Non-Hispanic	156	32.8
Survey Language		
English	329	60.8
Spanish	212	39.2
Age		
<18	7	1.5
18-21	31	6.5
22-31	183	38.4
32-41	152	31.9
42-51	78	16.4
52-61	20	4.2
62+	5	1.1
Children (Number)		
1	135	40.2
2	87	25.9
3	69	20.5
4	27	8.0
5	13	3.9
6	4	1.2
7	1	0.3
Children (At least 1 child in age range)		
<1	117	21.6
1-5	228	67.9
6-10	162	48.2
11-18	165	49.1
>18	46	13.7

Figure 1. Perceived Financial Strain (n = 462, mean 56.9, SD 13.0, range 19-82)

