

Safety of Reiki Therapy for Newborns at Risk for Neonatal Abstinence Syndrome

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The incidence of opioid abuse and subsequent drug withdrawal is exponentially on the rise in the United States for many populations including newborns who are born to drug-addicted mothers. These newborns often exhibit symptoms of neonatal abstinence syndrome (NAS) within 24 to 72 hours of birth. Treatment of NAS includes monitoring of withdrawal symptoms, managing physiological parameters, and the use of supportive and pharmacologic treatments. Although a few randomized controlled trials exist, studies on supportive intervention are generally limited by small sample sizes, case study reports, expert opinions, and descriptive design. Few studies address the safety of Reiki for newborns at risk for NAS using neonatal parameters. This pilot study addresses feasibility and demonstrates that Reiki is safe when administered to this high-risk population. Considerations for future studies are discussed. **KEY WORDS:** neonatal abstinence syndrome, neonates, Reiki

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INTRODUCTION

The incidence of opioid abuse and subsequent drug withdrawal is exponentially on the rise in the United States for many populations including newborns who are born to drug-addicted mothers.¹ Heil et al² reported that pregnancies are common in women who abuse opioids, with as many as 86% of pregnancies being unintended in that population. From 2009 to 2012, neonatal abstinence syndrome (NAS) incidence nearly doubled nationally from 3.4 to 5.8 per 1000

hospital births for a total of 21 732 infants with the diagnosis in 2012.³ More recent data suggest that the incidence of NAS has increased by 400%, with some states reporting 30 per 1000 hospital births.^{4,5} The costs for NAS are also tremendous with hospitalizations alone increasing from \$732 million in 2009 to \$1.5 billion in 2012 ($P < .001$), with 81% attributed to state Medicaid systems.³ Newborns exhibiting signs or symptoms of drug withdrawal often display uncoordinated feeding patterns, vomiting, diarrhea, dehydration, weight loss, excessive or high-pitched crying, irritability, inconsolability, yawning, temperature instability, seizures, tremors, and hypertonia.^{1,6,7} Typical withdrawal management of newborns born to drug-addicted mothers includes monitoring of withdrawal symptoms, managing physiological parameters, and using supportive and pharmacologic treatments.⁸ Despite these interventions, many newborns continue to exhibit signs of distress such as inconsolable crying and irritability. Supportive and nonpharmacologic interventions have been used in some newborns experiencing withdrawal but with little comparison data.⁸ Complementary therapies, such as Reiki, have seldom been studied in newborns. Studies on Reiki in the adult population have shown a decrease in pain⁹⁻¹¹ and stress^{10,11} without affecting vital signs.⁹⁻¹¹ However, little or no research has

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documented the feasibility and safety or the immediate results of such an intervention, on neonatal parameters. Therefore, a pilot study was performed with the following aims: (1) determine feasibility of administering Reiki therapy in a busy neonatal nursery among newborns at risk for withdrawal and (2) determine safety as evidenced by measuring the immediate effects of Reiki therapy on neonatal heart rate, pulse oximetry, and symptoms of NAS.

BACKGROUND

Neonatal abstinence syndrome

Newborns born to drug-addicted mothers often undergo withdrawal within 24 to 72 hours or in some cases up to several days after delivery¹² depending on maternal drug exposure, duration of exposure, time of last dose, and number of substances to which the neonate was exposed.¹³⁻¹⁵ In utero exposure to licit and illicit psychoactive substances has the potential to produce physiological and neurobehavioral problems after birth that culminate in issues such as sleeping and feeding problems, decreased interactional capacity, and poorer adaptation to extrauterine life.^{8,16,17}

Newborns at risk for NAS are scored using a tool to quantify withdrawal symptoms. The most commonly used scoring tool in the United States is the modified Neonatal Abstinence Syndrome Score, also known as the modified Finnegan score which was created in 1975.^{6,18} The reliability and validity of this tool can vary due to frequent modifications, length and complexity, but it has an internal consistency of the Cronbach α that does not exceed 0.62.¹⁹ Scores are administered within hours of birth, and throughout the period when the newborn is at risk for NAS. The scoring tool is divided into segments depicting withdrawal symptoms that commonly occur: nervous system hyperirritability, gastrointestinal dysfunction, respiratory distress, and metabolic and vasomotor disturbances. Individual NAS symptoms are weighed depending upon symptom and severity and are scored from 0 to 5 for each segment of the tool. There are 21 to 31 items on the scoring tool that have various scores available for each item. Scores are totaled every 3 to 4 hours. A normal score for all segments of the tool is 0 to 4.

An abnormal total score, indicating significant withdrawal, is 8 or greater. Because untreated sustained NAS may result in seizures and potentially

death,²⁰ scores of 8 or higher are often treated with pharmacologic interventions.

Nonpharmacologic and supportive interventions for NAS

Nonpharmacologic, supportive interventions are commonly used to comfort newborns and to manage symptoms of NAS, but there is a paucity in the literature regarding effect on outcome data.²¹ Much of the research on interventions for NAS is based on case reports, expert opinions, and descriptive studies.⁸ Nonpharmacologic interventions include swaddling,²² responding early to newborn needs, providing a quiet and soothing environment with minimal stimulation, and careful management of feedings and weight loss.^{7,8,12,23-27}

Gentle music and white noise have been used to help calm a baby experiencing NAS.^{26,27} In one randomized controlled trial (RCT), both NAS (N = 45) and non-NAS (N = 75) newborn subjects were randomized to a study arm in which the newborn received two 15-minute interventions including infant-directed talk, light stroking/infant massage, eye-to-eye contact, and vertical rocking when swaddled. Findings indicate positive changes in neonatal behavior, even with short-term administration of the intervention in both NAS and non-NAS groups ($P < .05$).²⁸

Various types of touch and nontouch (working with the energy field around the body) therapies are described in the literature for both healthy term and premature newborns. Nontouch therapies include Therapeutic Touch[®] (TT) and touch therapies include Kangaroo care, massage, and gentle hold therapies.

TT is a type of nontouch therapy in which the practitioner incorporates intentional and compassionate use of universal energy through his or her hands to sense and promote balance in the bioenergetic field of the body.²⁹ In a double-blind RCT on preterm infants, TT resulted in an increase in infant parasympathetic tone as evidenced by heart period variability without adverse effects. Using repeated-measures multivariate analysis of variance on heart period variability in TT and non-TT groups (n = 10 in each group), differences between group assignments with low-frequency, high-frequency, and low- to high-frequency ratio interactions ($F_{2,143} = 8.076$, $P = .000$) and for group, day, and low-frequency, high-frequency, and low- to high-frequency

ratio ($F_{2,288} = 3.146$, $P = .015$) and in posttreatment period ($F_{1,16} = 6.259$, $P = .024$) were observed.³⁰

Kangaroo care, also known as skin-to-skin care where the newborn is placed directly on the chest of the mother or father, and simple touch therapies have been shown to improve sympathovagal responses, as evidenced by heart rate variability in premature and very low-birth-weight newborns.³¹ Studies are limited by small sample size and case study design.^{31,32}

Research examining moderate pressure massage among premature infants demonstrates that gentle human touch is safe and is associated with developmental benefits and positive effects on behavioral states.³³ While TT, Kangaroo care, massage, and gentle handling have demonstrated positive effects on newborn outcomes, few have studied or included newborns at risk for NAS and little or no research has specifically examined Reiki therapy as an adjuvant for care in this high-risk population.

Reiki therapy in adults

Reiki therapy is defined by the National Center for Complementary and Integrative Health as “a health practice in which practitioners place their hands lightly on or just above the person, with the goal of facilitating the person’s own healing response.”³⁴ Reiki therapy is different from traditional touch therapies because it is based on an Eastern belief in an energy that supports the body’s innate or natural healing abilities.³⁴ The Reiki practitioner channels universal energy and, through the hands, works directly with the body’s energy field to restore balance from disruptions in the flow of energy that can occur from illness, stress, or discomfort. Reiki can bring about a deep release of emotions or energies to restore the natural flow of the body’s energy and is often experienced by the client as relaxing, feeling more comfortable in their body, or clear-minded.³⁵

While there are several RCTs using Reiki with various medical conditions, a systematic review of the literature concluded that, due to small sample sizes, inadequate study designs, and poor reporting, evidence is insufficient to suggest that Reiki is an effective treatment for any condition.³⁶ Still, preliminary findings indicate positive effects of Reiki therapy on patient outcomes among adult patients with various conditions.³⁷⁻³⁹

In a phase II pilot study on cancer pain, Olson et al³⁷ compared a group of patients with cancer who had standard opioid therapy and rest ($n = 13$) and a

similar group who had Reiki and standard opioid therapy ($n = 11$). The group with opioid therapy plus Reiki experienced significant improvement in pain ($P = .035$), a drop in diastolic blood pressure ($P = .005$), pulse ($P = .019$), and improvement in psychological component of quality of life ($P = .002$) compared with the group not receiving Reiki.

In an experimental study of community-dwelling older adults, Reiki was studied for its effect on anxiety, depression, and pain.³⁸ Twenty participants were randomly assigned to a wait-list control group or an experimental group and were given a 45-minute Reiki treatment once weekly for 8 weeks. Data were obtained in a semistructured interview during the last Reiki session and measures used include the Geriatric Depression Scale Short Form (GDS-15), Hamilton Anxiety Scale (HAM-A), Faces Pain Scale (FPS), heart rate, and blood pressure. Results showed that the experimental group had significant decreases in depression (GDS-15, $P < .001$), anxiety (HAM-A, $P < .001$), and pain (FPS, $P < .001$) compared with the control group. No significant differences were found in blood pressure ($P > .25$) or heart rate ($P > .45$).

Vitale and O’Connor³⁹ studied the effect of Reiki on pain and levels of state anxiety in women with abdominal hysterectomies. In this quasiexperimental pilot study, an experimental group ($n = 10$) received traditional nursing care and three 30-minute Reiki sessions and a control group ($n = 12$) received only traditional nursing care. Results showed that the experimental group reported less pain as measured using a visual analog 10-point scale (mean for experimental group = 3.8, and control group = 5.4, $t = 1.72$, $P = .04$) and requested fewer analgesics in the first 24 hours than the control group. There were no significant differences in pain rating between the 2 groups 48 to 72 hours after the Reiki treatment. Using the State-Trait Anxiety Inventory, the experimental group also reported less state anxiety than the control group on discharge 72 hours after surgery ($t = 3.17$; $P = .005$).

Reiki therapy in children and newborns

Very few studies have investigated Reiki therapy among pediatric patient populations and those that exist show mixed results. A double-blind RCT conducted by Seattle Children’s Hospital of pediatric patients ($n = 38$) undergoing dental procedures compared Reiki therapy preoperatively with sham

Reiki as adjuvants to standard opioid treatment.⁴⁰ Outcome data included postoperative pain scores, opioid requirements, and family satisfaction with perioperative care. Multiple linear regressions were used for analyzing the data. In this cohort of children, findings in the 2 study arms showed no statistically significant differences on any outcome measures.

Thrane et al⁴¹ examined the feasibility, acceptability, and outcomes of pain, anxiety, and relaxation using Reiki therapy with children receiving palliative care. Statistics included paired *t* tests or Wilcoxon signed rank tests to compare changes in these parameters after providing two 20-minute Reiki sessions. Significant decreases for pain occurred from pain in the first treatment in nonverbal children ($P = .063$) and for respiratory rate for the second treatment in verbal children ($P = .009$). This work suggests that Reiki may be beneficial to support traditional pain management and anxiety in children receiving palliative care.⁴¹

There is little research on Reiki therapy among newborns. In a trial testing feasibility, safety, and acceptability of daily Reiki for premature newborns for 10 days started 7 to 14 days after birth, there were no serious adverse events as measured by vital signs and oxygen saturation.⁴² Separate anecdotal reports highlight routine use of Reiki in several neonatal intensive care units (NICUs), with positive perceived effects on vital signs, improved appearance of distress, responsiveness, and body tone.⁴²

Reiki therapy in addiction literature

Reports from adult addiction literature identify positive effects of Reiki treatments on withdrawal symptoms. In adults, anecdotal case reports of Reiki performed during alcohol withdrawal have described a profound relaxation response, a reduction in client anxiety, tension and aggression, improved sleep, and a feeling of energy that led the practitioners to conclude that Reiki may have sped up the detoxification process.⁴³ After a decade of Reiki practice in a professionally supervised clinic, Chapman and Milton,⁴⁴ using qualitative survey methodology, suggested Reiki was effective in alleviating physical and psychosocial stress occurring during withdrawal and recovery phases of addiction treatment. Statistics were based on a Likert scale that probed the anecdotal reports of the caregivers of these clients during the withdrawal and recovery phase. There were only positive reports in the statistical analysis.

Little or no research has investigated Reiki and newborns. Because research is carefully regulated with highly vulnerable populations such as newborns with NAS, it was decided that the focus of research should be about safety and feasibility of Reiki therapy in this population.

METHODS

Setting and sample

This study was reviewed and approved by the institutional review board within the authors' organization as a minimal risk study. A prospective cohort pilot study design was used to investigate the feasibility and efficacy of Reiki therapy among newborns at risk for withdrawal in a newborn nursery. This study was completed in an urban, academic public hospital with a level III NICU and a separate neonatal nursery where infants and postpartum mothers are cared for prior to discharge home. Inclusion criteria consisted of newborns 37 weeks' gestational age or older, admitted to the newborn nursery weighing 2 kg or more upon admission, and receiving NAS scoring for monitoring of withdrawal symptoms. Exclusion criteria were newborns with extensive comorbidities or complex diagnoses (ie, severe anomalies, cardiac complications, seizures, and respiratory distress) or less than 37 weeks' gestational age and/or admitted to the level III NICU. Subjects were not excluded if they were receiving pharmacologic treatment for their NAS symptoms. Upon admission to the newborn nursery, subjects were screened for eligibility by one of the nurse investigators who were familiar with the inclusion and exclusion criteria as part of the consent process. If encountering a non-English-speaking parent, a language line interpreter service would be utilized.

Procedures

Mothers of newborns meeting inclusion criteria were approached by 1 of the 2 perinatal nurse investigators and informed about the study. In the neonatal population, paternity may not be proven at the time of birth; therefore, only the mother of the neonate was approached for this study. Following written informed consent, subjects were scheduled for a Reiki therapy session by 1 of the study investigators who would provide the treatment.

The Reiki treatments were provided by 1 of the 4 researchers who were either in the perinatal nursing or advanced practice nursing staff and were certified as Reiki Masters. Reiki Masters are trained at the highest level of certification and have practiced Reiki on themselves, others, and have met the qualifications to teach Reiki to others.

Reiki sessions were scheduled at a time that would not interfere with newborn feedings, routine tests, or procedures, and were mutually agreed upon by the Reiki Master, the mother, and nurse caring for the newborn. Each subject received one 30-minute treatment of Reiki therapy in a quiet room. A new disposable pulse oximeter probe was applied on each subject for monitoring of heart rate and pulse oximetry immediately before, half way through the therapy (15 minutes after initiation), and immediately after Reiki therapy.

The Reiki practitioner placed her hands lightly on or above the newborn’s head and eyes, upper body from neck to pelvic area, arms and legs for the duration of the therapy. Reiki therapy was to be discontinued if the neonate had a pulse oximeter desaturation less than 88% or a heart rate less than 100 beats per minute (bpm) or greater than 180 bpm, or at the discretion of the Reiki master, parent/legal guardian, or health care providers.

Additional data abstracted from the patient and maternal medical record included patient age, gender, ethnicity, 1-minute and 5-minute Apgar scores, type of delivery, type of feeding, maternal drug use during pregnancy, and current pharmacologic treatment for newborns at risk for withdrawal. NAS scores were abstracted from the medical record both before and after the Reiki therapy session.

Data analysis

Data were analyzed using descriptive statistics, including means, frequencies, and standard deviations to describe the study sample. Inferential statistics were performed to identify relationships between study variables before, during, and after Reiki therapy. Specifically, Friedman’s analyses within subject-repeated measures were performed with subject heart rate and oxygen saturation rates before, during, and after Reiki. Wilcoxon analyses were performed to compare means between NAS scores before and after Reiki. Frequency calculations were performed to identify any adverse events associated with administration of Reiki therapy.

RESULTS

In this study, 34 mothers were approached for consent, and 4 declined. None of the subjects were excluded once consented; 30 consented to participate and completed the study. A summary of subject characteristics is displayed in the Table. The mean age of subjects was 3.59 days; 50% were male and 50% female. Twenty-nine (96.6%) subjects were Caucasian and 1 (3.4%) was African American, were born vaginally (n = 24, 80%), or were delivered by cesarean delivery (n = 6, 20%). None of the vaginal deliveries were assisted by vacuum or forceps. Most subjects received formula feedings (n = 18, 60.0%),

TABLE. Summary of Subject Characteristics

Characteristic	Value
Age	
n	30
Mean (SD)	3.59 (3.261)
Gender, n (%)	
Male	15 (50.0)
Female	15 (50.0)
Ethnicity, n (%)	
Caucasian	29 (96.6)
African American	1 (3.4)
Type of birth, n (%)	
Vaginal	24 (80)
Cesarean delivery	6 (20)
1-min Apgar	
N	30
Mean (SD)	8.63 (1.03)
5-min Apgar	
N	30
Mean (SD)	9.00 (0.00)
Intrauterine drug exposure, n (%)	
Methadone	15 (44.1)
Morphine	0 (0.0)
Cocaine	2 (5.9)
Suboxone	7 (20.6)
Percocet	6 (17.6)
Vicodin	2 (5.9)
Oxycontin	0 (0.0)
Other	6 (17.6)
Withdrawal treatment, n (%)	
Morphine	9 (26.5)
Methadone	4 (11.8)
Clonidine	1 (2.9)
Other/none	16 (53.3)
Type of feeding, n (%)	
Breast milk	9 (30)
Formula	18 (60)
Both	3 (10)

Abbreviation: SD, standard deviation.

9 (30%) were breast fed, and 3 (10%) received both formula and breast milk. The most common drug exposure for subjects was methadone (44.1%), suboxone (20.6%), and percocet (17.6%).

Fifty-three point three percent (53.3) of this cohort received no pharmacologic treatment during the study period. If the newborn was receiving pharmacologic treatment for withdrawal, 26.5% received oral morphine, 11.8% received oral methadone, and 2.9% received oral clonidine. Data were not collected on how many newborns started pharmacotherapy following Reiki therapy. When examining changes in subjects' heart rate immediately before, during, and after Reiki, Friedman tests indicated statistically significant changes during the different time points (Figure). The oxygen saturation rates at the same 3 time points fluctuated slightly, but these changes were not statistically significant (mean rank before = 2.03; mean rank during = 1.95; mean rank after = 2.020, test statistic 0.169, $P = .919$). There was no change in the absolute means at each time point (mean remained at 98%).

Wilcoxon analyses were performed to compare NAS scores recorded before and after Reiki therapy. The mean NAS score recorded before Reiki was 2.89 (range 0-7), and mean post-Reiki scores were 2.86 (range 0-9). While differences in mean scores suggest a slight decrease, changes were not statistically significant (test statistic 132.5, $P = .867$).

There were no serious adverse events related to Reiki administration during the course of the study. Stopping points were in place to ensure safety of the subjects and included oxygen desaturation less than 88%, heart rate decreasing below 100 bpm or increasing above 180 bpm, or any other occurrence at the discretion of the Reiki therapist, parent, or health care provider that would warrant cessation of therapy. With sustained crying, the pulse oximeter may not be

able to pick up oxygenation levels. This was discussed by study investigators, and it was decided that this physiological change was not an adverse event associated with Reiki therapy. The newborn was quickly calmed by nursing staff or the mother with usual care, and Reiki was resumed on the request of the mother, with no further physiological or behavioral changes occurring during the remainder of the treatment session.

DISCUSSION

The primary aim of this pilot study was to explore whether performing Reiki was a feasible and safe intervention and to identify immediate effects on physiological parameters among a high-risk population of newborns at risk for NAS. A key element in the success and feasibility of replicating this study was that all Reiki masters used as interventionists in this study were also members of the hospital or perinatal nursing or provider staff. Reiki services were arranged to not conflict with usual care, scheduled appointments or tests, and administered within a reasonable time in a busy newborn nursery. Coordinating with nonemployees or outside Reiki masters to administer therapies to this high-risk population may be difficult, particularly if they are not familiar with this age group or the complex signs and symptoms of NAS.

A separate consideration in determining feasibility was how often parents or legal guardians would be interested in Reiki therapy if it was offered or if there was a charge. Of interest, many of the mothers in the study were familiar with Reiki therapy, as they had received the therapy themselves while being treated at local chemical dependency or mental health centers for their addiction. As such, these individuals were very interested in having the Reiki therapy offered as an adjunct to care for treating their newborn's symptoms of withdrawal. In a future study, mothers of the subjects could be surveyed about what influenced their decision with Reiki and whether they would pay for it if offered.

Practical implications for clinicians

Findings from our pilot study suggest Reiki therapy among newborns at risk for NAS is a safe intervention. There were no adverse events reported throughout the duration of the study, which is consistent with previous research on the safety of Reiki therapy

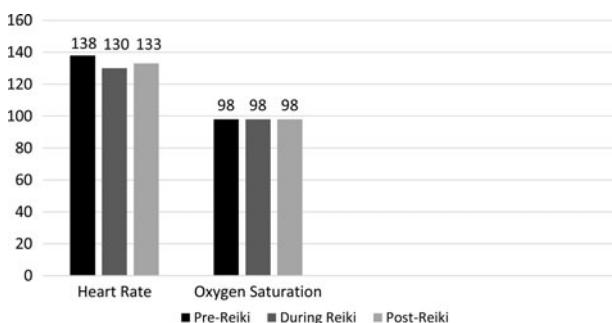


FIGURE. Mean heart rate and oxygen saturation pre-Reiki, during Reiki, and post-Reiki.

among premature newborns who were not at risk for withdrawal.⁴⁰ In this study, stopping points for safety measures were identified before study initiation.

Monitoring of physiological parameters in the study provided data on safety of the intervention, and allowed for preliminary analyses on the potential benefits of Reiki therapy. Repeated-measures analyses of physiological data suggest a possible benefit in neonatal heart rates during and after Reiki sessions. A decrease in heart rate during the Reiki session may be reflective of a relaxation response, described in a study of adults receiving Reiki for withdrawal.⁴¹ The decrease in heart rate in our study was statistically significant, and may also be clinically significant, as a decrease from 138 to 130 bpm may be therapeutic and beneficial among newborns experiencing NAS symptoms. It is possible that the decrease in heart rate seen among newborns in our study was due to other factors such as removing the infant from the distractions in the nursery and into a quiet room. When designing future studies, a larger sample size and identifying location of the Reiki treatment (eg, nursery vs quiet room) could be studied. Also, comparing the usual care control group with “sham Reiki” and Reiki therapy should be a focus of study in this population.

An additional area to be explored in future studies includes frequency and duration of Reiki therapy to determine dose, dose response, and optimal methods for administration. It would also be helpful to study whether there is an effect based on (1) the mother’s choice of abused drug, (2) whether or not the newborn was medicated, or (3) the method of delivery. Questions regarding effect duration should be addressed. In this study, a decrease in heart rate remained below baseline (although always within normal range) after Reiki therapy was complete. It may be important to determine whether these decreases were sustained over time or, with repeated sessions, whether there would be effects on discharge outcomes such as whether Reiki therapy may decrease admissions to NICU for NAS.

Limitations to our study included the pilot study design, low sample size, and performing the study in a single center, which impact generalizability on a larger scale. The data support that Reiki is an intervention that can be safely offered to newborns 37 weeks’ gestation and greater who are at risk for NAS and may not be generalizable for preterm or otherwise health-challenged newborns. However, this research lays the groundwork for future trials systematically investigating this important therapy.

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