

RESEARCH ARTICLE

Newborn Falls in a Large Tertiary Academic Center Over 13 Years

Jaspreet Loyal, MD, MS,^a Christian M. Pettker, MD,^b Cheryl A. Raab, RNC,^c Elizabeth O'Mara, BSN, RN, CNML,^c Heather S. Lipkind, MD, MS^b

ABSTRACT

OBJECTIVES: We sought to report the frequency of, circumstances surrounding, and outcomes of newborn falls in our hospital. We evaluated the impact of specific interventions on the frequency of newborn falls and the time between falls.

METHODS: We performed a retrospective study of newborn falls reported on our postpartum unit over a 13-year period. Demographic information and circumstances of falls were collected via an electronic event reporting system and medical record review.

RESULTS: There were 63 633 births and 29 newborn falls, yielding an average of 4.6 falls per 10 000 live births (median: 2 per year; range 0–5 per year). Newborns who sustained a fall were exclusively breastfeeding (75.9%), 24 to 48 hours of age at the time of the fall (58.6%), and had first-time parents (62.1%). At the time of the fall, most newborns were with the mother compared with being with the father or both parents (65.5% vs 34.5%); in the mother's bed compared with being elsewhere, such as on a couch or chair, with a parent, or in the parent's arms (62.1% vs 37.9%); and feeding at the time of the fall versus not (79.3% vs 20.7%). All newborns were monitored after the fall, with no adverse outcomes. Despite interventions, we continued to see cases of newborn falls, although the overall trend revealed decreasing falls per 10 000 patient-days and longer time between falls over the study period.

CONCLUSIONS: Newborn falls in our hospital are infrequent but continue to occur despite preventive efforts, highlighting the importance of continuous awareness and education.

www.hospitalpediatrics.org

DOI: <https://doi.org/10.1542/hpeds.2018-0021>

Copyright © 2018 by the American Academy of Pediatrics

Address correspondence to Jaspreet Loyal, MD, MS, Department of Pediatrics, Yale University, 333 Cedar St, New Haven, CT 06445. E-mail: jaspreet.loyal@yale.edu

HOSPITAL PEDIATRICS (ISSN Numbers: Print, 2154-1663; Online, 2154-1671).

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: No external funding.

POTENTIAL CONFLICT OF INTEREST: The authors have indicated they have no potential conflicts of interest to disclose.

Dr Loyal conducted the analysis, drafted the initial manuscript, and critically reviewed the manuscript; Dr Pettker supervised data collection, analysis, interpretation of data, and manuscript editing; Ms Raab conceptualized and designed the study, performed data collection, and edited the manuscript; Ms O'Mara performed data collection, analysis, and interpretation of data; Ms Lipkind conceptualized and designed the study and supervised data collection, analysis, and interpretation of data; and all authors approved the final manuscript as submitted.



^aDepartments of Pediatrics and

^bObstetrics, Gynecology, and Reproductive Sciences, Yale University School of Medicine, New Haven, Connecticut; and

^cYale New Haven Hospital, New Haven, Connecticut

The Joint Commission has identified patient falls as an important source of sentinel events and recommends that organizations review their fall statistics to implement fall prevention programs.¹ Falls are the leading cause of nonfatal injuries for all children ages 0 to 19 years in the United States.² While in the hospital, falls of toddlers are a well-recognized concern,³⁻⁶ but there are few published reports on newborn falls within the hospital setting in the pediatric literature.⁷⁻⁹

Our institution is a tertiary-level academic medical center in Connecticut serving a diverse urban and suburban population and is the predominant referral center within a 50-mile radius, averaging ~4500 deliveries per year. To address a cluster of newborn falls on the Maternity and Well Newborn unit, the Newborn Fall Prevention Task Force was created in 2005. The task force began to track newborn falls as part of a patient safety initiative that was led by the perinatal patient safety nurse. The perinatal patient safety nurse evaluates clinical care and outcomes for women and newborns at our hospital and identifies cases that are complicated by adverse outcomes, errors, and complexities in the medical system.¹⁰ Additional members of the Newborn Fall Prevention Task Force included postpartum nurses and clinicians. The first charge of the Newborn Fall Prevention Task Force was to review all reported falls and collect data regarding the demographics and circumstances of each event. Members of the Newborn Fall Prevention Task Force led educational initiatives, created awareness about newborn falls and reporting, and collaborated on creating a policy to prevent newborn falls (Supplemental Fig 3). The policy to prevent newborn falls was periodically revisited, and postpartum staff members were educated on the policy with each review. Education was provided through skills fairs, staff meetings, and e-mails.

In this study, we describe our experience with the surveillance of newborn falls in our large academic tertiary-care medical center and the impact of the Newborn Fall Prevention Task Force on the number of falls.

METHODS

Sample and Setting

Our sample consisted of newborns who sustained a fall on the Maternity and Well Newborn unit in our hospital between January 2005 and December 2017. A fall was defined as an unplanned descent to the floor (or extension of the floor, such as a trash can or other equipment), with or without injury to the patient, occurring within the hospital. All types of falls were included, whether they resulted from physiologic reasons (eg, caregiver fainting or falling asleep) or environmental reasons (eg, slippery floor).

Data Collection

Data were abstracted by the perinatal patient safety nurse from the electronic medical record and an anonymous electronic adverse event reporting tool.¹¹ The event reporting system can be used by any member of the hospital staff to anonymously report quality or safety events, including medication errors, device-related events, falls, or other potentially preventable adverse events. In some instances, hospital staff directly notified the perinatal patient safety nurse about a fall, and those events were included for review. Variables collected were based on literature review⁸ and expert opinion. For context, our hospital serves a diverse racial and ethnic population of postpartum patients (~60% white, ~20% Hispanic, ~15% African American, and ~5% Asian American or other race). The percent of cesarean births is <30%. The percent of women who initiate breastfeeding is ~80%, and the percent of women exclusively breastfeeding before hospital discharge is ~55%. Our hospital received Baby-Friendly USA (BFUSA) designation in 2016. Birth facilities that are designated are recognized for the education and support provided to women choosing to breastfeed their newborns.¹² Core tenets of BFUSA include supporting infant feeding (breastfeeding or formula), as described in "Ten Steps to Successful Breastfeeding," and adherence to safe sleep practices.¹²

Data Analysis

Over the study period, we report an annual and overall frequency of newborn falls, days

between newborn falls, and specific interventions. We calculated the number of patient-days per year and report the number of newborn falls per 10 000 patient-days. Most newborns stay in the hospital for 2 days after a vaginal delivery and 3 days after a cesarean delivery. We describe the frequency of additional variables collected. All data analysis was conducted by using SPSS version 24 (IBM SPSS Statistics, IBM Corporation, Armonk, NY). This project was reviewed by the institutional human investigations committee and deemed a quality assurance activity, and thus it was considered exempt from review by the committee.

RESULTS

There were 63 633 deliveries and 29 falls over the 13-year study period, yielding a total of 4.6 falls per 10 000 live births. On average, there were 2.4 falls per year, and the number of falls ranged from 0 in 2016 to 5 in 2010. The number of days between the 29 newborn falls and specific interventions are shown in Fig 1, and the number of newborn falls per 10 000 patient-days annually over the study period are shown in Fig 2. Specific interventions included the creation of the Newborn Fall Prevention Task Force in 2005. Members of the task force developed the Newborn Fall Prevention policy in 2006, which was reviewed and distributed via education every 2 to 4 years. The number of days between falls declined in 2009, which was around the same time that the hospital implemented a new electronic safety event reporting system. Two additional educational interventions included a statewide newborn falls prevention initiative in 2012 and efforts before and during the hospital's BFUSA designation in 2016. Over the 13-year study period, there was an upward trend in the number of days between falls (Fig 1) and a downward trend in the number of newborn falls per 10 000 patient-days (Fig 2).

Characteristics of the 29 newborns who sustained a fall in the hospital are shown in Table 1. Twenty-two newborns (75.9%) were breastfeeding exclusively compared with 7 (24.1%) who were receiving a combination of breast milk and formula or formula exclusively; most of the falls occurred

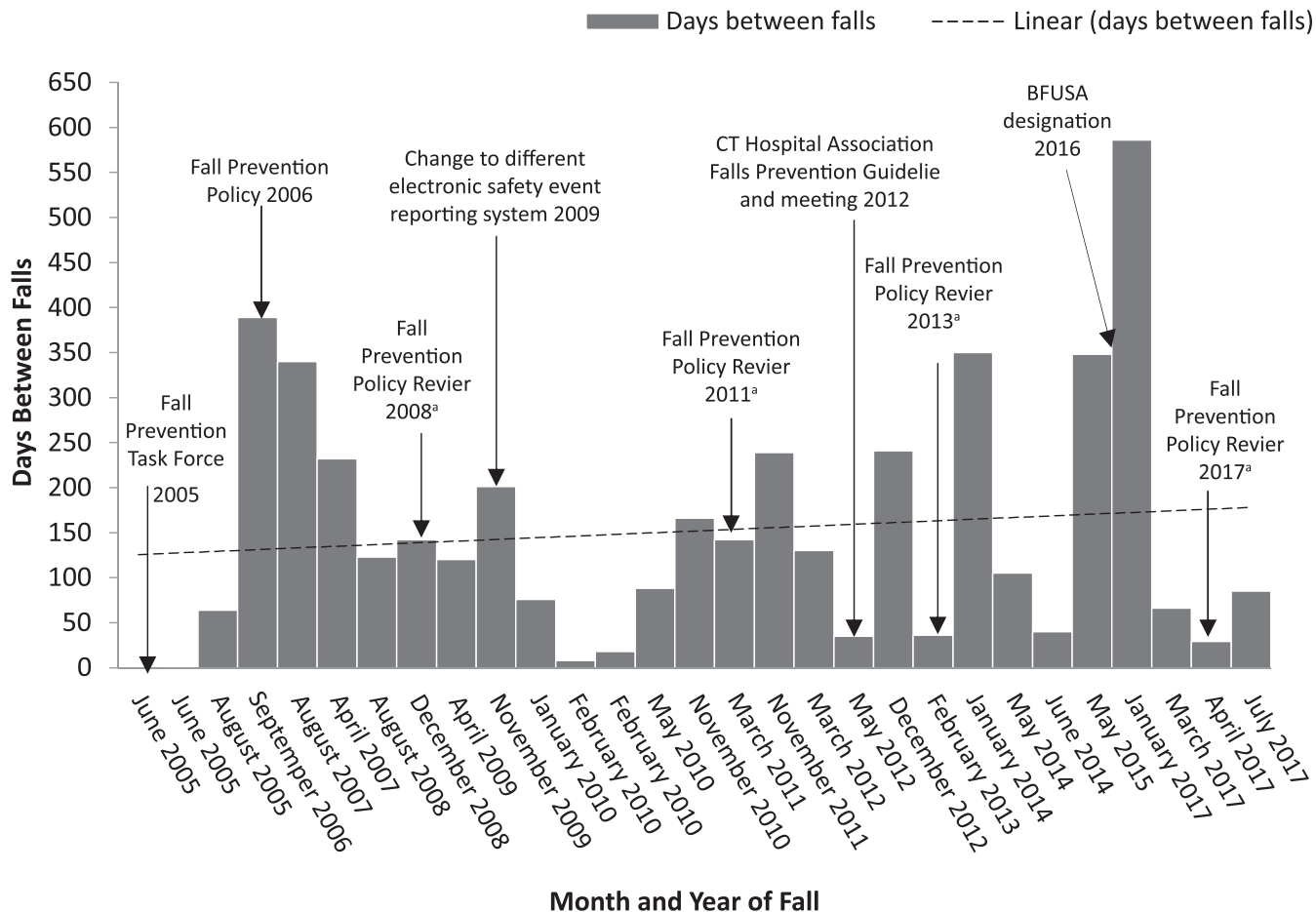


FIGURE 1 Days between newborn falls ($N = 29$) and specific interventions. ^a Each review of the Fall Prevention Policy included the reeducation of staff about the policy. CT, Connecticut.

between 24 and 48 hours of life (58.6%) compared with 24.1% at <24 hours of age and 17.2% after 48 hours of age. Circumstances surrounding the falls are shown in Table 2. All falls occurred in

postpartum rooms. In most instances, the mother was with the newborn at the time of the fall (65.5%) compared with the father (31.0%) or both the mother and father (3.4%) being with the newborn. Regarding

location immediately before the fall, newborns were either in the mother's bed (62.1%), on a couch or chair with a parent (20.7%), or in the parent's arms (17.2%). Of 29 newborn falls, in 18 cases (62.1%), a parent was sleeping with the newborn. Twenty-three newborns (79.3%) were feeding at the time of the fall. Of these 23 newborn falls, in 6 cases, the mother fell asleep while feeding the infant. Most newborn falls occurred during the 11 PM to 6:59 AM nursing shift (62.1%).

All newborns who fell were monitored in the NICU after the fall. Thirteen newborns (44.8%) received imaging of the head and/or neck, during which 4 abnormalities were found. Abnormal findings included a small parietal skull fracture¹ and hematomas.³ No acute neurosurgical intervention was required on any of the newborns monitored in the NICU.

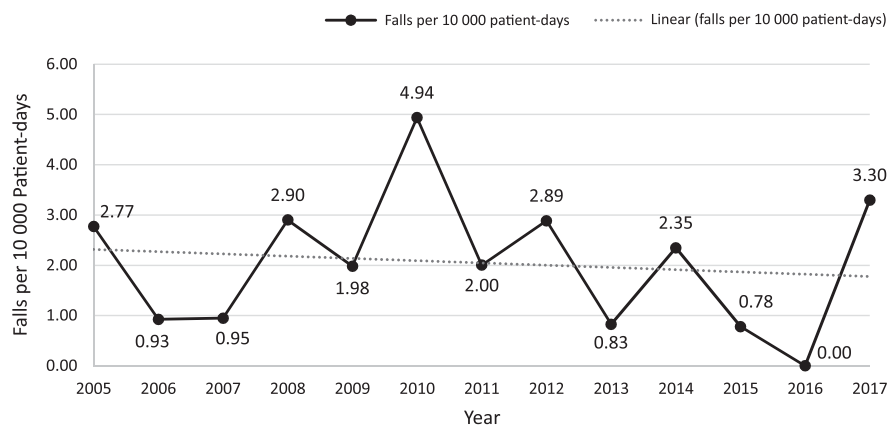


FIGURE 2 Newborn falls per 10 000 patient-days (2005–2017).

TABLE 1 Characteristics of Newborns and Their Mothers (*N* = 29)

Characteristic	<i>n</i> (%)
Feeding	
Breast milk	22 (75.9)
Formula only	5 (17.2)
Combination	2 (6.9)
Mother's first child	
Yes	18 (62.1)
No	11 (37.9)
Age at fall, h of life	
24–48	17 (58.6)
<24	7 (24.1)
>48	5 (17.2)
Delivery type	
Vaginal	17 (58.6)
Cesarean	12 (41.4)
Mother's race and/or ethnicity ^a	
White	18 (62.1)
African American	9 (31.0)
Asian American	1 (3.4)
Hispanic	1 (3.4)
Mother's age, y	
25–34	13 (44.8)
<25	12 (41.4)
≥35	4 (13.8)
Gestational age, wk ^b	
Term	28 (96.5)
Late preterm	1 (3.4)
Sex	
Male	16 (55.2)
Female	13 (44.8)
Birth weight percentile ^c	
AGA	25 (86.2)
SGA	2 (6.9)
LGA	2 (6.9)

AGA, appropriate for gestational age; LGA, large for gestational age; SGA, small for gestational age.

^a As reported in the medical record.

^b Term is ≥37 wk; late preterm is 35–37 wk.

^c By using Fenton growth charts. AGA is defined as birth weight in the 10th to 90th percentile for gestational age, SGA is <10th percentile, and LGA >90th percentile.

TABLE 2 Circumstances Surrounding Newborn Falls (*N* = 29)

Characteristic	<i>n</i> (%)
Newborn feeding at the time of fall	
Yes	23 (79.3)
No	6 (20.7)
Parent sleeping with newborn at the time of fall	
Yes	18 (62.1)
No	11 (37.9)
Parent with newborn at the time of fall	
Mother	19 (65.5)
Father	9 (31.0)
Both mother and father	1 (3.4)
Newborn location immediately before fall	
In mother's bed	18 (62.1)
On couch or chair with parent	6 (20.7)
In parent's arms ^a	5 (17.2)
Time of fall	
11 PM–6:59 AM	18 (62.1)
3 PM–10:59 PM	7 (24.1)
7 AM–2:59 PM	4 (13.8)
Day of the week ^b	
Weekday	19 (65.5)
Weekend	10 (34.5)
Mother's medications 6 h before newborn fall ^c	
Nonsteroidal anti-inflammatory	16 (47.1)
Narcotic	9 (26.5)
None	5 (14.7)
Other	4 (11.8)

^a In 2 instances, the parent fell while holding the infant.

^b Weekday included Monday, Tuesday, Wednesday, Thursday, and Friday. Weekend included Saturday and Sunday.

^c Unknown in falls involving the father. Ibuprofen was the most commonly used nonsteroidal anti-inflammatory pain medication. Narcotics included oxycodone and acetaminophen (*n* = 6), hydromorphone (*n* = 1), and oxycodone (*n* = 2). "Other" included diphenhydramine (*n* = 1), acetaminophen (*n* = 2), and lorazepam (*n* = 1). Numbers add to >29 because a mother may have been on >1 medication.

the downward trend in the number of falls per 10 000 patient-days over the study period reveals a positive movement toward preventing newborn falls in our hospital. It is possible that a heightened awareness of newborn falls was created, resulting in a higher number of falls reported. After each newborn fall, there were debriefings, reminders to staff, and education to parents. Witnessing a newborn fall was distressing to staff, which resulted in increased awareness in the days and months after the event. We observed that there were fewer falls in the year after higher fall frequency, but those periods were short lived. It may be that the immediate postevent vigilance waned with time until the next event. This highlights the challenge of completely eradicating newborn falls and is a call to action for hospitals to not risk complacency.

Many parents were asleep with their newborns either in bed or on the couch at the time of the fall in our study. Bed-sharing with infants is strongly discouraged by pediatricians because of the risk for sudden unexpected infant death but continues to be a problem despite recommendations.¹³ The American Academy of Pediatrics recommends room sharing without bed-sharing during the postpartum stay and at home to support breastfeeding and infant bonding along with safe infant sleep practices.¹⁴ In the state of Connecticut, the Department of Health requires that hospitals provide new parents with education on safe infant sleep practices.¹⁵ At our hospital, this information is reviewed with parents on admission and reinforced throughout the hospital stay. Some hospitals require parents to review and sign a document indicating that education on safe sleep practices and newborn fall prevention has been provided. The effect of signing such a document on safe sleep practices and newborn falls is unclear.

Most newborns who sustained a fall were breastfeeding in the mother's room at the time of the fall. At our hospital, mothers are educated on the benefits of breastfeeding and are supported to breastfeed. Mothers are encouraged to room-in with their newborns to further support

frequency of 3.9 falls per 10 000 live births reported in Oregon in 2010.⁹ Despite the efforts of the Newborn Falls Prevention Task Force in leading education, awareness, and reporting initiatives, there was an average of 2 newborn falls per year over our study period. The overall upward trend in the number of days between newborn falls and

breastfeeding.¹² Rooming-in is defined as allowing mothers and infants to remain together 24 hours per day. Authors of previous studies have reported that new mothers often fall asleep in their hospital beds, and rooming-in with their newborns increases the risk for adverse events, such as falls.¹⁶ However, in the year preceding and including the year our hospital received BFUSA designation, we had the lowest number of newborn falls per 10 000 patient-days (0.78) and 0 falls, respectively. This may be because of the intense focus on safe nursing practices around feeding, safe sleep, and rooming-in during those months. In the year after receiving BFUSA designation, the number of falls per 10 000 patient-days increased, and this may have been because of change fatigue.

Some hospitals have developed nursing-led enhanced education, hourly rounding, and safety bundles as prevention strategies, with some success.^{14,16-20} In a study by Slogar et al²¹, investigators describe their experience with the surveillance of near misses in an effort to identify situations involving a high risk for a newborn fall. High-risk situations described by Slogar et al²¹ were identified by the nurses and included high levels of maternal fatigue, recent pain medication, and night shift hours.¹⁹ With our findings, we support those reported by Slogar et al²¹ regarding the increased frequency of newborn falls during the night shift and parent fatigue (24–48 hours of life). In our hospital's Newborn Fall Prevention policy, postpartum staff implement universal newborn fall precautions, which include enhanced nighttime vision with a nightlight or bathroom light, especially when feeding. Less than 5% of newborns who fell had 2 parents in the room. One consideration for hospitals that practice rooming-in is to encourage a second caregiver to be with the mother, particularly overnight after 24 hours.

Our study has several limitations. Because it is an observational study, it is problematic for us to draw conclusions about factors potentially associated with newborn falls. Although we observed a high frequency of falls in newborns who were breastfeeding, our sample size was not large enough to perform a multivariable analysis to evaluate

this observation. Our study was not designed for us to detect factors associated with increased fall risk, and we did not collect information on infants who did not sustain falls. The combination of feeding and rooming-in during the immediate postpartum recovery period and the relationship with newborn falls is an area needing further study. Another limitation is that periodic education of staff regarding the importance of reporting falls in the electronic reporting system resulted in varying levels of reporting, and our findings are limited to observations in our institution.

CONCLUSIONS

In our study, we highlight an infrequent but concerning problem of newborn falls on the hospital's Maternity and Well Newborn unit. Although our study is small, targeted efforts to decrease falls among newborns should, at minimum, be directed toward the nighttime hours and the immediate postpartum recovery period and include fall prevention education, with a specific focus on safe sleep practices and feeding. The infrequent occurrence of newborns falls risks complacency among hospital staff, and there may be a role for periodic simulation exercises as an additional educational intervention to maintain attentiveness. Other strategies include hourly rounding, safety bundles that include education, parent safety agreements, and reporting of falls and near misses. Our findings reveal the need for more large-scale, rigorous studies in which the authors look at potential factors associated with newborn falls or near misses, such as rooming-in, feeding, and unsafe sleep practices, to better target education for new parents and to help create effective prevention strategies for hospitals.

REFERENCES

1. Joint Commission on the Accreditation of Healthcare Organizations (JCAHO). Sentinel event alert 55: preventing falls and fall-related injuries in health care facilities. Available at: https://www.jointcommission.org/sea_issue_55/. Accessed December 20, 2017
2. Centers for Disease Control and Prevention. CDC childhood injury report: patterns of unintentional injuries among

- 0-19 year olds in the United States, 2000-2006. Available at: <https://www.cdc.gov/safechild/pdf/cdc-childhoodinjury.pdf>. Accessed December 20, 2017
3. Levene S, Bonfield G. Accidents on hospital wards. *Arch Dis Child*. 1991;66(9):1047-1049
4. Razmus I, Wilson D, Smith R, Newman E. Falls in hospitalized children. *Pediatr Nurs*. 2006;32(6):568-572
5. Cooper CL, Nolt JD. Development of an evidence-based pediatric fall prevention program. *J Nurs Care Qual*. 2007;22(2):107-112
6. Hill-Rodríguez D, Messmer PR, Williams PD, et al. The Humpty Dumpty Falls Scale: a case-control study. *J Spec Pediatr Nurs*. 2009;14(1):22-32
7. Monson SA, Henry E, Lambert DK, Schmutz N, Christensen RD. In-hospital falls of newborn infants: data from a multihospital health care system. *Pediatrics*. 2008;122(2). Available at: www.pediatrics.org/cgi/content/full/122/2/e277
8. Matteson T, Henderson-Williams A, Nelson J. Preventing in-hospital newborn falls: a literature review. *MCN Am J Matern Child Nurs*. 2013;38(6):359-366, quiz 367-368
9. Helsley L, McDonald JV, Stewart VT. Addressing in-hospital "falls" of newborn infants. *Jt Comm J Qual Patient Saf*. 2010;36(7):327-333
10. Will SB, Hennicke KP, Jacobs LS, O'Neill LM, Raab CA. The perinatal patient safety nurse: a new role to promote safe care for mothers and babies. *J Obstet Gynecol Neonatal Nurs*. 2006;35(3):417-423
11. RL Solutions. *Patient Safety Software*. Toronto, Canada: RL Solutions; 2018
12. Baby-Friendly USA. The ten steps to successful breastfeeding. Available at: <https://www.babyfriendlyusa.org/about-us/10-steps-and-international-code>. Accessed December 20, 2017
13. Ainsworth RM, Summerlin-Long S, Mog C. A comprehensive initiative to prevent falls among newborns. *Nurs Womens Health*. 2016;20(3):247-257
14. Moon RY; Task Force on Sudden Infant Death Syndrome. SIDS and other

- sleep-related infant deaths: evidence base for 2016 updated recommendations for a safe infant sleeping environment. *Pediatrics*. 2016; 138(5):e20162940
15. Connecticut State Department of Public Health. Sec. 19a-55b. Information on newborn infant safe sleep practices. Available at: https://www.cga.ct.gov/current/pub/chap_368a.htm#sec_19a-55b. Accessed December 20, 2017
 16. Lipke B, Gilbert G, Shimer H, et al. Newborn safety bundle to prevent falls and promote safe sleep. *MCN Am J Matern Child Nurs*. 2018;43(1): 32–37
 17. Teuten P, Bolger S, Paul SP. Need for improved recognition of in-hospital newborn falls. *Aust Nurs Midwifery J*. 2015;23(1):28–31
 18. Wallace SC. Preventing newborn falls while supporting family bonding. *Am J Nurs*. 2015;115(11):58–61
 19. Wallace SC. Balancing family bonding with newborn safety. *Pennsylvania Patient Safety Advisory*. 2014;11(3): 102–108
 20. Hodges KT, Gilbert JH. Rising above risk: eliminating infant falls. *Nurs Manage*. 2015;46(12):28–32
 21. Slogar A, Gargiulo D, Bodrock J. Tracking 'near misses' to keep newborns safe from falls. *Nurs Womens Health*. 2013;17(3): 219–223