

Learning From National and State Trends in Sudden Unexpected Infant Death

Rebecca Carlin, MD,^{a,b} Rachel Y. Moon, MD^c

In their analysis of national and state trends in US sudden unexpected infant death (SUID) rates in this month's issue of *Pediatrics*, Erck Lambert et al¹ demonstrate that declines in SUID rates have plateaued for the past 2 decades. The state-by-state data in which large disparities in SUID rates are shown should both raise alarm in the 22 states where rates are increasing and bring light to prevention efforts in the 9 states with the largest declines.

Widespread education about safe sleep environments (eg, the Back to Sleep campaign) was associated with large decreases in SUID rates between 1990 and 2002. However, the effectiveness of such campaigns may have peaked as they have encountered cultural barriers, Internet misinformation, and countercampaigns. In light of this, how should we, as health care and public health professionals, proceed?

First, we should recognize that among developed countries, the United States has the highest SUID rate. In a recent international comparison, researchers found that among 8 developed countries, the United States had the highest mean 2002–2010 postneonatal mortality rates (of which SUID comprises the majority) at 2.25 per 1000 live births, ~70% higher than the other countries; only New Zealand, at 2.14 per 1000 live births, came close.² To understand these differences, we must begin to look at variations in national policies. Of these countries, the United States is the only one that does not provide

universal health care,³ home visitors in the neonatal period,⁴ and universal paid maternity leave.⁵ All of these are important protective factors for infant mortality.^{6–8} Additionally, these policies may have positive downstream effects on parental practices. The education received during prenatal care and by home visitors establishes a social norm for safe sleep. Parents are continually encouraged (and assisted in their efforts) by home visitors to breastfeed and to place the infant supine. Many healthy infant care practices (eg, breastfeeding, supine sleep position, safe infant sleep location) cease when the mother returns to work because of poor work support, new caregivers,^{9,10} or the need for increased parental sleep.^{11–14} In the United States, most mothers must return to work when the infant is 1 to 4 months of age, which coincides with the highest risk period for SUID.¹⁵

It is unlikely that, in the current political climate, universal changes in health care, home visitor programs, and parental leave policies on the national scale will occur. Thus, we should look at changes that we can make locally. Although Erck Lambert et al¹ point out that it may be difficult to discern what changes may have been responsible for the state-by-state variability in SUID trends, and although most areas have not committed funding to conduct rigorous trials, there may still be lessons that can be applied to further prevent SUIDs in this country.

FREE

^aDivision of General Pediatrics and Community Health, Goldberg Center for Community Pediatric Health, Children's National Medical Center, Washington, District of Columbia; ^bDepartment of Pediatrics, George Washington University School of Medicine and Health Sciences, Washington, District of Columbia; and ^cDivision of General Pediatrics, University of Virginia School of Medicine, Charlottesville, Virginia

Opinions expressed in these commentaries are those of the authors and not necessarily those of the American Academy of Pediatrics or its Committees.

DOI: <https://doi.org/10.1542/peds.2017-4083>

Accepted for publication Dec 11, 2017

Address correspondence to Rachel Y. Moon, MD, Division of General Pediatrics, University of Virginia, PO Box 800386, Charlottesville, VA 22908. E-mail: rym4z@virginia.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2018 by the American Academy of Pediatrics

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.

To cite: Carlin R and Moon RY. Learning From National and State Trends in Sudden Unexpected Infant Death. *Pediatrics*. 2018;141(3):e20174083

Surveying parental practices and turning to evidence-based strategies are important places to begin. For instance, maternal smoking has been found in >50 studies to increase SUID risk.¹⁶ The 5 states with the highest and rising SUID rates in Erck Lambert et al's¹ study have tobacco use rates in the top 2 quintiles (>18.6%),¹⁷ whereas only 1 of the 9 states with the most dramatic falls in SUID rates had similarly high tobacco use rates.¹⁷ Researchers in several studies have looked at financial incentives as a way to encourage smoking cessation,¹⁸ including in a randomized controlled trial in Scotland, where 24% of pregnant women reported being a smoker. In this trial, in addition to providing stop-smoking support services, pregnant women were provided a financial incentive of up to 400 British pounds (~\$530) throughout their pregnancy to remain smoke free. Women receiving incentives had almost 4 times higher odds (adjusted odds ratio 3.88, 95% confidence interval 2.10–7.16) of remaining smoke free throughout pregnancy.¹⁹ Health districts in New Zealand and Scotland are funding financial incentives to help smokers quit (E.A. Mitchell, DCH, DSc (Med) and D. Tappin MBBS, MD, MSc, personal communication). Given estimates that one-third of sudden infant death syndrome deaths could be prevented if all maternal smoking during pregnancy was eliminated,^{16,20} implementation of similar programs could help significantly lower SUID rates.

As Erck Lambert et al¹ noted, the opioid crisis in the United States may also be a new and yet poorly defined variable in the SUID environment. In one prospective cohort study, researchers found that infants exposed to methadone, heroin, or methadone and heroin had 3.6-, 2.3-, and 3.2-fold increases in SUID, respectively.²¹ Researchers

in another study found a 15-fold increased sudden infant death syndrome rate for opiate-exposed infants.²² It remains unclear if the risk to infants is from the exposure itself, disparate infant care practices, or the increased risk that an impaired caregiver poses. As more infants are born to mothers actively using opiates, it is important for us to further examine these risks so they can be targeted in risk reduction.

In addition to substance and cigarette use, regional comparisons are important because there is still much work to be done with regard to improving sleep practices. US nonsupine sleep position rates are ~25%,^{14,23} whereas rates in other developed countries have consistently been <5%.^{24–30} US bed-sharing rates continue to increase,¹³ and rates of soft bedding use are consistently at 50%.³¹ Qualitative studies have revealed that parents make their infant care decisions largely on the basis of what they perceive will keep their infant both safe and comfortable.^{32–34} Thus, they place infants prone because they believe that supine positioning will increase the risk of aspiration or because the infant will sleep longer.³² They bed-share because they believe that this is the best way to monitor their infant while they are asleep and thus the best way to keep their infant safe.³³ They use soft bedding because they believe that the infant will be more comfortable or because they are concerned about the infant becoming injured against the hard, uncushioned crib sides.³⁴ For behavior change to occur, health care and public health professionals will need to understand and address parental concerns about safety and comfort.

It will also be critical for us to change the way that we communicate with parents and family members. Given widespread access to the Internet, where there

is a false equivalency between evidence-based recommendations and unsubstantiated statements about the safety of not following safe sleep recommendations, health care and public health professionals must be smarter with health messaging. We need to learn to communicate with parents using tools and applications that they already turn to on their mobile phones. One randomized controlled trial revealed that mobile messaging using text messages or e-mails with embedded videos was effective at improving safe sleep practices.³⁵ However, we also need to understand what types of messages work, and this will require partnering with experts in advertising and technology. We need to better use search engine algorithms so that we can increase the likelihood that when parents search “should my baby sleep on the stomach?” they will land on a Web site that provides evidence-based information.

As we approach the Healthy People 2020 goals, it is important for us to take stock and examine both our successes and failures. Although the SUID rate has continued to slowly trend downward nationally, ~3700 infants still die annually, and in many regions of the country the rate continues to rise. However, there are also regions that have had significant successes in decreasing their SUID rates. In the absence of a dramatic change in our health care delivery system that would enable more emphasis on public safety and prevention to improve infant mortality rates, we must commit to learning from local successes and applying them more broadly.

ABBREVIATION

SUID: sudden unexpected infant death

REFERENCES

1. Erck Lambert AB, Parks SE, Shapiro-Mendoza CA. National and state trends in sudden unexpected infant death: 1990–2015. *Pediatrics*. 2018;141(3):e20173519
2. Taylor BJ, Garstang J, Engelberts A, et al. International comparison of sudden unexpected death in infancy rates using a newly proposed set of cause-of-death codes. *Arch Dis Child*. 2015;100(11):1018–1023
3. Roy A. Conservative think tank: 10 countries with universal healthcare have freer economies than the U.S. 2015. Available at: <https://www.forbes.com/sites/theapothecary/2015/01/27/conservative-think-tank-10-countries-with-universal-health-care-are-economically-freer-than-the-u-s/#7b5dec45137e>. Accessed December 8, 2017
4. Council on Community Pediatrics. The role of preschool home-visiting programs in improving children's developmental and health outcomes. *Pediatrics*. 2009;123(2):598–603
5. Livingston G. Among 41 nations, U.S. is the outlier when it comes to paid parental leave. 2016. Available at: www.pewresearch.org/fact-tank/2016/09/26/u-s-lacks-mandated-paid-parental-leave/. Accessed November 28, 2017
6. Donovan EF, Ammerman RT, Besl J, et al. Intensive home visiting is associated with decreased risk of infant death. *Pediatrics*. 2007;119(6):1145–1151
7. Poma PA. Effect of prenatal care on infant mortality rates according to birth-death certificate files. *J Natl Med Assoc*. 1999;91(9):515–520
8. Nandi A, Hajizadeh M, Harper S, Koski A, Strumpf EC, Heymann J. Increased duration of paid maternity leave lowers infant mortality in low- and middle-income countries: a quasi-experimental study. *PLoS Med*. 2016;13(3):e1001985
9. Moon RY, Patel KM, Shaefer SJ. Sudden infant death syndrome in child care settings. *Pediatrics*. 2000;106(2, pt 1):295–300
10. Moon RY, Sprague BM, Patel KM. Stable prevalence but changing risk factors for sudden infant death syndrome in child care settings in 2001. *Pediatrics*. 2005;116(4):972–977
11. Ahluwalia IB, Morrow B, Hsia J. Why do women stop breastfeeding? Findings from the Pregnancy Risk Assessment and Monitoring System. *Pediatrics*. 2005;116(6):1408–1412
12. Baker M, Milligan K. Maternal employment, breastfeeding, and health: evidence from maternity leave mandates. *J Health Econ*. 2008;27(4):871–887
13. Colson ER, Willinger M, Rybin D, et al. Trends and factors associated with infant bed sharing, 1993-2010: the National Infant Sleep Position Study. *JAMA Pediatr*. 2013;167(11):1032–1037
14. Colson ER, Rybin D, Smith LA, Colton T, Lister G, Corwin MJ. Trends and factors associated with infant sleeping position: the national infant sleep position study, 1993-2007. *Arch Pediatr Adolesc Med*. 2009;163(12):1122–1128
15. Shapiro-Mendoza CK, Tomashek KM, Anderson RN, Wingo J. Recent national trends in sudden, unexpected infant deaths: more evidence supporting a change in classification or reporting. *Am J Epidemiol*. 2006;163(8):762–769
16. Mitchell EA, Milerad J. Smoking and the sudden infant death syndrome. *Rev Environ Health*. 2006;21(2):81–103
17. Centers for Disease Control and Prevention. Current cigarette use among adults (Behavior Risk Factor Surveillance System) 2016. Available at: <https://www.cdc.gov/statesystem/cigaretteuseadult.html>. Accessed December 6, 2017
18. Cahill K, Hartmann-Boyce J, Perera R. Incentives for smoking cessation. *Cochrane Database Syst Rev*. 2015;(5):CD004307
19. Tappin D, Bauld L, Purves D, et al; Cessation in Pregnancy Incentives Trial Team. Financial incentives for smoking cessation in pregnancy: randomised controlled trial. *BMJ*. 2015;350:h134
20. Dietz PM, England LJ, Shapiro-Mendoza CK, Tong VT, Farr SL, Callaghan WM. Infant morbidity and mortality attributable to prenatal smoking in the U.S. *Am J Prev Med*. 2010;39(1):45–52
21. Kandall SR, Gaines J, Habel L, Davidson G, Jessop D. Relationship of maternal substance abuse to subsequent sudden infant death syndrome in offspring. *J Pediatr*. 1993;123(1):120–126
22. Ward SL, Bautista D, Chan L, et al. Sudden infant death syndrome in infants of substance-abusing mothers. *J Pediatr*. 1990;117(6):876–881
23. Colson ER, Geller NL, Heeren T, Corwin MJ. Factors associated with choice of infant sleep position. *Pediatrics*. 2017;140(3):e20170596
24. Alm B, Möllborg P, Erdes L, et al. SIDS risk factors and factors associated with prone sleeping in Sweden. *Arch Dis Child*. 2006;91(11):915–919
25. Ball HL, Moya E, Fairley L, Westman J, Oddie S, Wright J. Infant care practices related to sudden infant death syndrome in South Asian and White British families in the UK. *Paediatr Perinat Epidemiol*. 2012;26(1):3–12
26. van Sleuwen BE, L'Hoir MP, Engelberts AC, Westers P, Schulpens TW. Infant care practices related to cot death in Turkish and Moroccan families in the Netherlands. *Arch Dis Child*. 2003;88(9):784–788
27. Hutchison BL, Thompson JM, Mitchell EA. Infant care practices related to sudden unexpected death in infancy: a 2013 survey. *N Z Med J*. 2015;128(1408):15–22
28. Vennemann MM, Findeisen M, Butterfass-Bahloul T, et al; GeSID Group. Modifiable risk factors for SIDS in Germany: results of GeSID. *Acta Paediatr*. 2005;94(6):655–660
29. Hirabayashi M, Yoshinaga M, Nomura Y, et al. Environmental risk factors for sudden infant death syndrome in Japan. *Eur J Pediatr*. 2016;175(12):1921–1926

30. Nelson EAS, Taylor BJ. International Child Care Practices Study: infant sleep position and parental smoking. *Early Hum Dev.* 2001;64(1): 7–20
31. Shapiro-Mendoza CK, Colson ER, Willinger M, Rybin DV, Camperlengo L, Corwin MJ. Trends in infant bedding use: National Infant Sleep Position study, 1993-2010. *Pediatrics.* 2015;135(1):10–17
32. Oden RP, Joyner BL, Ajao TI, Moon RY. Factors influencing African American mothers' decisions about sleep position: a qualitative study. *J Natl Med Assoc.* 2010;102(10):870–872, 875–880
33. Joyner BL, Oden RP, Ajao TI, Moon RY. Where should my baby sleep: a qualitative study of African American infant sleep location decisions. *J Natl Med Assoc.* 2010;102(10):881–889
34. Ajao TI, Oden RP, Joyner BL, Moon RY. Decisions of black parents about infant bedding and sleep surfaces: a qualitative study. *Pediatrics.* 2011;128(3):494–502
35. Moon RY, Hauck FR, Colson ER, et al. The effect of nursing quality improvement and mobile health interventions on infant sleep practices: a randomized clinical trial. *JAMA.* 2017;318(4):351–359

Learning From National and State Trends in Sudden Unexpected Infant Death

Rebecca Carlin and Rachel Y. Moon

Pediatrics 2018;141;

DOI: 10.1542/peds.2017-4083 originally published online February 12, 2018;

Updated Information & Services

including high resolution figures, can be found at:
<http://pediatrics.aappublications.org/content/141/3/e20174083>

References

This article cites 32 articles, 13 of which you can access for free at:
<http://pediatrics.aappublications.org/content/141/3/e20174083#BIBL>

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):
Fetus/Newborn Infant
http://www.aappublications.org/cgi/collection/fetus:newborn_infant_sub
SIDS
http://www.aappublications.org/cgi/collection/sids_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Learning From National and State Trends in Sudden Unexpected Infant Death

Rebecca Carlin and Rachel Y. Moon

Pediatrics 2018;141;

DOI: 10.1542/peds.2017-4083 originally published online February 12, 2018;

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/141/3/e20174083>

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2018 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

