

## Supplementary Online Content

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*. doi:10.1001/jama.2017.8982

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**eReferences**

This supplementary material has been provided by the authors to give readers additional information about their work.

**eTable 1.** Video topics

<b>Safe Sleep</b>
Importance of sleep position Choking and sleep position Importance of sleep space Bedsharing Handling advice from others Mattress safety Soft bedding Feeding baby in bed Pacifiers Dangers of smoking Infant sleep patterns
<b>Breastfeeding</b>
Importance of breastfeeding How to start breastfeeding How often to breastfeed Hunger cues What to do if baby is always hungry Benefits of breastmilk How long it takes for milk to come in Latching on Avoiding breast discomfort/pain Dealing with fussy baby Getting support from others Economics of breastfeeding Breastfeeding when returning to work

**eTable 2.** Demographic characteristics of respondents and non-respondents at enrollment during birth hospitalization

	<b>Respondents</b>	<b>Non-respondents</b>	<b>Total</b>	<b>Chi-sq. p-value*</b>
	N=1263	N=337	1600	
	N (%)	N (%)	N (%)	
<b>Infant sex</b>				0.5206
Male	616 (48.8)	171 (50.7)	787 (49.2)	
Female	647 (51.2)	166 (49.3)	813 (50.8)	
<b>Parity</b>				0.2039
1	526 (41.6)	140 (41.5)	666 (41.6)	
2	419 (33.2)	98 (29.1)	517 (32.3)	
≥3	318 (25.2)	99 (29.4)	417 (26.1)	
<b>Mother's Age</b>				<.0001
Less than 20 y	85 (6.7)	37 (11.0)	122 (7.6)	
20-29 y	644 (51.0)	205 (60.8)	849 (53.1)	
30 or more y	534 (42.3)	95 (28.2)	629 (39.3)	
<b>Mother's Race/Ethnicity</b>				<.0001
Non-Hispanic White	414 (32.8)	71 (21.1)	485 (30.3)	
Non-Hispanic Black	344 (27.2)	133 (39.5)	477 (29.8)	
Hispanic	408 (32.3)	112 (33.2)	520 (32.5)	
Other	97 (7.7)	21 (6.2)	118 (7.4)	
<b>Mother's Education</b>				<.0001
Less than high school	88 (7.0)	44 (13.1)	132 (8.3)	
High school or GED**	312 (24.8)	117 (34.8)	429 (26.9)	
Some college	438 (34.8)	110 (32.7)	548 (34.4)	
College or more	420 (33.4)	65 (19.3)	485 (30.4)	
<b>Marital Status</b>				<.0001
Married	640 (51.3)	106 (31.9)	746 (47.2)	
Never married	552 (44.2)	209 (63.0)	761 (48.2)	
Separated, divorced, or widowed	56 (4.5)	17 (5.1)	73 (4.6)	
<b>Household Income</b>				<.0001
Less than \$20,000	181 (14.3)	53 (15.7)	234 (14.6)	
\$20,000-49,999	239 (18.9)	73 (21.7)	312 (19.5)	
\$50,000 or more	435 (34.4)	57 (16.9)	492 (30.8)	
Unknown	408 (32.3)	154 (45.7)	562 (35.1)	
<b>Infant age at followup maternal survey</b>				
8-11 weeks	917 (72.7)	--	917 (72.7)	--
12-15 weeks	172 (13.6)	--	172 (13.6)	

	<b>Respondents</b>	<b>Non-respondents</b>	<b>Total</b>	<b>Chi-sq. p-value*</b>
16-19 weeks	87 (6.9)	--	87 (6.9)	
≥20 weeks	87 (6.9)	--	87 (6.9)	

\*P-value specifies comparison between respondents and non-respondents

\*\*GED: General Equivalency Diploma

**eTable 3.** Characteristics of Study of Attitudes and Factors Effecting Infant Care Practices (SAFE)<sup>1,2</sup> study participants at enrollment during birth hospitalization, used to calculate baseline rates of infant care practices

	<b>Study Group</b>			
	<b>Breastfeeding</b>	<b>Safe Sleep</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>
<b>Nursing Quality Improvement Intervention</b>				
<b>Mobile Health Intervention</b>				
	N=417	N=387	N=421	N=379
	N (%)	N (%)	N (%)	N (%)
<b>Infant sex</b>				
Male	210 (50.4)	203 (52.5)	212 (50.5)	198 (52.4)
Female	207 (49.6)	184 (47.5)	208 (49.5)	180 (47.6)
<b>Parity</b>				
1	184 (44.3)	138 (35.8)	149 (35.5)	159 (42.0)
2	137 (33.0)	139 (36.0)	142 (33.8)	120 (31.7)
≥3	94 (22.7)	109 (28.2)	129 (30.7)	100 (26.4)
<b>Mother's Age</b>				
Less than 20 y	30 (7.2)	33 (8.5)	24 (5.7)	39 (10.3)
20-29 y	213 (51.1)	197 (50.9)	222 (52.7)	213 (56.2)
30 or more y	174 (41.7)	157 (40.6)	175 (41.6)	127 (33.5)
<b>Mother's Race/Ethnicity</b>				
Non-Hispanic White	155 (37.3)	93 (24.0)	155 (36.8)	117 (30.9)
Non-Hispanic Black	110 (26.4)	183 (47.3)	120 (28.5)	97 (25.6)
Hispanic	99 (23.8)	72 (18.6)	96 (22.8)	130 (34.3)
Other	52 (12.5)	39 (10.1)	50 (11.9)	35 (9.2)
<b>Mother's Education</b>				
Less than high school	20 (4.8)	54 (14.0)	17 (4.0)	51 (13.5)
High school or GED*	86 (20.6)	109 (28.2)	100 (23.8)	87 (23.1)
Some college	139 (33.3)	115 (29.7)	155 (36.8)	123 (32.6)
College or more	172 (41.2)	109 (28.2)	149 (35.4)	116 (30.8)
<b>Marital Status</b>				
Married	232 (56.0)	162 (41.9)	243 (58.0)	168 (44.6)
Never married	166 (40.1)	212 (54.8)	157 (37.5)	183 (48.5)
Separated, divorced, or widowed	16 (3.9)	13 (3.4)	19 (4.5)	26 (6.9)
<b>Household Income</b>				
Less than \$20,000	121 (29.0)	161 (41.6)	105 (24.9)	156 (41.2)
\$20,000-49,999	81 (19.4)	81 (20.9)	101 (24.0)	79 (20.8)
\$50,000 or more	83 (19.9)	44 (11.4)	98 (23.3)	68 (17.9)
Unknown	132 (31.7)	101 (26.1)	117 (27.8)	76 (20.1)
<b>Infant age at followup</b>				

	<b>Study Group</b>			
<b>Nursing Quality Improvement Intervention</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>
<b>Mobile Health Intervention</b>	<b>Breastfeeding</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>	<b>Safe Sleep</b>
<b>maternal survey</b>				
8-11 weeks	255 (61.2)	253 (65.4)	238 (56.5)	209 (55.1)
12-15 weeks	72 (17.3)	51 (13.2)	83 (19.7)	79 (20.8)
16-19 weeks	42 (10.1)	44 (11.4)	44 (10.5)	35 (9.2)
≥20 weeks	48 (11.5)	39 (10.1)	56 (13.3)	56 (14.8)

**eTable 4.** Effects of the Nursing Quality Improvement and Mobile Health interventions by maternal survey at infant age  $\geq 60$  days, imputation analysis

	<b>Study Group</b>			
<b>Nursing Quality Improvement (NQI) Intervention</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>
<b>Mobile Health (mHealth) Intervention</b>	<b>Breastfeeding</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>	<b>Safe Sleep</b>
<b>Usual Sleep Position in Past 2 Weeks</b>				
<b>Usual Supine Sleep Position</b>	<b>N=400</b>	<b>N=400</b>	<b>N=400</b>	<b>N=400</b>
Unadjusted number and percent	315 (78.8%)	302 (75.5%)	348 (87.0%)	364 (90.9%)
Adjusted NQI Effect*#	aR <sub>C</sub> =78.8, aR <sub>NQI</sub> =81.6, aRD <sub>NQI</sub> =2.8 (-3.7, 7.9), p=0.38			
Adjusted mHealth Effect#	aR <sub>C</sub> =78.8, aR <sub>mH</sub> =87.8, aRD <sub>mH</sub> =9.0 (4.2, 12.6), p=0.003			
Test for Interaction^	p=0.05			
<b>Usual Sleep Location in Past 2 Weeks</b>				
<b>Usual Room sharing without bedsharing</b>	<b>N=400</b>	<b>N=400</b>	<b>N=400</b>	<b>N=400</b>
Unadjusted number and percent	279 (69.7%)	298 (74.6%)	316 (79.0%)	340 (85.0%)
Adjusted NQI Effect#	aR <sub>C</sub> =69.7, aR <sub>NQI</sub> =73.6, aRD <sub>NQI</sub> =3.9 (-1.1, 8.4), p=0.38			
Adjusted mHealth Effect#	aR <sub>C</sub> =69.7, aR <sub>mH</sub> =81.7, aRD <sub>mH</sub> =12.0 (8.1, 15.3), p<0.001			
Test for Interaction^	p=0.55			
<b>Soft Bedding Use## in Past 2 Weeks</b>				
<b>No soft bedding use</b>	<b>N=400</b>	<b>N=400</b>	<b>N=400</b>	<b>N=400</b>
Unadjusted number and percent	270 (67.4%)	271 (67.7%)	310 (77.5%)	326 (81.6%)
Adjusted NQI Effect#	aR <sub>C</sub> =67.4, aR <sub>NQI</sub> =70.8, aRD <sub>NQI</sub> =3.4 (-2.6, 8.9), p=0.38			
Adjusted mHealth Effect#	aR <sub>C</sub> =67.4, aR <sub>mH</sub> =79.1, aRD <sub>mH</sub> =11.7 (6.9, 15.8), p<0.001			
Test for Interaction^	p=0.50			
<b>Pacifier Use in Past 2 Weeks</b>				
<b>Any pacifier use**</b>	<b>N=400</b>	<b>N=400</b>	<b>N=400</b>	<b>N=400</b>
Unadjusted number and percent	241 (60.2%)	264 (66.1%)	274 (68.6%)	295 (73.7%)

	<b>Study Group</b>			
<b>Nursing Quality Improvement (NQI) Intervention</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>
<b>Mobile Health (mHealth) Intervention</b>	<b>Breastfeeding</b>	<b>Breastfeeding</b>	<b>Safe Sleep</b>	<b>Safe Sleep</b>
Adjusted NQI Effect#	aR <sub>C</sub> =60.2, aR <sub>NQI</sub> =65.9, aRD <sub>NQI</sub> =5.7 (-1.0, 11.9), p=0.38			
Adjusted mHealth Effect#	aR <sub>C</sub> =60.2, aR <sub>mH</sub> =67.0, aRD <sub>mH</sub> =6.8 (0.0, 12.8), p=0.05			
Test for Interaction <sup>^</sup>	p=0.84			

\* Adjusted for infant age at survey and sex, and mother's age, parity, race, educational level, marital status, household income, and pre-study SAFE outcome rate (by hospital, pre-study SAFE rates not available for soft bedding use).

# Adjusted risk (aR) (%) for control group and intervention group; adjusted risk difference (aRD) calculated from odds ratios and confidence intervals from logistic regression. p-value from logistic regression adjusted for multiple outcome measures using Hochberg's method.

<sup>^</sup> p-value from test for multiplicative interaction in the logistic regression model

## Soft bedding included heavy blanket or quilt or comforter, rug, stuffed toys, cushion or pillow, adult sleeping bag, cloth diaper or towel, pad on top of sheet, bumpers, and sleep positioners or wedges.

\*\*Includes responses of "usually use pacifier" and "sometimes use pacifier."



**eTable 5.** Safe sleep outcomes of Breastfeeding Nursing Quality Improvement/Breastfeeding Mobile Health (control) and Safe Sleep Nursing Quality Improvement/Safe Sleep Mobile Health Groups, by race/ethnicity, when infant was  $\geq 60$  days of age\*

<b>Intervention group Nursing Quality Improvement/Mobile Health</b>	<b>Infant care practice</b>	<b>All</b>	<b>White</b>	<b>Black</b>	<b>Hispanic</b>	<b>Other**</b>
	Sleep Position					
Breastfeeding/Breastfeeding	N=303	243 (80.2%)	82 (90.1%)	55 (66.3%)	82 (82.8%)	24 (80.0%)
Safe Sleep/Safe Sleep	N=318	294 (92.5%)	116 (91.3%)	60 (85.7%)	106 (97.2%)	12 (100%)
	Sleep Location					
Breastfeeding/Breastfeeding	N=291	205 (70.5%)	64 (72.7%)	53 (67.9%)	70 (73.7%)	18 (60.0%)
Safe Sleep/Safe Sleep	N=313	269 (85.9%)	108 (85.7%)	57 (86.4%)	93 (85.3%)	11 (91.7%)
	Pacifier Use - Any					
Breastfeeding/Breastfeeding	N=291	174 (59.8%)	53 (59.6%)	51 (66.2%)	57 (60.0%)	13 (43.3%)
Safe Sleep/Safe Sleep	N=315	240 (76.2%)	100 (78.7%)	46 (67.6%)	84 (77.8%)	10 (83.3%)
	No soft bedding					

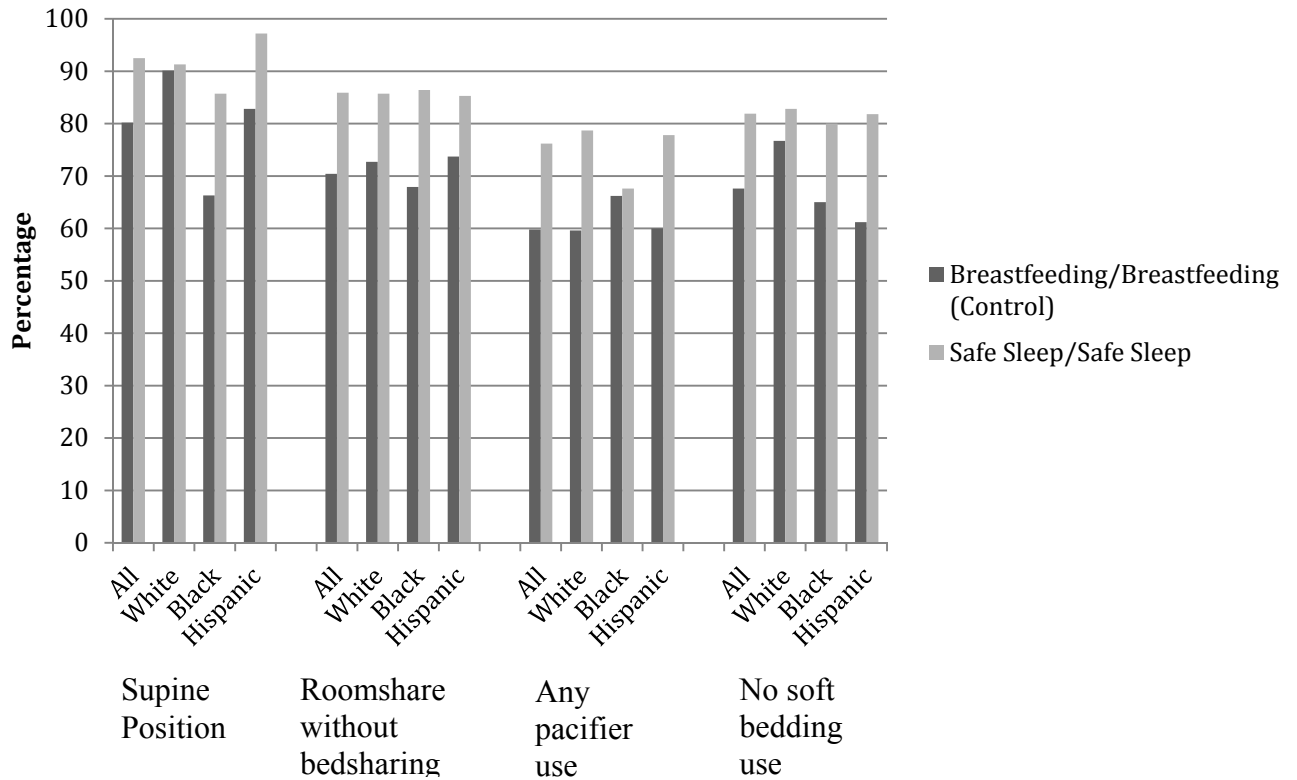
<b>Intervention group Nursing Quality Improvement/Mobile Health</b>	<b>Infant care practice</b>	<b>All</b>	<b>White</b>	<b>Black</b>	<b>Hispanic</b>	<b>Other**</b>
Breastfeeding/Breastfeeding	N=299	202 (67.6%)	69 (76.7%)	52 (65.0%)	60 (61.2%)	21 (67.7%)
Safe Sleep/Safe Sleep	N=320	262 (81.9%)	106 (82.8%)	56 (80.0%)	90 (81.8%)	10 (83.3%)

\*See eFigure for a graphical display of the frequency data

\*\*Note: 'Other' race/ethnicity group not included in eFigure

**eFigure.** Safe sleep outcomes of Breastfeeding Nursing Quality Improvement/Breastfeeding Mobile Health (control) and Safe Sleep Nursing Quality Improvement/Safe Sleep Mobile Health Groups, by race/ethnicity, when infant was >60 days of age

### Safe Sleep Outcomes by Race/Ethnicity\*



\*See eTable 5 for data on sample sizes.

**eReferences**

1. Eisenberg SR, Bair-Merritt MH, Colson ER, Heeren TC, Geller NL, Corwin MJ. Maternal Report of Advice Received for Infant Care. *Pediatrics* 2015;136:e315-22
2. Hwang SS, Rybin DV, Heeren TC, Colson ER, Corwin MJ. Trust in Sources of Advice about Infant Care Practices: The SAFE Study. *Matern Child Health J* 2016;20:1956-64