

A Comparison of Parents of Healthy Versus Sick Neonates: Is There a Difference in Readiness and/or Success in Quitting Smoking?

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ABSTRACT

OBJECTIVES: Study objectives were to compare smoking cessation rates between parents in the newborn nursery (NBN) versus the NICU and compare acceptance of referral to the New York State Smoker's Quitline (NYSSQL) between the 2 units. Secondary aims were to identify opportunities for improved smoking cessation interventions with parents of newborns.

METHODS: From January through December 2013, smoking parents/caregivers of infants in the NBN and NICU ($n = 226$) completed a 34-item questionnaire. For those who accepted electronic referral to the NYSSQL, participation/outcome data and questionnaire data were matched. Relationships were examined using the χ^2 test of independence.

RESULTS: The majority of respondents had cut back (56%) or quit (36%) prenatally. Seventy-nine percent of NBN parents accepted referred to the NYSSQL versus 53% of NICU parents; odds ratio = 3.31 (1.48–7.40; $P < .01$). At 7- to 8-month follow-up ($n = 35$): 11 of 28 (NBN) versus 0 of 7 (NICU) quit, 11 of 28 (NBN) versus 5 of 7 (NICU) cut back, 6 of 28 (NBN) versus 2 of 7 (NICU) did not quit/cut back ($P = .13$). Significantly more mothers (80%; 16/20) compared with fathers (46%; 6/13) quit/cut back, 20% (4/20) of mothers versus 54% (7/13) of fathers did not quit/cut back ($P = .04$). Exclusive formula-feeding rates were higher in this cohort of smokers surveyed than in all parents of infants admitted to the NBN/NICU for the same year (45% vs 13%).

CONCLUSIONS: In this study population, parents of healthy newborns were more receptive to quitline referrals than parents of infants admitted to the NICU.

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Results from recent studies suggest that the inpatient setting presents an opportunity for engaging parents in smoking cessation.¹⁻³ Although several studies have evaluated smoking cessation in parents of newborns, fewer have evaluated smoking cessation efforts targeting parents of newborns specifically in the postpartum hospital stay. In the Newborns Excel Without Secondhand Smoke (NEWS) study, Winickoff et al found that parents in the postpartum period were receptive to enrolling in tobacco cessation services and may be more motivated to quit at that time.¹

The adverse effects of smoking on the developing fetus are well established and include preterm delivery and low birth weight.⁴ Thirty percent to 60% of pregnant women quit smoking or cut back significantly before delivery.⁵ However, the relapse rate is high; up to 85% of women resume smoking in the postpartum period. Furthermore, smoking fathers may be less likely to receive advice or help in quitting prenatally because paternal smoking may not be perceived as directly harmful to the fetus.⁶ Promoting smoking cessation in the postpartum period is key in maintaining support for women who have cut back and in addressing cessation with those parents who have not yet quit. Addressing smoking cessation in the postpartum period may also provide an opportunity to promote breastfeeding because smoking is associated with higher formula-feeding rates.⁷

We examined whether there was any association between smoking cessation and having an infant in the newborn nursery (NBN) versus the NICU. Additionally, we compared acceptance rates for quitline services between the 2 units and explored opportunities for improved smoking cessation interventions with parents of newborns in both units.

METHODS

Implementation of Opt-to-Quit in the NBN and the NICU

In this study, we describe (1) the implementation of a new program in our hospital to refer smokers to the New York State Smoker's Quitline (NYSSQL) and (2) the administration of a survey to smoking

parents of infants admitted to the NBN and the NICU.

In 2012, we initiated a partnership with the NYSSQL to implement their new Opt-to-Quit program in 2 units of Stony Brook Children's Hospital, the NBN and the NICU. Stony Brook Children's is a 106-bed children's hospital within a hospital, with a 36-bed mother-infant postpartum unit (NBN) and a 50-bed level 3 NICU. On average, there are 4000 births per year. The Opt-to-Quit program establishes a systematic policy in which all smokers are offered referral to the NYSSQL before discharge from a health care facility.⁸ At our institution, templates were built within the existing electronic health record (EHR) to facilitate referral to the NYSSQL for any accepting smoker associated with patients in the NBN and NICU through direct data transfer from the EHR to the quitline. The process is standardized: the referring health care professional (in our institution, primarily nurses) reads a short text box, which serves as consent to obtain and transfer contact information. Once this information is entered into the chart, it is sent automatically to the NYSSQL. The smoker is contacted by the NYSSQL within 3 days and offered a range of quitline services, including telephone coaching and nicotine replacement therapy. The NYSSQL maintains a database of those referred, whether they have been reached, and whether they have quit (quit status), for an average of 7 months after the referral.

Participants and Smoking Survey

From January through December 2013, we administered a 34-item self-report questionnaire to all consenting smoking parents and other (smoking) primary caregivers of infants admitted to the NBN and the NICU. Respondents received no monetary compensation. The questionnaire included demographic information and relevant items from several validated and publicly available surveys, including the Fagerstrom Test for Nicotine Dependence, the Contemplation Ladder, the Life Around Newborn Discharge Study, and the Pregnancy Risk Assessment Monitoring System.⁹⁻¹¹ Questions focused on smoking history, quit attempts both before and during pregnancy, whether smoking

cessation was addressed (and how) by health care professionals during pregnancy, and attitudes toward and preparation for a new infant. Questionnaires were administered in English and Spanish by a bilingual research assistant within 72 hours before discharge for those infants admitted to the newborn nursery and within 7 days before discharge for those admitted to the NICU. In May 2013, an amendment to the protocol was approved to allow surveying participants regarding electronic cigarette use.

Participation/outcome data for quitline services, as reported by the NYSSQL at 7 months postreferral, was matched to questionnaire data for smoking parents/caregivers who accepted referral to the NYSSQL. Our research team also made follow-up phone calls to all consenting survey respondents (regardless of acceptance of referral to the NYSSQL), between 6 to 9 months postreferral, for the purpose of tracking referral acceptance and quit status. The study protocol was approved by our Institutional Review Board.

Statistical Evaluation

Descriptive statistics (ie, frequency distributions, means, and standard deviations) were obtained for all study variables. Relationships between variables were examined by using the χ^2 test of independence. All tests of significance used a 2-tailed α at the level of $P < .05$. Analyses were conducted by using the Statistical Package for the Social Sciences (Version 21) software.

RESULTS

Of the 202 eligible smoking mothers, 83% (167) consented to and completed the survey, 7% (15) refused, and 5% (10) were ineligible for personal reasons or consented but did not complete surveys, and 5% (10) were not captured. Because of the difficulty in tracking fathers through the EMR system, participation/refusal rates can only be based on the population of smoking mothers during the data collection period.

A total of 226 parental surveys were completed: 167 by mothers (74%), 57 by fathers (25%), and 2 by other caregivers (1%). Of the completed surveys, ~34% were completed by both the mother and father of

the same child. Seventy-nine percent of parents had an infant in the NBN, and 21% of responding parents had an infant in the NICU. The percentage of those completing surveys from each unit is proportionate to the relative number of discharges: for 2013 there were 3149 discharges from the NBN (81% of total) and 739 discharges from the NICU (19% of total). Demographics of our cohort are reflective of smokers nationally, with the majority being Caucasian, of lower socioeconomic status, and of low educational level. There were no statistically significant differences in socioeconomic or demographic characteristics between parents of infants in the 2 nursery units (see Table 1).

Similarly, there were no differences in the smoking status of surveyed parents in the NBN versus parents in the NICU (see Table 2). Sixty-two percent of those surveyed were still smoking after the birth of their child. The majority of respondents (56%) reported that they had cut back when they learned of the pregnancy; 36% had quit completely at some point in the pregnancy. Only 3% of mothers and 28% of fathers reported not quitting or cutting back at all during the pregnancy. The majority of smokers (72%) scored at the low or very

low dependence level on the Fagerstrom Test for Nicotine Dependence.

Analysis of data from January through August 2013, revealed that 152 smokers accepted referral to the NYSSQL through Opt-to-Quit. Fifty-three percent (18/34) of smoking caregivers in the NICU accepted referral versus 79% (93/118) of smoking caregivers in the NBN; odds ratio = 3.31 (1.48–7.40; $P < .01$). Of the 35 caregivers for whom we obtained quit status data at 7 to 8 months postsurvey, there was not a statistically significant difference in quit rates, or cutting back: 39% (11/28) of NBN caregivers quit, compared with none (0/7) in the NICU. Thirty-nine percent (11/28) of those in NBN cut back compared with 71% (5/7) of those in NICU. Twenty-one percent (6/28) of NBN and 29% (2/7) of NICU caregivers had not quit or cut back ($P = .13$). There was, however, a statistically significant difference between the proportion of mothers who had quit or cut back at 7 to 8 months postsurvey compared with fathers: 80% (16/20) of mothers quit or cut back versus 20% (4/20) of mothers who did not; 46% (6/13) of fathers quit or cut back versus 54% (7/13) of fathers who did not quit or cut back, $P = .04$ (the grandmother caregivers were not included in this analysis).

Sixty-three percent of survey respondents (50% of fathers and 68% of mothers) reported that a doctor, nurse, or other health care worker had spent time discussing how to quit smoking with them. However, the majority of respondents had not been given specific information regarding smoking cessation, including setting a specific date to stop smoking (34%), counseling (27%), booklets (36%), referral to a quitline (40%), or nicotine or other medications for smoking cessation (8%–34% depending on formulation).

Twenty-three percent of all survey respondents stated they were currently (at the time of the survey, before discharge) exclusively breastfeeding; 27% planned to exclusively breastfeed after discharge. Forty-four percent of those surveyed were exclusively formula feeding (at the time of survey, before discharge); 49% of survey respondents planned to exclusively formula feed after discharge.

Of 125 people surveyed regarding electronic cigarette use, 63% had tried electronic cigarettes: 18% for smoking cessation, 46% in place of regular cigarettes, and 5% in addition to regular cigarettes. The survey did not quantify the amount of electronic cigarette use nor whether they had been used during pregnancy.

DISCUSSION

We found that significantly more parents of infants in the NBN than in the NICU accepted referral through Opt-to-Quit, which seems counterintuitive. Other studies, focusing on parents of older children admitted to the hospital with asthma, have shown that illness provides a “teachable moment.”^{1,3,12} However in our study, the parents of sicker infants were less likely to accept referral. Perhaps the danger of secondhand smoke to premature lungs is less apparent or compelling to parents than the danger of smoking to an asthmatic. Additionally, parents may feel more overwhelmed with a critically ill or premature infant. The attitudes of the staff completing the referral may have also played a role in the acceptance of the smoker. For example, nurses caring for infants in an ICU may be less inclined to focus on preventive measures such as smoking cessation.

TABLE 1 Demographics of Parents Surveyed ($n = 226$)

	NBN	NICU	<i>P</i>
Parent age, mean (SD)	28.6 (5.7)	28.6 (7.5)	.99
Parent gender, % (<i>n</i>)			.75
Male	25 (46)	23 (11)	
Female	75 (133)	77 (36)	
Race, % (<i>n</i>)			.80
White	57 (126)	16 (35)	
African American	9 (20)	2.7 (6)	
Other	12.7 (28)	2.3 (5)	
Education completed, % (<i>n</i>)			.32
Junior high	9.6 (17)	17.4 (8)	
High school	70.1 (124)	65.2 (30)	
College/graduate school	20.3 (36)	10.4 (8)	
Annual household income, % (<i>n</i>)			.25
<\$20 000	42.3 (63)	27.9 (11)	
\$20 000–\$50 000	31.5 (47)	31 (9)	
\$51 000–\$100 000	17.4 (26)	10.3 (3)	

Some variables may not sum to total because of missing data for that variable.

TABLE 2 Smoking History of Parents Surveyed (*n* = 226)

	NBN, % (<i>n</i>)	NICU, % (<i>n</i>)	<i>P</i>
Current smoker	62.5 (110)	58.5 (24)	.78
Daily smoker ^a	82.1 (115)	94.3 (33)	.07
Cigarettes smoked/d			.09
<4	42.1 (64)	28.9 (11)	
5–4	39.5 (60)	39.5 (15)	
15–24	13.2 (20)	28.9 (11)	
25–34	5.3 (8)	2.6 (1)	
Infant with smoking exposure from others	57.3 (98)	53.5 (23)	.65
Years smoking			.56
<5	17.6 (31)	12.8 (6)	
5–9	26.1 (46)	36.2 (17)	
10–19	45.5 (80)	40.4 (19)	
>20	10.8 (19)	10.6 (5)	
Ever tried to quit before	86.4 (153)	87.2 (41)	.88
Quit attempts this pregnancy			.80
Not at all	10.3 (18)	7 (3)	
Cut back	54.3 (95)	55.8 (24)	
Quit before or during	35.4 (62)	37.2 (16)	
FTND			.12
Very low or low dependence	72.7 (101)	67.7 (21)	
Medium dependence	17.3 (24)	9.7 (3)	
High or very high dependence	10.1 (14)	22.6 (7)	
E-cigarette use	65 (65)	58.3 (14)	.64

Some variables may not sum to total because of missing data for that variable. FTND, Fagerstrom Test for Nicotine Dependence.

^a Includes current and former smokers.

woman, we found it encouraging that more than half of smoking expectant fathers in our cohort had received advice to quit smoking and that 72% had quit or cut back in the prenatal period. However, significantly more mothers than fathers had quit or cut back 7 months postsurvey. In contrast to the large body of literature regarding maternal prenatal and postnatal smoking, relatively little is known regarding fathers. In a cross-sectional study of 286 smoking fathers interviewed within the first 3 months of the infant's birth, <20% had tried to quit, and only 4% had fully quit smoking.⁵ Conversely, Everett et al found that 70% of low-income expectant smoking fathers had tried to quit in the previous year. However, in this same cohort, high smoking rates among fathers were correlated with higher smoking rates among their pregnant partners.¹⁴ Improved use of the 5As with both expectant mothers and fathers, could improve smoking cessation efforts in the prenatal and postpartum periods. As a comparison, pediatricians report counseling smoking parents at similar rates to their OB counterparts, from 56% to 62% in 1 study¹⁵ and less (36% to 41%) in another.¹⁶

Smokers in our cohort had much higher exclusive formula feeding rates (45%) than the general population of women in our hospital for the same time period (all women, including smokers = 13% exclusive formula feeding for 2013). Although we did not elucidate the reasons for this in our survey, other studies have documented associations between smoking status and formula feeding as well as improvement in breastfeeding when coupled with smoking cessation interventions. In a randomized-controlled trial (RCT) of 251 women, breastfeeding at 8 weeks postpartum was significantly associated with smoking abstinence (odds ratio = 7.27 (95% confidence interval = 3.27, 16.13), *P* < .001).¹⁷ Similarly, in a smaller RCT of 54 women, Collins et al found that maternal smokers who remained abstinent were more likely to initiate breastfeeding postpartum.⁷ In another RCT of 54 mothers of infants in the NICU, breastfeeding and maintenance of smoking cessation were both improved

Further research should explore attitudes of staff relative to the frequency of quitline referrals and parental acceptance of referral for cessation services.

We found no difference in quit rates at 7 months between parents of infants in the NBN versus the NICU. This may be due to type II error, from the small number for whom we had follow-up quit data (*n* = 35). However, the statistically significant difference between mothers and fathers who had quit or cut back at 7-month follow-up suggests that mothers are either more motivated and/or have received more cessation support pre- and postnatally. In our cohort, we noted a trend: more mothers than fathers had received smoking cessation advice prenatally (68% [109] vs 53% [27], *P* = .07).

We chose to look at parental prenatal and postnatal smoking attitudes and behavior as a continuum with opportunities for

improvement. For >50% of those surveyed, a physician or other health care worker had discussed smoking cessation during a prenatal visit. However, the majority of parents had not been given specific evidence-based interventions; only 46% of mothers and 34% of fathers had been referred to a quitline at any time during the pregnancy. At the same time, the majority had cut back and some had even quit during the pregnancy. This is underscored by the fact that the majority of respondents scored at the low or very low dependence level on the Fagerstrom Test for Nicotine Dependence. Our results are similar to those of Chang et al, who found that obstetric providers gave women information about smoking in 54% of the visits, but used ≥ 3 of the 5As (ask, advise, assess, assist, and arrange) as recommended by Obstetrical Guidelines in only 24% of visits.¹³ Although the focus of the prenatal visit is clearly on the pregnant

when mother-infant bonding was encouraged in the first 8 weeks postpartum.¹⁸

Our study findings should be considered within the context of its limitations. These include the initially low referral rate to the NYSSQL through the EHR because the program had been in place for only a short time before the study's inception. In addition, the small number of respondents for whom we have follow-up quit data also limits our ability to compare survey results with final quit status.

With this survey, we identified several areas for future focus. During prenatal visits, health care providers should improve smoking cessation efforts with both expectant mothers and fathers, and these efforts should be continued in the postnatal period. Interventions to promote breastfeeding and smoking cessation together should be initiated and studied further. The significant use of electronic cigarettes in this population of parents needs to be further described and addressed, particularly in light of emerging evidence of electronic cigarettes' potential cytotoxicity to pregnant women.¹⁹

CONCLUSIONS

We found that parents of healthy newborns were significantly more likely to accept referral for quitline services than parents of infants in the NICU, which was counterintuitive. We sought to identify whether NBN versus NICU status predicted success in smoking cessation among parents of neonates but were limited by the small number for whom we had follow-up quit rates.

Expectant parents appear to want to quit smoking but may not receive the support they need to succeed.

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