

Attitudes of pregnant women towards collection of biological specimens during pregnancy and at birth

Sarah Nechuta^a, Lanay M. Mudd^b, Michael R. Elliott^{c,d}, James M. Lepkowski^{c,d}, Nigel Paneth^{e,f} and the Michigan Alliance for the National Children's Study

^aDivision of Epidemiology, Department of Medicine, Vanderbilt University School of Medicine, Nashville, TN, ^bDepartment of Health, Leisure and Exercise Science, College of Health Sciences, Appalachian State University, Boone, NC, ^cDepartment of Biostatistics, School of Public Health and ^dInstitute for Social Research, University of Michigan, Ann Arbor, and Departments of ^eEpidemiology and ^fPediatrics & Human Development, College of Human Medicine, Michigan State University, East Lansing, MI, USA

Summary

Correspondence:

Dr Sarah Nechuta, Vanderbilt Epidemiology Center, Institute of Medicine & Public Health, Vanderbilt University School of Medicine, 2525 West End Avenue, 6th Floor, Nashville, TN 37203-1738, USA.
E-mail: sarah.nechuta@vanderbilt.edu

Nechuta S, Mudd LM, Elliott MR, Lepkowski JM, Paneth N, the Michigan Alliance for the National Children's Study. Attitudes of pregnant women towards collection of biological specimens during pregnancy and at birth. *Paediatric and Perinatal Epidemiology* 2012; **26**: 272–275.

Epidemiological investigations of maternal and child health may involve the collection of biological specimens, including cord blood and the placenta; however, the attitudes of pregnant women towards participation in the collection of biological specimens have been studied rarely. We evaluated attitudes towards collection and storage of biological specimens, and determined whether attitudes differed by maternal characteristics, in a cross-sectional study of pregnant women residing in Kent County, Michigan. Women were interviewed at their first visit for prenatal care between April and October 2006 ($n = 311$). Willingness to participate was highest for maternal blood collection (72%), followed by storage of biological specimens (68%), placenta collection (64%), and cord blood collection (63%). About one-quarter of women (25–28% by procedure) would not participate even if compensated. Hispanic ethnicity was associated with unwillingness to participate in maternal blood collection (OR = 2.16 [95% CI 1.15, 4.04]). Primiparity was associated with unwillingness to participate in cord blood collection (OR = 1.72 [95% CI 1.23, 2.42]). Among women willing to participate, Hispanic women were less likely to require compensation; while higher educated, married and primiparous women were more likely to require compensation. In conclusion, while many pregnant women were willing to participate in biological specimen collection, some women were more resistant, in particular Hispanic and primiparous women. Targeting these groups of women for enhanced recruitment efforts may improve overall participation rates and the representativeness of participants in future studies of maternal and child health.

Keywords: prenatal attitudes, maternal blood sample, cord blood, placenta, parity, financial compensation.

Introduction

The collection and storage of biological specimens is a critical component of many epidemiological investigations, including studies of maternal and child health.^{1–3} Little data exist, however, on attitudes of pregnant women towards participation in the collection of bio-

logical specimens unique to the perinatal period, such as the placenta and cord blood.⁴ We conducted a cross-sectional survey among a multiethnic sample of pregnant women to evaluate attitudes towards participation in the collection of biological specimens and desired compensation, and determined whether attitudes differed by maternal characteristics.

Methods

This study was conducted by the Michigan Alliance for the National Children's Study, which was established in 2002 to assist with planning efforts for the National Children's Study;⁵ and methods have been described elsewhere.^{6,7} Briefly, nine of ten clinics sampled participated. Eligibility criteria included age 18–50 years, first visit for prenatal care, and proficiency in English or Spanish. Of 342 eligible pregnant women approached in prenatal care clinics in Kent County, MI between April and October 2006, 311 (91%) participated. In-person interviews (in English or Spanish) were conducted to assess maternal characteristics and attitudes towards participation in the collection of maternal blood, cord blood, placenta and storage of these biological specimens. Women were first asked about their willingness to participate in each procedure (yes, no, it depends) and then the smallest amount of monetary compensation they would require to participate. The study was approved by Institutional Review Boards of each institution.

Logistic regression models were used to evaluate (1) maternal factors associated with unwillingness to participate even with monetary compensation (reference = would participate), and (2) factors associated with a requirement for monetary compensation (reference = would not require compensation) adjusting for maternal factors. We used PROC GENMOD to calculate odds ratios (ORs) and 95% confidence intervals [CI], accounting for clustering by clinic. SAS version 9.1.3 was used; *P*-values < 0.05 indicated statistical significance.

Results

Approximately 59% of the participants were non-Hispanic White, 20% were Hispanic, and 17% were non-Hispanic Black. The mean age was 27 (standard deviation = 5.3), 45% had an annual family income <\$25 000, about 39% had ≤high school education, 29% had some college and 32% had ≥bachelor's degree. Most women were in their first trimester (79%), 41% were primiparous and 52% were married.

Percentages for willingness to participate (yes, it depends) prior to assessment of compensation attitudes were as follows: maternal blood collection (72%, 6%), cord blood collection (63%, 13%), placenta collection (64%, 10%), and storage of specimens (68%, 17%). After assessment of attitudes towards monetary compensation, absolute refusals (would not participate for

Table 1. Willingness to participate by planned biological specimen collection among pregnant women (*n* = 311)^a

Biological sample to be collected	Willingness to participate ^b			Lowest amount of monetary compensation ^c					
	Would participate for no compensation, <i>n</i> (%)	Would participate if compensated, <i>n</i> (%)	Would not participate for any compensation, <i>n</i> (%)	Mean \$ (SD)	\$0, <i>n</i> (%)	≤\$10, <i>n</i> (%)	\$11–19, <i>n</i> (%)	\$20–49, <i>n</i> (%)	≥\$50, <i>n</i> (%)
Maternal blood	95 (33)	118 (41)	72 (25)	36 (48.7)	95 (45)	30 (14)	28 (13)	16 (7)	44 (21)
Cord blood	96 (35)	108 (39)	72 (26)	52 (62.9)	96 (47)	22 (11)	16 (8)	20 (10)	50 (24)
Placenta	107 (38)	95 (34)	79 (28)	46 (41.8)	107 (53)	18 (9)	18 (9)	16 (8)	43 (21)

^aAttitudes towards compensation for storage of biological specimens were not assessed; hence, Tables 1 and 2 do not include this data procedure.

^bFrequencies and percents exclude missing by procedure: maternal blood (*n* = 26), cord blood (*n* = 35), placenta collection (*n* = 30).

^cFrequencies and percents exclude missing and women who would not participate for any amount of compensation by procedure: maternal blood (*n* = 98), cord blood (*n* = 107), and placenta (*n* = 109).

any compensation) ranged from 25–28% (Table 1). Among women willing to participate, about half (by data procedure) would not require compensation for participation (Table 1). However, about 21–24% would require \geq \$50 for collection of the different biological samples (Table 1).

We examined the associations between maternal factors and unwillingness to participate in specimen collection even with compensation (Table 2). Compared with non-Hispanic White women, Hispanic women were more likely to be unwilling to participate in maternal blood collection (OR = 2.16 [95% CI 1.15, 4.04]). Primiparous women were more likely to be unwilling to participate in cord blood (OR = 1.72 [95% CI 1.23, 2.42]) and placenta collection (OR = 1.73 [95% CI 0.91, 3.30]).

We examined maternal factors associated with requirement for compensation. Hispanic women were less likely to require compensation for maternal blood (OR = 0.38 [95% CI 0.15, 0.95]) or placenta collection (OR = 0.34 [95% CI 0.12, 0.93]). Women of higher education tended to be more likely to require compensation for participation; however, except for high school educated women requiring compensation for cord

blood collection (OR = 2.74 [95% CI 1.32, 5.66]), results were not statistically significant (data not shown). Married and primiparous women were more likely to require compensation for placenta collection, OR = 1.45 [95% CI 1.13, 1.86] and OR = 1.73 [95% CI 1.12, 2.69], respectively.

Discussion

To the best of our knowledge, studies of attitudes towards participation among currently pregnant women for collection of biological specimens have not been reported. We found that 25–28% of pregnant women were unwilling to participate in maternal blood, cord blood or placenta collection, even if offered compensation. Hispanic ethnicity was associated with refusal for collection of maternal blood, and primiparity was associated with refusal for collection of cord blood. While about 50% of pregnant women willing to participate would do so for no compensation, about 21–24% would require \geq \$50 in compensation. Further, among women willing to participate, Hispanic women were less likely to require compensation for

Table 2. Adjusted odds ratios (AOR) for maternal characteristics in association with unwillingness to participate in biological specimen collection even if offered compensation among pregnant women ($n = 311$)^a

	Maternal blood collection AOR [95% CI] ^b		Cord blood collection AOR [95% CI] ^b		Placenta collection AOR [95% CI] ^b	
Race/ethnicity ^c						
Non-Hispanic white	1.00	Reference	1.00	Reference	1.00	Reference
Non-Hispanic black	2.02	[0.60, 6.84]	1.65	[0.63, 4.32]	1.32	[0.59, 2.97]
Hispanic	2.16	[1.15, 4.04]	1.84	[0.75, 4.52]	1.11	[0.55, 2.23]
Maternal age						
\geq 25 years	1.00	Reference	1.00	Reference	1.00	Reference
<25 years	0.79	[0.35, 1.78]	0.85	[0.59, 1.21]	0.87	[0.55, 1.37]
Education ^d						
<High school	1.00	Reference	1.00	Reference	1.00	Reference
High school	0.60	[0.24, 1.49]	0.56	[0.19, 1.67]	0.81	[0.32, 2.03]
>High school	1.62	[0.81, 3.22]	0.95	[0.52, 1.74]	1.20	[0.75, 1.93]
Annual income						
<\$25 000	1.00	Reference	1.00	Reference	1.00	Reference
\geq \$25 000	0.55	[0.27, 1.11]	0.70	[0.40, 1.20]	0.77	[0.43, 1.39]
Marital status						
Not married	1.00	Reference	1.00	Reference	1.00	Reference
Married	1.20	[0.73, 1.98]	0.94	[0.56, 1.59]	1.16	[0.71, 1.88]
Primiparous						
No	1.00	Reference	1.00	Reference	1.00	Reference
Yes	0.71	[0.44, 1.14]	1.72	[1.23, 2.42]	1.73	[0.91, 3.30]

^aTable excludes missing data by procedure as shown in Table 1.

^bAdjusted for age, education, marital status, parity and trimester (where appropriate); models where education is the main factor of interest are also adjusted for race/ethnicity.

^cExcludes Non-Hispanic other ($n = 14$).

^dAmong participants \geq 19 years of age.

participation, while women of higher education were more likely to require compensation for participation.

Limitations should be considered. First, because of resource limitations, our sample was a convenience sample of women recruited from a random sample of Kent County obstetric and gynaecological clinics. However, clinic-based recruitment is a valid approach widely used in studies of maternal and child health,⁸ and the demographic characteristics of our sample are broadly representative of maternal characteristics available from Kent County birth certificate data.⁷ Second, our findings may not be generalisable to other populations of pregnant women with differing cultural backgrounds. However, we included a high percentage of non-Hispanic Black and Hispanic women, and both English- and Spanish-speaking women, which improves the generalisability of our results to pregnant women of under-represented race/ethnicities. Third, our study evaluated attitudes towards hypothetical research participation; attitudes can change with time and may not accurately reflect actual behaviours.^{9,10} Finally, we did not assess why women reported they were unwilling to participate in biological specimen collection.

In conclusion, we found that about 25% of pregnant women were resistant to participation in biological specimen collection for clinical studies of maternal and child health. Further, certain groups of women were more resistant towards participation in specific procedures. Recruitment efforts should ensure participation of groups more resistant to specific research procedures, such as Hispanic women for maternal blood collection, and this can improve the inclusiveness of the study populations for future studies of maternal and child health.

Acknowledgements

The authors would like to thank the staff members at participating clinics and hospitals for their cooperation, as well as Brian Hartl, Barb Hawkins-Palmer, and other staff at the Kent County Health Department, the Grand Rapids Medical Education Research Center, and Brian Lamoreaux for assistance in planning and implementing the study. We would also like to acknowledge the MANCS Steering Committee which included, at the time this study was performed, Jan Bokemeier, Naomi Breslau, H. Dele Davies, and Nigel Paneth from Michigan State University; Valerie Castle, Michael

Elliott, Timothy Johnson, Daniel Keating, and James Lepkowski from the University of Michigan; Charles Barone, Christine Johnson, and Christine Joseph from Henry Ford Health System; Virginia Delaney-Black, William Lyman, Hilary Ratner, Robert Sokol, Bonita Stanton, and Daniel Waltz from Wayne State University; Lori Cameron, Violanda Grigorescu, and Doug Paterson from Michigan Department of Community Health, and Health Officers/Medical Directors from Grand Traverse County (Frederick Keeslar), Lenawee County (R. Michael Knight), Genesee County (Robert Pestronk), Macomb County (Kevin Lokar), and Wayne County (Kathy Urbats, Anahid Kulwicki). Funding for this study was provided by the Henry Ford Health System, Michigan State University, the University of Michigan, and Wayne State University.

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