

Information Giving: Effects on Birth Outcomes and Patient Satisfaction

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ABSTRACT

Production pressures make it increasingly less feasible for prenatal care providers to engage in meaningful information giving according to national guidelines. Managed care organizations rely on printed materials to augment information historically provided orally by physicians. This study examines the effects of mailing supplemental health information to mothers at home. Results of an anonymous post-delivery survey indicate that supplemental information giving increases patient satisfaction and recall of key messages linked to birth outcomes.

INTRODUCTION

Production pressures make it increasingly less feasible for prenatal care providers to engage in meaningful information giving according to national guidelines. As a result, health plans and managed care organizations increasingly rely on printed materials to augment information historically provided orally by physicians when more time was available for interaction with patients (Rosselli, Santalucia & Woodward, 1996). Direct mailing of printed materials to mothers at home is an alternative mechanism for delivering basic prenatal health information.

The purpose of this study is to identify whether supplementing prenatal care with health information materials mailed to mothers at home increases the proportion of women who recall receiving information on topics linked to birth outcomes. In addition, we explore effects of supplemental information on mothers' self-efficacy and health improvements. Finally, since patient satisfaction is an accepted measure of quality of care, we examine effects of supplemental information on mothers' satisfaction with overall prenatal care, providers and information giving.

It should be noted that the terms *health promotion*, *health education*, and *information giving* are not precisely used in the literature on prenatal care. According to the report of the Public Health Service (PHS) Expert Panel on the Content of Prenatal Care (1989), "health promotion consists of counseling to promote and support healthful behaviors, general knowledge of pregnancy and parenting, and information on proposed care." The Expert Panel and other researchers use the terms *information*, *advice*,

counseling, *education*, and *health promotion* interchangeably.

For the purposes of this study, *health education* is the broader term which includes teaching, counseling, information giving and other activities to serve the purposes defined by the Expert Panel. *Information giving* refers to the selection, packaging and provision of information to facilitate patients' self-directed learning and decision making.

The next section presents methods for determining whether supplemental information increases recall of key messages linked to birth outcomes or affects patient satisfaction with information, providers or overall prenatal care.

PROCEDURES

Design

In this two-group experimental design, a static group comparison (Campbell 1963), the intervention group received supplemental information and the comparison group received usual care. Effects were measured through an anonymous post delivery mail survey.

Sample

Study subjects were 117 women who obtained health insurance, prenatal care and obstetric services in a Utah-based integrated health care delivery system in 1996. The intervention group was formed by randomly selecting 60 names from a list of all health plans members who responded to a cash incentive to complete a telephone risk assessment and thereby be enroll in the Beginnings Program, a maternity management program designed to improve birth outcomes among members. The Beginnings Program was designed to supplement routine prenatal care. It provided a telephone risk assessment, medical case management at varying degrees according to identified

risk, and health information materials sent in a series of mailings to mothers' homes.

The comparison group was formed by randomly selecting 60 names from a list of members of the same health plans as the intervention group who obtained routine prenatal care from the same panel of physicians, but did not accept the incentive and so did not participate in the Beginnings Program. Three of these names were excluded due to unusable addresses. Comparison group members had no contact with case managers and were sent no supplemental health information.

Methods

Supplemental information on pregnancy health and prenatal care was mailed to the intervention group at home in a series of mailings throughout pregnancy. The test materials were Beginnings: A Practical Guide Through Your Pregnancy 2nd Edition (Smith, 1993). The Beginnings materials consist of six booklets referenced by gestational age and the usual course of prenatal care. Content and sequencing of information are based on guidelines of the PHS Expert Panel on the Content of Prenatal Care (PHS, 1989). Content focuses on key messages linked to birth outcomes (PHS, 1989; Kogan, Alexander, & Kotelchuck, 1994a; ACOG/AAP, 1992; Libbus & Sable, 1991; Briggs, 1989). The materials are culturally neutral and require a fifth grade reading level (Flesch Kincaid), appropriate for about 80 percent of the US population (Doak, Doak & Root, 1996). The materials are certified scientifically accurate, readable and useful in practice by the American Academy of Family Physicians Foundation (1993).

During program development, a focus group was conducted with pregnant women and new mothers who were health plans members and who received prenatal and obstetric care in the integrated health care delivery system. Focus group participants were characterized by the facilitator as "voraciously information hungry." The women said they wanted information early and throughout pregnancy, and the information they received from providers was inadequate and untimely. They preferred print materials and to learn at home. They confirmed that they wanted and would use information on the topics covered in the test materials. They were eager to share such information with their partners. The women said that their health plans would be an acceptable source of information and that direct mail was an acceptable delivery method.

This formative research led us to the following hypotheses: Compared to women obtaining routine prenatal care only, women given supplemental health behavior information are more likely to:

1. recall key messages that are linked to birth outcomes;
2. feel extremely satisfied with prenatal care overall, with providers, and with information giving by the health plan.

Measures

An earlier study designed to test the recommendations of the PHS Expert Panel on the Content of Prenatal Care (Kogan et. al. 1994) served as a model for the current study and for our survey questions regarding recall of key messages. The Kogan study also provided baseline findings from a nationally representative population. To measure mothers' recall of key health behavior messages that are linked to birth outcomes, Kogan et.at. asked mothers if they were given any advice or instruction during any prenatal visits on the a list of topics.* See Table 1. In the present study, we asked respondents if they were given any advice or instruction *during pregnancy* on the ten health behavior topics listed in Table 1.

Table 1. Key Messages Linked to Birth Outcomes

- *Eat a healthy diet
- *Gain weight
- *Take prenatal vitamins
- *Do not drink Alcohol
- *Do not do drugs
- *Do not smoke cigarettes
- *Breast feed your baby
- Discuss family violence with your doctor or midwife.
- Baby's growth and development
- How to recognize problems that need medical attention.

Key Messages Linked to Birth Outcomes

The Public Health Service Expert Panel on the Content of Prenatal Care emphasized that these messages directly affect outcomes and recommended giving information on each topic to all women in prenatal care (PHS 1989).

Our questionnaire also included patient satisfaction questions and a rating system typical of studies of satisfaction with aspects of medical care (Hall & Dornan, 1988). We asked mothers to rate their satisfaction with overall prenatal care, providers, and

information received on a scale of 0 to 10 where 0 is extremely dissatisfied and 10 is very satisfied. Also, we collected demographic data and mothers' self-reports of time of initiation of prenatal care, infant birth weight, and prematurity. Since our questions were closely modeled on those from large published studies, we did not invest in further validation of the instrument.

Our primary outcomes of interest were:

- Recalled receipt of key messages. Since key messages are linked to birth outcomes, recall is used as an interim measure of the effect of information giving on birth outcomes.
- Satisfaction with information, provider, and overall prenatal care defined as a rating of 5 or higher. We were particularly interested in effects on extreme satisfaction defined as a rating of 8 or higher.
- Proportions of mothers attributing health improvements and increased feelings of confidence to information received.

Analysis

We investigated independent variables known to affect birth outcomes, information seeking and information giving such as maternal age, education, income, race, parity, history of adverse birth outcome, employment, adequacy of prenatal care, smoking during pregnancy. To determine whether a significantly larger proportion of the intervention group reported receiving information on topics linked to birth outcomes, we used SPSS to cross tabulate dichotomous variables including receiving information on all seven topics previously tested by Kogan, versus not-all, and comparison of recall by specific topics. We relied on Pearson's chi-square or Fishers exact chi-square test to determine significance. Findings were verified by logistic regression.

To compare mean levels of satisfaction with information, overall prenatal care and providers, we used the t-statistic for comparing means in two independent samples or the Mann-Whitney rank sum test when the F statistic indicated unequal variances making the t-test inappropriate. In comparing satisfaction with information, cases indicating no information received were excluded.

To investigate the effect of the program on extreme satisfaction, we recoded the variables to create new dichotomous variables distinguishing ratings of 8 or above from all other responses. The new extreme-

satisfaction variables were cross tabulated with receipt of the subject materials. We collected this data in anticipation of future studies using the same instruments and a central depository to determine by aggregate analysis if recall of key messages is a valid proxy measure for clinical outcomes.

We relied on chi-square measures and logistic regression to test significance of variance in mean levels of agreement with statements that information received increased confidence and helped improve health. The sample size was too small for meaningful analysis of prematurity and low birth weight rates.

RESULTS

Sample Characteristics

Table 2 shows the characteristics of the study sample. The intervention and comparison groups were similarly well educated and health conscious. All subjects initiated prenatal care in the first trimester. Ninety-nine percent were non-smokers. Three-fourths of all subjects were "experienced" mothers. Linear regression indicated that married status ($p < .001$) and household income greater than \$30,000 ($p < .001$) were significantly associated with the intervention group. The study population is at low socioeconomic risk for negative birth outcomes.

Mothers' recall of key health behavior messages

Table 3 shows rates of maternal recall of key health behavior messages linked to birth outcomes. As expected in this relatively small well-educated sample, there were no significant differences in recall of most topics. However, the intervention group was significantly more likely than the comparison group to recall information on how to recognize problems that warrant medical attention (89% versus 63%, RR 1.41 $p .04$). In addition, the intervention group was more than twice as likely to recall advice to discuss domestic violence with providers (30% versus 13%, RR 2.31 $p .03$).

At a level of practical significance, the intervention group was more likely to recall advice to gain weight, 83% versus 70% for the comparison group and 74% for a similarly educated and affluent sub-population of the national baseline study (RR 1.2 $p .08$). In the intervention group, 59% recalled all seven messages previously tested by Kogan et al., (Table 1) compared to 53% of the comparison group and 32% of a nationally representative population, however this did not reach statistical significance.

Table 2— Sample Characteristics

Characteristic	Intervention Group N=46 100 %		Comparison Group N=31 100%		Overall N=77 100%	
Age						
20-29	28	61	20	67	48	63
30-34	12	26	5	17	17	22
Education						
High School/GED	9	20	3	10	12	20
At least some College	36	78	24	83	60	80
Parity						
One	10	22	9	30	19	25
More	36	78	21	70	57	75
Employed						
Yes FT or PT	29	63	18	60	47	62
No	17	37	12	40	29	38
Race/Ethnicity						
White	45	98	26	90	71	95
Household Income \$						
<12,000	3	7	6	21	8	11
> 30,000	36	78	19	68	52	70
Married						
Yes	45	98	25	83	70	93

Table 3—Maternal reports of information received for the intervention and comparison groups and for a similar subgroup of a nationally representative population. National figures are from Kogan et.al. (1994a). Relative risk is shown for statistically significant topics only.

Topic	Intervention Group		Comparison Group		Relative Risk	P	National
	supplemental information		routine care				(Kogan 1994)
	n 46	100%	n30	100%			%
Eat Well	44	96%	28	93%		.30	94%
Take Vitamins	41	89%	30	100%		.76	98%
Gain Weight	38	83%	21	70%	1.20	.08	74%
Don't Drink	42	91%	29	97%		.34	69%
Don't Smoke	40	87%	28	93%		.51	68%
Don't Do Drugs	42	91%	29	97%		.37	65%
Breast feed	37	80%	24	80%		.86	52%
ALL SEVEN	27	59%	16	53%		.51	32%
Recognize Problems	41	89%	19	63%	1.41	.04	
Fetal growth	45	98%	26	87%	1.13	.08	
Violence	14	30%	4	13%	2.31	.03	22%

(Freda 1993)

Mothers' Satisfaction ratings

Table 4 shows mothers satisfaction ratings for overall prenatal care, providers and information received. The major finding regarding satisfaction is that the intervention group was significantly more likely than the comparison group to be extremely satisfied with information received from the health plans (78% versus 48% RR 1.63 p<.01) and four times as likely to give the highest satisfaction rating (42% versus 10% RR 4.2 p .01).

A larger proportion of the intervention group was extremely satisfied with their providers (96% versus 87% p .16) and prenatal care (91% versus 80% p .14). Larger samples may show statistically or practically significant increases in satisfaction levels. A figure to watch in planned larger studies is that 4% of all respondents recalled receiving no health information from their providers.

Table 4—Percentages of the intervention and comparison groups who are dissatisfied and extremely satisfied with aspects of their prenatal experience. Mean satisfaction ratings also are shown.

Satisfaction with:	Intervention Group	Comparison Group	Relative Risk	Overall
Prenatal Care Overall				
Dissatisfied (<5)	0	3%		1%
Extremely satisfied (>8)	83%	72%	1.2	79%
Mean Satisfaction Rating	9.3	8.9		9.1
Providers				
Dissatisfied (<5)	0	3%		1%
Extremely satisfied (>8)	89%	76%	1.2	84%
Mean Satisfaction Rating	9.6	9.1		9.4
Health Plan Services				
Dissatisfied (<5)	9%	10%		17%
Extremely satisfied (>8)	68%	70%		68%
Mean Satisfaction Rating	8.5	8.4		8.6
Information from Doctor				
No information received	4%	3%		4%
Dissatisfied (<5)	4%	3%		4%
Borderline satisfied (< 6)	13%	27%		13%
Extremely satisfied (>8)	61%	60%		61%
Mean Satisfaction Rating	8.8	8.7		8.7
Information from Plan				
No information received	0	24%*		10%
Dissatisfied (<5)	7%	7%		5%
Extremely satisfied (>8)	78%	48%*	1.63	41%
Highest rating (10)	42%	10%*	4.20	30%
Mean Satisfaction Rating	8.5	7.5		8.2

* Indicates statistical significance. Subjects were asked to rate their satisfaction on a scale of 0 (extremely dissatisfied) to 10 (very satisfied).

Self-efficacy and Health Improvements

Another potentially important finding is that 90% of all respondents said information helped them

improve their health during pregnancy. In addition, 96% said that information increased their confidence about pregnancy and birth.

DISCUSSION

Key messages linked to outcomes

Prenatal information giving is particularly important since recall of certain messages is associated with improved birth outcomes. The link between information giving and birth outcomes is established by the Public Health Service Expert Panel on the Content of Prenatal Care in their landmark 1989 report emphasizing that certain health behavior messages are directly related to birth outcomes and are a critical element of prenatal care (PHS, 1989). Perhaps because of widespread belief in information giving during pregnancy, the health promotion component of prenatal care received little attention in the scientific literature prior to publication of the Expert Panel guidelines (Thompson, 1990).

Kogan et.al. (1994) demonstrated that mothers' recall of seven key messages recommended by the Expert Panel was clearly associated with a significant reduction in the risk of delivering a low birth weight infant. The tested messages are: eat well, gain weight, take vitamins, don't drink alcohol, don't smoke tobacco, don't do drugs, breast feed your baby. Four topics each had significant effect in the absence of other messages — weight gain, avoidance of alcohol, avoidance of smoking and breast feeding. Studies by Kogan et.al. (1994 a-c), the first on the content of information giving in prenatal care, served as the model and baseline for the current study.

We added three topics to Kogan's model. We asked mothers if they recalled information on how to recognize warning signs that require medical attention. This question is based on Libbus and Sable's (1991) finding of an adjusted risk ratio of 2.87 between risk of preterm low birth weight and lack of advice to call the provider when preterm labor was suspected. In addition, many managed care organizations want pregnant women to initiate timely intervention by recognizing and reporting warning signs.

We asked about recall of advice to discuss family violence with prenatal care providers since pregnancy is a risk factor for violence and violence increases risk of negative birth outcomes. The American College of Obstetricians and Gynecologists (1992) recommends giving information on domestic violence to all pregnant women and encouraging them to report violence to their prenatal care providers.

Finally, we asked about recall of information on fetal growth and development. While knowledge of this

topic has not been directly linked to birth outcomes, researchers report that knowledge of fetal development increases bonding between mother and infant (Davis & Akridge, 1987, Briggs, 1989). Bonding during pregnancy may affect maternal behaviors and self-care and thereby affect newborn health.

This study adds to the evidence (Kogan et.al., 1994a) that recall of key messages may be a valid interim measure for the effect of health education on birth outcomes. An advantage of the interim measure is that it makes feasible studies with relatively small populations to measure the effects of health education on birth outcomes. Aggregate analysis of data collected from small studies such as this one repeated in multiple locations over time may validate recall as an interim measure and yield important clues to the link between information giving and birth outcomes.

Information Giving in Prenatal Care

The strongest predictor of recall is information giving (Roter & Hall, 1997). Information giving improves compliance and is interpreted by patients as an indication of caring and concern by the provider (Hall & Dornan, 1988). Nagey (1989) suggests this "caring factor" — patients' perception of doctors' concern — as the most likely candidate for the as yet unidentified mechanism by which routine prenatal care improves outcomes beyond the degree attributable to its components.

Despite broad acceptance of health education as part of prenatal care, the majority of women in prenatal care do not recall receiving essential information. Less than one-third of women in a nationally representative population recalled receiving information on topics recommended by the PHS Expert Panel on the Content of Prenatal Care (Kogan et.al., 1994b). Peoples-Sheps, Hogan and Ngandu (1996) confirmed this by a review of medical records finding that less than half of prenatal records showed that providers engaged in information giving that the Expert Panel described as essential and routine in a minimal quality service. Shapiro, Najiman and Change (1983) found that topics are discussed in prenatal care only if they are raised by the patient or provider. Our focus group of currently and recently pregnant women in the study population corroborated these earlier findings. Participants stressed that they obtained less information than they wanted from their providers later than they wanted it; and they expressed concern about "bothering" busy practitioners.

Waitzkin's 1985 analysis of 326 recorded patient visits in several outpatient settings, found that doctors who saw more than 20 outpatients per day spent much less time giving information and gave fewer explanations. The current trend to managed care and attendant production pressures make it increasingly less feasible for providers to engage in meaningful information giving during prenatal care visits according to national guidelines. Managed care organizations rely on printed materials to augment information historically provided orally by physicians when more time was available for interaction with patients (Rosselli et.al., 1996).

Effectiveness of Printed Health Information

Pregnancy is a life transition that triggers self-directed learning (Orr, 1990; St. Claire & Anderson 1989). Lacey (1988) found that pregnant women of all races, ages, parity, employment status and education levels possessed tendencies to self-directed learning above national norms. This readiness to learn may make print materials more effective than expected. Sullivan (1993) found that pregnant women overwhelmingly preferred printed materials and to learn at home. This finding was corroborated by our focus group of currently and recently pregnant health plans members; they preferred to learn from printed information at home.

In a review of the literature on written patient information, Arthur (1995) cites numerous studies showing that written information increases recall, compliance, and behavior change and reduces consultations regarding common discomforts. Written information also has been shown to improve patients' ability to negotiate and participate in decisions (Meredith 1996). McCann and Weinman (1995) found that patients who received written information had longer consultations, asked more questions, and were more likely to benefit from encounters than controls. Vetto, Dubois and Vetto (1996) reported that patient education pamphlets resulted in better patient knowledge.

Mothers' Recall of Key Messages

In this study, we found increased recall of certain health behavior messages among those who were given supplemental pregnancy information. The intervention group was more than twice as likely to recall advice to discuss domestic violence with providers. Freda et.al. (1993a) found only 22% of women in their study recalled this advice despite ACOG's guidelines. Other

researchers have suggested that such topics are uncomfortable for both providers and patients and so frequently remain undiscussed. Women in prenatal care interpreted providers' failure to bring up a topic as an indication that it is not important or should not be discussed (Shapiro et.al., 1983).

Kogan, Kotelchuck and Alexander (1994) showed that topics of information giving vary by provider, site, and maternal race, age and education. Freda et.al.(1993a) found significant differences in information giving in public and private sites that was unrelated to patients' interest. Purposefully designed print materials, may be more reliable than provider counseling as a method for disseminating information on hard-to-discuss topics and for overcoming inequities in information giving.

Results of the current study suggest that supplemental information giving significantly increases recall of advice regarding domestic violence over routine care (30% vs. 13% RR 2.31 p .03). However, the relatively small proportion in both groups who recall advice to discuss violence with providers shows only minor improvement over earlier findings. This finding guided revision of the test materials to increase emphasis on seeking providers' assistance with domestic violence (Smith, 1997).

A significantly greater proportion of the intervention group recalled information on how to recognize problems that require medical attention (RR 1.41 p .04). Our focus group findings confirmed Freda's report (1993b) that warning signs was a topic of high interest for both privately and publicly funded women, and providers underestimated their patients' interest. These findings suggest that supplemental information on warning signs along with permission to initiate intervention may empower pregnant women as front-line monitors of personal and fetal health. This finding guided revision of the test materials to increase emphasis on recognizing and reporting warning signs (Smith, 1997).

At a level of practical significance the intervention group was more likely to recall advice to gain weight (RR 1.2 p.08). Advice to gain weight —by itself— is associated with a significantly reduced chance of delivering a low birth weight infant (Kogan et.al., 1994a). Increased recall of this particular message is encouraging since the importance of gaining weight is reflected in other topics linked to birth outcomes such

as nutrition, vitamins, avoiding alcohol, drugs and smoking.

Similarly, the intervention group was more likely to recall information about fetal growth and development and the difference approached significance (RR 1.13 p .08). Our focus group and Freda et.al. (1993b) found high interest in fetal growth among pregnant women which was underestimated by providers. There is evidence in the scientific literature that knowledge of fetal development increases maternal-fetal bonding (Davis & Akridge, 1987; Briggs, 1989). Increased bonding may in turn affect health behaviors and self-care during pregnancy and thereby affect birth outcomes.

Due to the small size and the relatively high socioeconomic status of our sample, it is somewhat surprising to find statistically significant differences in recall of key messages linked to outcomes. Kogan et.al. (1994a) showed that, while all women benefit from information, women with known risk for adverse birth outcomes (extreme age, low income, low education, unmarried) benefit more than low-risk women like those in our sample. Taken together these findings suggest that distributing the test materials to pregnant Medicaid recipients, who are by definition in socioeconomic risk categories, may produce significant effects on recall of key messages. Further research with a high risk population is warranted.

Perhaps due to the small sample size, we did not detect a significant difference in the proportion of mothers who recall information on the seven topics tested in the model study. This finding guided revision of the test materials to increase emphasis on those messages (Smith, 1997).

Self-efficacy and Health Behaviors

In this study, 96% of all respondents said the information they recalled, regardless of source or format, increased their confidence about pregnancy and birth. This is in agreement with previous findings that information giving, including printed information, improved compliance (Hall, Roter & Katz, 1988; Arthur, 1995), ability to participate in decision making, and communication with providers (Meredith & Wood, 1996). Increased self-efficacy also has been linked to increased compliance with prenatal medical care and increased self-care which may in turn affect outcomes (Hart, 1995).

Ninety percent of all respondents in this study said that information they recalled, regardless of source or

format, helped them improve their health during pregnancy. This finding indicates that the women took action on health behavior messages that they recalled and confirms earlier research reports that information giving, including print information, increased behavior change (Arthur, 1995).

Despite a common belief that information alone does not change behavior, considerable evidence exists that, in some kinds of situations, information is all that is needed (Ware, 1985). This finding suggests that, at least for low risk women—the majority of pregnant women—pregnancy may be one such situation.

Satisfaction Ratings

Satisfaction is an accepted measure of quality of care. Information giving is the best predictor of both satisfaction and dissatisfaction with prenatal care (Richard et.al., 1992). Accordingly, in this study the intervention group was more satisfied than the comparison group with overall prenatal care and with providers at levels approaching significance. The major finding regarding satisfaction is that the intervention group is four times more likely to be extremely satisfied with information received from the health plan. Since the test materials were sent only to the intervention group, this finding indicates strong acceptance of the health plan as a source of health information and of direct mail as a distribution method.

Effectiveness of Direct Mail Dissemination of Health Education Materials

Newell, Girgis and Sanson-Fisher (1995) compared effects of provider distribution and mail distribution of the same written health education materials. Direct mail dissemination led to higher utilization (more of the target population read the materials) and wider distribution (more of the target population received the information). In the only reported study on direct mail dissemination of pregnancy health information, Owen, Hibbard and Robinson (1984) found that women who were mailed information at home were more knowledgeable, better prepared for prenatal visits, and more compliant than women in routine prenatal care in the same practice. They conclude that direct mail information improved provider-patient communications during prenatal visits. Results of this study add weight to these earlier findings.

Limitations

This study is limited in several ways. We relied on maternal self-reports so some allowance must be made

for recall error, although bias could go either way. That is, mothers may not recall information they did in fact receive; or they may confuse information already known or received elsewhere with information from the program. We found no studies that specifically investigated recall accuracy regarding information giving during pregnancy. Research findings are mixed regarding the reliability of mother's recall of exposures during pregnancy (Casey, Rieckhoff & Beebe, 1992; Glithens, Glass & Sloan, 1993). Still, as the researchers point out, the woman's perception, not the provider's practice, is most likely to be linked with health behavior changes.

In addition, findings by Kogan et.al. (1994b) that mothers' self reports reveal that only about a third recalled being informed on key topics is corroborated by People-Sheps' (1996) finding from medical records that only about half were given the information. Furthermore, a meta-analysis of patient satisfaction studies shows consistently positive correlation between patients' reports of providers' information-giving and objective data from taped medical encounters with family physicians and other providers (Hall & Dornan, 1988). These findings indicate that mothers' reports are reasonably reliable regarding prenatal events including information giving, birth weight and prematurity.

Another limitation of this study is that the population was homogeneously educated, relatively affluent, and privately insured. Results are probably generalizable in these broad categories. However, printed information and direct mail dissemination may not be effective in less stable and resource-rich populations. On the other hand, research indicates, perhaps counter-intuitively, that at-risk women benefit more from information than women like those in our study population (Kogan et.al. 1994a). Capability of the test materials to significantly affect recall and satisfaction in this educated low risk population suggests that culturally and linguistically appropriate materials (Montes, 1997) may show greater differentials in higher risk populations with more room for improvement.

A third limitation is that women in the intervention group self-selected to a maternity management program. All study participants in both groups were offered a cash incentive to be interviewed for a telephone risk assessment in addition to routine assessment by prenatal care providers. Completion of the interview constituted enrollment in the program

and triggered mailing of the test materials. Women who accepted the incentive and enrolled in the program may differ from those who did not in their information seeking behavior or attitudes toward incentives, the health plan, health or pregnancy. Furthermore, enrollment in the program, and therefore the chance to be in the intervention group, is significantly associated with married status and higher income.

However, these differences are likely a reflection of varying degrees of program awareness. The program and the incentive were promoted by employers through work sites. The intervention and comparison groups were equally likely to be employed, but married women had greater chance to hear about the program and the incentive through their husbands. Companies may have promoted the program more intensely to more highly paid, married workers, and some companies promoted the program more than others. Married status is a well known factor in birth outcomes. Sharing information with a partner may reinforce messages and increase recall. We recommend that future surveys ask if pregnancy health information was shared with family members or other support persons.

Finally, all or part of the differences detected could be due to information giving through extra telephone contact with case managers. All subjects had 24 hour telephone access to nurse consultation; and standard of care dictates that all subjects had some form of risk assessment. Also, the intervention group did not express desire for extra contact, but rather responded to a cash incentive. Therefore, the potential additional factor contributing to significant differences in recall and satisfaction is telephone contact initiated by case managers with members of the intervention group only. Appropriately, the intensity of case manager initiated interactions varied according to level of identified risk. Subjects with no known risk received minimal extra contact. Case management records may reveal content of information giving by the case managers and allow identification of effects attributable to extra telephone contact. However, those records were not available to us. We anticipate that print materials and telephone contact reinforce each other. Research comparing the effects of printed materials with and without extra case management support is recommended to more clearly define independent effects of supplemental printed information and the cost effectiveness of case management in a low risk population.

Additional research on the effects of disseminating the same information by different mechanisms is needed to identify audience characteristics that may be indicators for specific mechanisms. Also, research is needed to test effects of disseminating the same information in different populations in order to identify factors that are universal and those that are related to socioeconomic status and other cultural issues (Pasick, 1997).

Conclusions

We attribute the detected differences in mothers' recall of key messages and their satisfaction with information, prenatal care and providers to a combination of supplemental direct mail print information and extra telephone contact with case managers. While the data is insufficient to separate effects of information giving through printed material from effects of telephonic information giving through case managers, it is clear that supplemental information giving by the health plans had a significant positive impact on mothers' recall of key messages linked to birth outcomes and on patient satisfaction.

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