Maternal Serum α-Fetoprotein Testing: Physician Experience and Attitudes and Their Influence on Patient Acceptance

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Background. Maternal serum α-fetoprotein (MSAFP) testing is complex and controversial. Although patient response to testing has been studied extensively, physician experience with and attitudes toward the test have not been investigated. The purpose of this study was to describe family physician experience with MSAFP testing and determine if physician characteristics and attitudes influence whether the test is offered and whether patients accept it.
Methods. Eight hundred forty-nine Minnesota members of the American Academy of Family Physicians who provide prenatal care were surveyed by mail. Statistical analyses were performed, comparing physician characteristics, their offering of the test, and patient acceptance of the test.
Results. The survey response rate was 84%. Eighty-seven percent of the physicians offered MSAFP testing, most of them routinely. However, relatively few patients chose to have the test done. Physicians had concerns about the cost of the test and its effect on maternal anxiety. The strongest predictor of offering the test was whether the physician agreed it was "medically-legally necessary."
Conclusions. Although most Minnesota family physicians offer MSAFP testing they have concerns about the test and its limitations and appear to convey these concerns to their patients.
Key words. α-Fetoproteins; neural tube defects; genetic screening; family practice.
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In 1983 commercial kits for maternal serum α-fetoprotein (MSAFP) testing were approved by the Food and Drug Administration (FDA). Before the approval, MSAFP testing for the detection of neural tube defects was limited to medical centers in a few states, primarily on the East Coast.[1] The FDA approval quickly raised medical-legal questions and concerns. An alert was sent from the American College of Obstetricians and Gynecologists (ACOG) Department of Professional Liability to its members in 1985 stating that it was "imperative that every prenatal patient be advised of the availability of this test."[2] There has since been a marked increase in the number of physicians who use MSAFP testing.

The original purpose of MSAFP testing programs was to identify open neural tube defects, which are associated with elevated MSAFP levels. A variety of scientific advances have occurred since testing programs began, and the use of this test continues to evolve.[3,4] These advances add further challenges to an already complex and value-laden testing process. The MSAFP test requires an unprecedented coordination among physicians, laboratories, genetics counselors, and prenatal diagnostic centers, which must function under narrow time constraints.[5] Because there currently is no intrauterine treatment for neural tube defects, prevention involves pregnancy termination. Consequently, testing is a controversial and emotional issue for many physicians and patients.

When testing programs were first introduced in this country, many of these potential problems and concerns were identified.[1] It was recognized that the attitudes held by women, physicians, and society in general toward prenatal diagnosis would have a significant impact on how MSAFP testing programs would be perceived. Program directors were warned not to expect universal enthusiasm for MSAFP testing.[1]

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Patient response to MSAFP testing has been studied extensively, both in this country and in others.[6–20] The numbers of women accepting MSAFP testing and maternal factors affecting that decision are known.[6–13] The effect of testing on maternal anxiety has also been investigated.[14–20]

Surprisingly, physicians' experience with and attitudes toward this new test have not been investigated. Before the test was commercially available, it was anticipated that physician attitude toward testing would significantly influence its use.[1,21] Obstetricians' attitudes have previously been shown to affect the use of amniocentesis in women aged 35 years and over for diagnosis of Down syndrome.[22] A study in 1985 examined Missouri physicians' intention to offer MSAFP testing shortly before testing became available locally.[23] Several physician factors and beliefs distinguished the physicians who intended to offer the test from those who did not. Swedish midwives who were required to offer MSAFP testing to all of their patients were surveyed about their attitudes toward the test.[24] The midwives held widely differing attitudes that were believed to influence pregnant women's decision about the test.

The purpose of this study was to examine physician experience with and attitudes toward MSAFP testing now that it has been widely available for several years. The hypothesis was made that physician characteristics and attitudes influence not only whether the test is offered but how frequently the offered test is accepted by patients. In particular, the experience of Minnesota family physicians who provide prenatal care was studied.

Methods

A mailing list of American Academy of Family Physicians members in Minnesota who provide prenatal care was obtained. A 35-item questionnaire was mailed to those physicians in the fall of 1990. All physicians received a reminder postcard. Nonrespondents were sent as many as two more copies of the questionnaire.

The offices of physicians who did not respond after the third questionnaire was sent were contacted by telephone to determine whether the physician did indeed provide prenatal care. The nonrespondents' ages and certification status were determined from the 1988 American Academy of Family Physicians Membership Directory and from the 1991 Directory of Diplomates of the American Board of Family Practice.

All data were entered and analyzed using SPSS.[25] Frequency and descriptive statistics were calculated on all variables. Anomalous values and distributions were verified or fixed. Occasionally, uninformative categories with small cell sizes were lumped together. Cross-tabulations with chi-square statistics were calculated for all physician characteristics and attitudes and whether MSAFP testing was offered. Where appropriate (ie, 2 × 2 tables), odds ratios were also calculated. Chi-square analysis was used to determine whether there was a relationship between patient acceptance of MSAFP testing and physician characteristics. Finally, a subset of these physician variables, hypothesized to be associated with offering the MSAFP test to expectant mothers, were multivariately analyzed using a stepwise logistic regression model in order to determine which characteristic had the greatest effect on offering the test.

Results

Questionnaires were mailed to 849 Minnesota family physicians. Six physicians had moved or retired. Seven hundred eleven physicians returned the questionnaire, for a response rate of 84%. Five hundred ninety-three physicians reported that they provided prenatal care. Of the 132 nonrespondents, 90 reportedly provided prenatal care, 29 did not provide prenatal care, and 13 were unable to be contacted.

The respondents who provided prenatal care were primarily men (81%), residency trained (78%), and board certified (97%), and had a mean age of 40.4 years. Sixty-three percent of respondents practiced in a rural location or small city. Amniocentesis and genetic counseling were available within a 1-hour drive from the office for 85% and 64% of the respondents, respectively. Nonrespondents who provided prenatal care were of a similar mean age (42.0 years) but were more likely to be men (93%, $P = .005$) and less likely to be board-certified (91%, $P = .01$). The questionnaire responses of the 593 family physicians who provide prenatal care were used for all remaining analyses.

Eighty-seven percent of the family physicians reported offering MSAFP testing to prenatal patients who began receiving prenatal care before 18 weeks' gestation. Thirteen percent of physicians had patients indicate their consent or refusal of MSAFP testing by signing a form. Two percent of respondents performed the test automatically before any physician explanation was given.

Of the physicians who offered the test, 63% offered it to all of their patients. However, 41% of physicians who offered the test reported that very few of their patients accepted the test. Only 22% reported that more than half of their patients accepted testing.

Of those physicians who offered the test, 188 (37%) had at least one patient with an abnormal result. Fourteen physicians identified neural tube defects and nine

identified chromosome abnormalities after further evaluation of patients who had abnormal MSAFP results. Ten physicians had a patient who decided to terminate her pregnancy because of a fetal abnormality discovered through MSAFP testing.

Physicians were asked whether they tended to agree or disagree with several statements. The options given were dichotomous. A majority of physicians agreed that MSAFP is an accurate screening test for neural tube defects (60%) and that MSAFP is a worthwhile test to offer prenatal patients (70%). Only 34% of physicians, however, would want the test performed if they or their spouse were pregnant. Moreover, most physicians agreed that MSAFP testing leads to anxiety in pregnant women (70%) and also leads to further tests that may jeopardize a normal pregnancy (64%).

Few of the physicians surveyed agreed that MSAFP is an accurate screening test for Down syndrome (14%) or that MSAFP testing is cost-effective (27%). Forty-seven percent of physicians agreed that testing misleads patients to believe that physicians can guarantee a healthy baby.

Fifty-seven percent of physicians agreed that they are very concerned about the possibility of a medical malpractice lawsuit. Seventy percent of physicians agreed that it is the standard of care in their community to offer MSAFP testing to all prenatal patients. The strongest agreement (82%) was with the statement that counseling regarding MSAFP testing is "medically-legally necessary."

Physicians' attitudes toward abortion were also explored. Seventy-nine percent of physicians agreed that a woman should be able to obtain an abortion if there is a strong chance of a serious birth defect. Fifty-six percent of physicians agreed that anyone who wants an abortion should be able to get it. Six percent of physicians agreed that abortion should not be permissible under any circumstances.

Certain physician characteristics were associated with whether a physician offers MSAFP testing, as tested by simple cross-tabulations with chi-square statistics and odds ratios. Strongest associations with offering the test included medical-legal concerns, board certifications, and urban or suburban practice location (Table 1).

Similarly, several factors were associated with how often physicians offer the test to their patients. For this analysis, the physician responses "almost always" and "always" were combined. The most significant ($P < .001$) predictors of offering testing almost always or always, and their odds ratios, were: if the physician or spouse were pregnant they would want the test (5.2); and the practice location was in a suburb or large city (5.0). Other significant factors ($P < .05$) were: younger physician age (mean 39.2 years); whether the physician or spouse had had MSAFP testing (6.3); and the responding physician was female (2.1).

The frequency with which patients choose to have the test is also associated with multiple physician characteristics, including sex and practice location. The physician response categories "about 3/4," "almost all," and "all" were combined in this analysis. Chi-square statistics were calculated for each association (Table 2).

Logistic regression analysis was performed for physician characteristics and whether they offer MSAFP testing. By far the strongest predictor of offering MSAFP testing is physician agreement that counseling regarding the test is medically-legally necessary (odds ratio 13.1, $P < .001$). Other significant predictors and their odds ratios were: genetic counseling was available within 60 minutes (2.9); practice location was in a large city or suburb (2.9); and the physician had received residency training (1.9). Two other characteristics that were hypothesized to be related to MSAFP testing were entered into the model but were rejected. They were physician sex and whether the physician agrees that a woman should be able to obtain an abortion if there is a strong chance of a serious birth defect. Overall, the model correctly classified physicians offering MSAFP testing 90% of the time.

Discussion

The use of MSAFP testing has increased rapidly in the United States since the test became commercially available in 1983. In a 1985 survey of prepaid group practices, 15% of plans routinely offered MSAFP testing.[26] The author of the survey estimated that in 1987 no more than about 40% of groups routinely tested for MSAFP outside California. In this 1990 survey, 87% of 593 Minnesota family physicians offer MSAFP testing, most of them routinely.

Although the high frequency with which the test is offered by Minnesota family physicians suggests wide acceptance of the test, an analysis of the attitudes of the respondents suggests that there is some ambivalence with its routine use as a screening test.

First, physicians are concerned about the accuracy of MSAFP testing. Only 60% of respondents agree that MSAFP is an accurate screening test for neural tube defects. Approximately 30 women will have an elevated MSAFP on initial testing for every fetus ultimately found to have a neural tube defect.[27]

Few respondents (14%) agree that MSAFP is an accurate screening test for Down syndrome. The American Society of Human Genetics and other authorities

Table 1. Characteristics of Physicians Who Offer and Do Not Offer Maternal Serum α-Fetoprotein (AFP) Testing (Chi-square statistics used unless otherwise noted)

Characteristic	Offer (n = 515)	Do Not Offer (n = 78)	Odds Ratio	*P* Value
Age (y) (*t* test)	39.7	45.2	—*	<.001
Female (%)	20.7	5.2	4.8	<.05
Residency trained (%)	81.3	55.8	3.4	<.001
Board certified (%)	98.4	85.7	10.5	<.001
Practice location large city or suburb (%)	41.3	7.7	8.6	<.001
Routinely screens for gestational diabetes (%)	94.6	88.3	2.3	<.05
Exposure to continuing medical education on MSAFP in last 12 months (%)	71.4	55.8	2.0	<.05
Amniocentesis available within 60 minutes (%)	86.5	74.7	2.2	<.05
Genetic counseling available within 60 minutes (%)	69.7	30.3	5.3	<.001
Agree if serious birth defect, woman should be able to obtain abortion (%)	80.8	68.4	1.9	<.05
Agree anyone who wants an abortion should be able to get it (%)	59.7	34.2	2.8	<.001
Agree counseling about MSAFP is medically-legally necessary (%)	89.0	35.2	15.0	<.001
Physician or spouse had MSAFP test (%)	11.5	0.0	—†	<.05
If physician or spouse pregnant, would want MSAFP test (%)	37.5	13.3	3.9*	<.001
Agree MSAFP accurate test for neural tube defect (%)	61.8	48.7	1.7	<.05
Agree MSAFP test is cost-effective (%)	27.9	9.0	3.9	<.001
Agree MSAFP test misleads patients that physicians can guarantee a healthy baby (%)	44.0	66.7	0.4	<.001
Agree MSAFP test worthwhile (%)	72.9	52.9	2.4	<.001

**Odds ratio not given because age is continuous variable over time.*
†Odds ratio not given because one of the variables was zero.

state that the use of the MSAFP test for this purpose is investigational and has not been established as effective.[28,29] The recently revised ACOG technical bulletin, however, is supportive of this use of the test.[27]

The question of accuracy of MSAFP testing is important because of the potential for provoking anxiety in patients with a false-positive result. Seventy percent of physician respondents agree that MSAFP testing leads to anxiety in pregnant women. In another study, 82% of Swedish midwives surveyed who were required to offer the test agreed that the MSAFP test causes unnecessary anxiety.[24] Fifty-eight percent of the midwives agreed that so many women experience anxiety while waiting for the result that it would be better if the test were not taken.

At the present time, prevention of a neural tube defect involves termination of the pregnancy. Not all Minnesota family physicians agree that this is an acceptable method of prevention. Respondents who agree that women should be able to obtain an abortion if there is a strong chance of a birth defect were more likely to offer MSAFP testing and have more women accept the test.

Convenience is another factor that affects Minnesota family physician acceptance of the test. These physicians are less likely to offer MSAFP testing if amniocentesis and genetic counseling are not available within less than an hour's drive from their office. Both ACOG and the American Society of Human Genetics recommendations emphasize the need for easy access to counseling and amniocentesis when screening with MSAFP.[27,28] The physicians without easy access to counseling and tertiary diagnostic facilities appear to be influenced by these limitations.

A final concern is cost-effectiveness. Few physicians (27%) agree that MSAFP testing is cost-effective. Studies

Table 2. Physician Characteristics and the Frequency with Which Patients Accept Maternal Serum α-Fetoprotein Testing

Characteristic	"Very Few" Accept (n = 208)	"About One Fourth" Accept (n = 81)	"About One Half" Accept (n = 104)	"About Three Fourths," "Almost "All," or "All" Accept (n = 111)	*P* Value
Age (y)	40.3	40.0	38.1	40.1	.06
Female (%)	14.0	21.0	31.7	22.9	<.05
Practice location large city or suburb (%)	27.5	42.0	55.3	53.2	<.001
Agree if serious birth defect woman should be able to obtain abortion (%)	73.6	87.0	82.8	88.8	<.05
Agree counseling about MSAFP is medically-legally necessary (%)	84.0	91.4	93.2	93.6	<.05
Agree MSAFP is accurate test for neural tube defect (%)	49.8	65.4	68.0	76.6	<.001
Agree MSAFP test is cost-effective (%)	15.7	23.7	33.0	48.0	<.001
Agree MSAFP test misleads patients that physicians can guarantee a healthy baby (%)	57.8	39.5	35.0	30.6	<.001
Agree MSAFP test leads to anxiety (%)	79.9	65.4	67.3	50.0	<.001
Agree MSAFP test worthwhile (%)	56.4	76.5	81.2	92.5	<.001

have shown that MSAFP screening is cost-effective from the perspective of society, but not from the perspective of the insurer.[30]

This study demonstrates that several physician factors have a major influence not only on whether and how frequently MSAFP testing is offered but also on how often women accept the test. Only 22% of physicians reported that more than half of their patients chose the test. Most studies of patient acceptance of MSAFP testing are from other countries and report much higher acceptance rates, ranging from 78% to 98%.[7,8,10,13] The acceptance rates previously reported in the United States have been lower (31% to 60%) but not as low as those reported by Minnesota family physicians.[3,11,12]

Although maternal factors affecting acceptance of MSAFP testing have been previously studied,[8,11–13] little attention has been paid to physician influences on testing. Eighty-eight percent of women in one survey did state that their prenatal care provider was very important in helping them decide whether or not to have the MSAFP test.[9] In a 1985 Missouri physician survey about intention to offer MSAFP testing, 33% of the physicians planned to offer testing routinely.[23] Physicians who intended to offer testing were more likely to feel it was medically-legally necessary and cost-effective, have a liberal attitude toward abortion, and practice in an urban location.

Minnesota family physicians' ambivalence about MSAFP testing appears to be conveyed to their patients. However, medical-legal concerns regarding the need for testing seem to override this ambivalence and contribute to the 87% rate of testing offered by these physicians. Physicians who agree that counseling regarding MSAFP testing is medically-legally necessary are much more likely to offer the test and have more women accept the test. In the logistic regression analysis, physician medical-legal concern was by far the strongest factor associated with offering MSAFP testing.

The medical-legal status of MSAFP testing is controversial. The 1985 ACOG Department of Professional Liability alert stating that all prenatal patients must be advised of the availability of testing has been strongly criticized by several authors.[31] However, the question of medical liability has been and continues to be raised.

The 84% response rate to this survey indicates that these results should be representative of the experience of Minnesota members of the American Academy of Family Physicians who provide prenatal care. However, the survey respondent population was disproportionately composed of women and board-certified physicians. Both of these groups were found to be more likely to offer MSAFP testing. Moreover, female physicians offer testing to more patients and have more patients accept

testing. Therefore, the true rate of MSAFP testing may be lower than reported.

Another important limitation of this survey is that the results are dependent on physician self-report. No record review was done to confirm the physician responses.

In conclusion, although most Minnesota family physicians currently offer MSAFP testing to most of their prenatal patients, relatively few patients accept testing. Physicians have many concerns about the test and its limitations, which appear to be conveyed to their patients. Medical-legal concerns have by far the most powerful influence on these physicians' use of MSAFP testing. Minnesota family physicians appear to be offering the test more from fear of a lawsuit than from a belief that it is an accurate screening test for neural tube defects or Down syndrome.

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