

Conference Summary Report

Improving Maternal Health Care: The Next Generation of Research on Quality, Content, and Use of Services

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Contents

Executive Summary	1
Conference Summary Report	
Background	3
Prenatal Care: Current Context and Key Issues	3
Specific Issues and Research Needs	5
Scope, Content, and Outcomes of Care	5
Models for Delivering Interventions	6
Special Populations	7
Quality of Care	8
Data and Information Needs	10
Translating Research into Practice	11
Getting Started: A Dialogue with Senior DHHS Officials	12
Conclusion	14
Recommendations	14
Content of Maternal Health Care	14
Quality of Maternal Health Care	14
Disparities in Access, Use, and Delivery of Services	15
Intervention Models	16
Data and Information Needs	16
Translating Research into Practice	17
Training	17
References	17
Appendix A: Meeting Agenda	19
Appendix B: List of Participants	23
Appendix C: Listing of Recent Prenatal Care Research Sponsored by DHHS	25

The information presented in this report does not necessarily represent the position or opinions of the Agency for Healthcare Research and Quality or the U.S. Department of Health and Human Services.

Improving Maternal Health Care: The Next Generation of Research on Quality, Content, and Use of Services

Background

A 1985 Institute of Medicine (IOM) report of the Committee to Study the Prevention of Low Birthweight promoted the enrollment of all pregnant women into a system of prenatal care as a national policy to reduce the risk of low birthweight (Institute of Medicine, 1985). This report was followed by Congressional initiatives that expanded Medicaid eligibility to include pregnant women. The policy actions sparked by the IOM report were based on the premise that increasing early initiation and adequate use of prenatal care would reduce the risk of low birthweight (LBW) and preterm birth, thus resulting in lower infant mortality rates (Alexander and Howell, 1997). Although prenatal care continues to be widely touted as an effective approach to reducing low birthweight and preterm births, a decade of further research has raised questions about the impact of prenatal care on LBW rates. As a result, the Department of Health and Human Services (DHHS) decided to reexamine its maternal health care research agenda.

In September 2000, DHHS convened a conference to discuss the next generation of research in maternal health care, with a focus on issues related to the content, quality, and use of maternal health care services. Five components within the DHHS—the Agency for Healthcare Research and Quality (AHRQ), the Office of the Assistant Secretary for Planning and Evaluation (OASPE), the Health Resources and Services Administration (HRSA), the National Institute for Child Health and Human Development (NICHD), and the Centers for Disease Control and Prevention (CDC)—cosponsored the meeting. It brought together experts from different parts of the system to identify research gaps and priorities and to suggest how to turn those research needs into questions. The overall objectives for the meeting were to:

- Identify methods to evaluate the quality, content, and use of maternal health care.
- Identify mechanisms to increase the speed by which research findings are disseminated and transferred into practice, programs, and policies.
- Identify health services research efforts necessary to build on and extend our understanding of ways to prevent low birthweight and preterm births.
- Assess the cost-benefit and cost-effectiveness of factors that promote and predict improved outcomes related to low birthweight and preterm births.
- Identify research topics and strategies to assess the impact of behavioral interventions during pregnancy for different groups of women.

The report presents a summary of the conference. A copy of the meeting agenda is presented in Appendix A, and a list of participants appears in Appendix B. A listing of recent research projects sponsored by DHHS agencies is presented in Appendix C.

Prenatal Care: Current Context and Key Issues

In his opening presentation, “Are We Ready to Assess the Content of Prenatal Care?” Milton Kotelchuk, Ph.D., M.P.H., reviewed many of the key issues that led to the need for this conference. He noted the confusion over what is meant by “prenatal care,” a concept that has been enlarged from being a strictly medical (obstetrical) visit to become a public health intervention. This shift resulted in new issues related to access, changing content, and new theories of causation around poor birth outcomes.

Over the last decade, the definition of prenatal care has been expanded to include other ancillary

services occurring during the antenatal period (e.g., nutrition, education, and psychosocial services). Alternate sources of prenatal intervention also have begun to receive attention (e.g., the impact of outreach workers, family members, and the community in providing prenatal services and information). Today, the expanded focus is on maternal health care, a concept that encompasses preconception, prenatal, and postnatal care. So from an initial focus on preventing maternal mortality, the role of prenatal care has progressed to encompass:

1. The detection, treatment, and prevention of adverse maternal, fetal, and infant outcomes.
2. The amelioration of adverse health behaviors and socioeconomic conditions.

Dr. Kotelchuk also discussed the three major factors leading to changes in health policy: changes in our knowledge base, social strategies, and/or political will. He emphasized that in the late 1980s and early 1990s, there was a consensus across the public health community and the Federal Government that the knowledge base was sufficient for developing a series of public interventions related to prenatal care (e.g., Medicaid expansions, Healthy Start).

Unfortunately, the efficacy of many of the original components of prenatal care was never rigorously established, nor have there been periodic reviews of the evidence for standards.

Most of the recent research has focused on the relationship between prenatal care use and low birthweight, ignoring the number of alternative outcomes that may be affected by prenatal care. Some of the questions raised by Dr. Kotelchuk include:

- What range of maternal and infant health outcomes are we trying to influence?
- What are the causal models underlying each of the negative outcomes?
- How can we measure the effects of interventions on outcomes?
- What range of maternal and antenatal health services that should be considered interventions?

- Are any interventions associated with poor outcomes?

A subsequent presentation by Robert Goldenberg, M.D., “Pre-Term Birth: Next Steps After the Low Birthweight PORT Study,” focused on one of many possible prenatal outcomes: preterm birth. Although preterm births account for just 10 percent of total births, preterm birth is a factor in 75 percent of perinatal mortality and 50 percent of neurologic handicap.

In 1992, the Agency for Healthcare Research and Quality funded a Patient Outcomes Research Team (PORT) study to examine low birthweight in minority and other high-risk women (Patient Outcomes Research Team, 1998). Dr. Goldenberg noted that the PORT’s outcomes of interest were not only preterm birth, but also included the relationship between low birthweight and preterm births and maternal/fetal mortality, long-term handicap, and severe neonatal morbidity.

Focusing on all of these outcomes, the PORT researchers reviewed the research on 11 common interventions thought to have an impact on reducing the incidence of preterm birth. These interventions included: prenatal care, risk screening, nutrition counseling, bed rest, hydration, home uterine activity monitoring, and caloric, protein, and/or iron supplementation. The PORT researchers concluded that there was no evidence to support the usefulness of any of these interventions in reducing rates of preterm birth.

Although prenatal care was found to substantially reduce the rate of stillbirths and term neonatal mortality, it had no or only marginal effects on preterm birth rates or survival rates of low birthweight infants. The lesson learned from this experience is that before other interventions are adopted, there first should be evidence on the effectiveness, ineffectiveness, or harm of the intervention in relation to a specific outcome.

To achieve this, the field of maternal health care would benefit from the development and adoption of a rigorous approach to evaluating new evidence, interventions, and/or technology. Among the specific research questions identified as critically important were the following:

- What strategies can be used for systematically evaluating new interventions?
- What mechanisms exist for increasing use of effective interventions and eliminating ineffective or harmful ones?
- How do social and demographic factors affect outcomes?

Specific Issues and Research Needs

These and other presentations made during the course of the meeting generated significant discussion on a range of topics. These discussions, including suggestions for specific research topics and questions, are summarized here.

Scope, Content, and Outcomes of Care

Participants agreed that while the relationship between use of prenatal care and low birthweight is almost always the exclusive focus of research, there are a number of alternative perinatal outcomes that may be modified by prenatal care and are in need of further investigation. These include maternal and fetal mortality, severe neonatal morbidity, and long-term handicap. Emphasis was placed on the importance of identifying, very specifically, what prenatal care should be designed to achieve. A starting point could be to determine which specific prenatal interventions affect which specific outcomes. To fully understand the benefits of prenatal care on specific outcomes, the modifiable adverse outcomes that each component is intended to ameliorate must be specified.

The controversy over the effectiveness of prenatal care in preventing low birthweight also has broadened to embrace the difficulties in defining what constitutes adequate use of prenatal care.

There are many content areas (both medical and social) that potentially can be incorporated into a comprehensive prenatal care package, but it simply is not feasible to include them all and achieve improvements in all the associated outcomes.

One of the challenges faced by researchers is that the purpose and content of prenatal care have changed (and continue to change) over time. Prenatal care has shifted from being a medical (obstetric) intervention to a much broader public health intervention where it now encompasses: (1) the detection, treatment, or prevention of maternal, fetal, and infant outcomes; and (2) the amelioration of detrimental health behaviors and socioeconomic conditions.

Another fundamental problem facing researchers is that the current standards of practice for prenatal care were established without randomized clinical trials to demonstrate the efficacy of many of the components. Conference participants seconded the opinion that there is a pressing need for more systematic research into the effectiveness of each of the many diverse components of prenatal care, using outcomes that can plausibly be modified through prenatal care services.

The discussion often returned to the idea of prenatal care being viewed as a platform that contains many specific components and interventions. To evaluate each specific intervention in an evidence-based manner, there must be a way to single out individual components of prenatal care that may be beneficial for targeted outcomes.

There also was an overwhelming consensus about the importance of moving beyond the traditional concept of prenatal care to integrating it into the broader concept of general women's health: what women need before they become pregnant (preconception care), through the pregnancy and delivery (prenatal care), and after delivery (postpartum care). Current interventions do not recognize that the prenatal period is not the only period of risk for adverse

outcomes and therefore do not take advantage of all opportunities for prevention.

The following suggestions for future research were offered:

- Define the objectives of maternal health care services in relation to a range of specific outcomes and expand research on the impact of prenatal care to alternative outcomes beyond preterm delivery and low birthweight (e.g., maternal, perinatal, infant, and child mortality and morbidity, health behaviors, health care use).
- Identify which specific content of care components within comprehensive prenatal care packages may be beneficial for targeted outcomes. Advance the use of randomized controlled trials to assess their impact.
- Examine the recommendations of the IOM Expert Panel on Content of Prenatal Care to determine which prenatal care interventions are supported with adequate evidence and which unproven interventions require further research.
- Redefine the concept of health care to improve birth outcomes from an exclusive focus on prenatal care to a continuum of care, starting at preconception and running through menopause. Fund more research on the full spectrum of women's experiences with reproductive health services.
- Study the impact of reproductive health management during the continuum of maternal health care, with a focus not only on the index pregnancy but also on subsequent pregnancies to determine if specific types of interventions have an impact on overall reproductive health.

Models for Delivering Interventions

In the presentation, "A Critical Reexamination of Models of Intervention in Perinatal and Maternal Health," Vijaya Hogan, Dr.P.H., identified research strategies to better understand the impact of behavioral interventions during

pregnancy for different groups of women and to assess their long-term value in prevention.

Numerous previous studies have noted that behavioral choices (e.g., smoking, diet, drug use) account for a significant portion of preventable fetal and maternal morbidity and mortality. Therefore, behavioral and social interventions offer great promise to reduce morbidity and mortality, but their potential to improve public health has not been fully tapped. An IOM report (Smedley and Syme, 2001) noted that although approximately 50 percent of mortality in the United States is attributable to behavioral factors, only 5 percent of all health care expenditures are directed at improving the way social and behavioral risks are addressed. When considered in the context of the slow progress in achieving desired outcomes, there is opportunity for reassessing current models of intervention.

According to the traditional model of addressing current known risks, the risk factor first must be identified, and then the effects of the risk factor must be mediated. Dr. Hogan noted that, unfortunately, many of the risk factors for preterm delivery are not readily accessible for intervention. Jack and Culpepper (1990) have classified prenatal risk type into:

1. Those factors mutable via changes in health habits (e.g., diet, smoking).
2. Medical conditions not subject to change.
3. Medical conditions subject to change but for which early detection and treatment can help manage the risk.
4. Risks that cannot be changed by prenatal intervention (e.g., age, race, previous reproductive history).

In treating the effects of risk, the symptoms affecting the current pregnancy are eliminated, but the social context stays the same. In correcting the causes of risk, on the other hand, there can be a greater effect on clinical conditions because the context has been changed, removing a fundamental cause.

Targeting intervention strategies at individual

women makes an incorrect assumption that their behaviors exist outside of a social context. In reality, there are several levels of influence on a woman's behavior, among them the family, social network, social environment, and health care providers. To be successful, any intervention strategy would need to account for all members of a woman's extended family network that she relies on for advice and material support.

Dr. Hogan proposed a multilevel approach that would first research and understand different levels of influence on behavior and then design and target a strategy to intervene on all those levels. She also suggested that intervention strategies should take full advantage of all periods of risk as opportunities for prevention: preconception, prenatal, during delivery, and postpartum.

The following related suggestions for future research were offered:

- Focus on the social determinants of maternal health, including screening and interventions regarding domestic violence and substance abuse.
- Develop better interventions (and evaluations of interventions) for complex problems (e.g., behavioral, social, biological, cultural) arising in a diverse community.
- Examine what factors influence women's health knowledge and behaviors (e.g., Where do they get their information?) and determine the types of care different groups of women prefer.
- Study the impact of social marketing strategies (e.g., talk shows, soap operas) on various behaviors.
- Improve the training of alternative types of providers (e.g., nurses, midwives) to provide care to women.

Special Populations

There is little definitive information on the extent to which individual components of standard prenatal care may be effective in reducing or preventing adverse pregnancy outcomes among different groups of women with special medical conditions and socioeconomic situations. However, there was general agreement among conference participants that the benefits of prenatal care may not be equal for all population subgroups and that there may be differences in use and outcomes based on socioeconomic, demographic, cultural, and medical risk factors. Indeed, participants were concerned about the biomedical, behavioral, social, and cultural factors that, singularly or in combination, are often found in diverse communities but about which little is known. Although they agreed that a research agenda should address the "big picture" (i.e., the entire nation), the agenda also should include outlying population "pockets" with major problems. These groups can be defined by ethnicity, subethnicity, locale, or a combination of factors.

There was some agreement as to the importance of carefully considering which subpopulations are studied and how conclusions are derived before translating one single study or intervention on a large scale to different populations where it may or may not have the same effect.

The following suggestions for future research were offered:

- Expand research to explore the varying impact of prenatal care on diverse populations as defined by medical, demographic, cultural, and socioeconomic characteristics and use multilevel statistical modeling techniques to determine how each of these factors independently affects perinatal outcomes.
- Develop methods to find variations where there are high rates of adverse outcomes, determine why they occur, and evaluate

targeted interventions to reduce the high rates.

- Investigate the consequences for maternal health of women who were born and raised in communities segregated on the basis of socioeconomic status, race, and/or ethnicity.
- Examine whether there are racial and ethnic disparities in the advice, content, or quality of care provided by health care professionals.
- Identify effective means to enhance cultural sensitivity among providers.
- Identify factors that drive higher rates of prematurity and other adverse outcomes in black women.
- Identify and measure how structural phenomena like social, economic, and power inequalities (e.g., racism) directly influence health outcomes.
- Examine the relationship between social determinants and population-level determinants in preterm delivery.
- Examine social, biological, economic, and environmental contributors to racial and ethnic disparities in maternal and infant outcomes.
- Examine the barriers that may keep women from entering systems of care.

Quality of Care

A background paper prepared for the meeting by Carolina Reyes, at the time a visiting scholar at the Agency for Healthcare Research and Quality, highlighted the fact that although there has been significant improvement in maternal and infant health over the last century, the last decade has shown a slow rate of improvement in maternal and perinatal mortality and morbidity. When considered in light of significant improvements in medical technology, this reinforces the need to place more emphasis on measuring and assessing the quality and outcomes associated with maternal health care.

Furthermore, usually there are many providers involved in a woman's care, which greatly

increases the amount of data collected and shared. This reinforces the need for improved and more efficient mechanisms for information flow. Also, traditional perinatal health indicators are no longer sufficient to characterize the underlying problems presented by many pregnant women. Therefore, a quality management strategy is needed to ensure that the health care system will continue to evolve in a comprehensive manner and remain responsive to the individual needs of women.

A presentation by Kimberly Gregory, M.D., M.P.H., "Assessing Maternal Quality of Care," expanded the discussion on these points. She emphasized that the historical paradigm of adequacy of prenatal care being linked to maternal and perinatal mortality and low birthweight are no longer valid criteria as the sole determinants of quality of maternal health care. Poor quality, as defined by the Institute of Medicine (Chassin and Galvin, 1998), encompasses underuse (failure to provide a beneficial health service), overuse (service provided when potential for harm exceeds benefit), and misuse (when the appropriate service is given but a preventable complication occurs). Dr. Gregory noted that although prenatal care quality indicators currently exist (e.g., Joint Commission on Accreditation of Healthcare Organizations [JCAHO] and American College of Obstetricians and Gynecologists [ACOG] measures), there are no measurements of their effectiveness or how often they are being used.

Several participants noted that there is little consensus regarding quality measures in obstetrics, due in part to a lack of consensus regarding the objectives of care. The adequacy of prenatal care is not easily measured because the definition of adequacy continues to evolve. The Kessner/IOM index (Kessner, Singer, Kalk, and Schlesinger, 1973; Brown, 1988) and ACOG standards (ACOG, 1974) both define adequacy as the number of medical visits received. Participants emphasized that this definition is misleading because assuming that an increased

number of visits is indicative of quality care misses an important confounder: that patients at highest risk for adverse outcomes often are the ones with the most visits. If future research is to enhance understanding about the benefits of prenatal care, the term “adequate care” must be better defined.

Measuring quality in terms of whether a patient receives the appropriate components of care also presents a challenge because, as discussed previously, there is no consensus on the appropriate content of prenatal care. Many content areas have changed considerably in the past decade (e.g., smoking cessation, HIV/AIDS, genetic testing, fetal monitoring). One participant proposed measuring quality of care in terms of whether services are delivered in an appropriate manner and whether patient satisfaction is achieved.

Addressing and improving quality of care also includes identifying and eliminating ineffective or harmful practices. Participants suggested that the examination of old practice models that have since been discredited could provide useful information on developing strategies to eliminate current harmful or ineffective interventions. Some participants suggested doing a cost-benefit analysis for practices that are suspected to be ineffective.

Other issues that relate to quality focus on the use of maternal health care services. Three distinct issues affecting use of care were raised: (1) defining and developing measures of prenatal care use; (2) assessing whether prenatal care or maternal health care services are actually being used; and (3) assessing whether adequate use affects birth outcomes (or other maternal health outcomes).

Participants noted that adequacy of prenatal care use indexes have been in use for nearly three decades, but much improvement is needed. For instance, current indexes of prenatal care use have problems in controlling for gestational age bias. The current measures also establish adequacy by relying on ACOG

recommendations for low-risk mothers (ACOG, 1974). What is considered adequate care for women with high-risk conditions has not been fully explored. It remains unclear if the ACOG standard is the best choice to define adequate use.

The following suggestions for future research were offered:

- Perform systematic evaluations of guidelines or proposed indicators and define optimal management and expected outcomes.
- Foster efforts to periodically evaluate proposed prenatal care guidelines and standards.
- Develop indicators across the continuum of care and across all provider levels.
- Support networks and collaboration to allow sharing of data and resources, permit multimethod research designs, and disseminate findings.
- Identify the most effective communication and education practices for maternal health, and study how physician-patient communication affects satisfaction and other outcomes in different types of settings.
- Develop potential quality indicators for conditions or services specific to maternal health care.
- Develop and validate new methods for the measurement of quality in maternal health care to include optimal outcomes, impact on subsequent pregnancies, and unconventional outcomes (e.g., decreased morbidity and developmental handicaps).
- Examine how the coordination of obstetric and primary care in different types of organizations impacts on quality of care.
- Expand research on the adequacy of prenatal care use, including improving the current definition and measurement of adequate use, exploring normal use patterns, and defining adequate use for high-risk women.
- Explain patient variation (e.g., attitudes, preferences, interpretation of informed

consent) and develop tools to integrate patient satisfaction and expectations in measuring quality.

- Explore the quality of maternal health care services from women's perspectives by simultaneously collecting quality/service data from both patients and their providers to identify where disparities in perspectives exist.
- Create mechanisms and tools for providers that promote adherence to and use of standards.

Data and Information Needs

One overriding concern of participants was the lack of a solid body of data that would provide the foundation for conducting much-needed research. More sophisticated methods for collecting data about the prenatal experience are needed to be able to associate particular interventions with outcomes in a scientifically sound manner. They argued that current data are outdated, uncontrolled, biased, and observational.

Some participants argued that some good data are already available, but the data are not linked together in some type of comprehensive system. Each data system (e.g., Medicaid data, administrative data) is insufficient in and of itself, so there needs to be a way of bringing all the systems together. They also noted that the assessment of prenatal care quality rests on having a comprehensive, nationwide electronic medical record, but costs and other implications have not been fully examined. Participants also noted that since practitioners are already required to keep records, Federal efforts could examine how to link the records electronically to allow for analysis using standardized data.

Participants also noted that in prenatal care, social strategies (e.g., Medicaid expansions) have far outpaced the knowledge base (e.g., knowledge about effectiveness of interventions). The efficacy of many of the original aspects of prenatal care was never rigorously established, nor have there been periodic assessments of the

scientific evidence for prenatal care practice standards as prenatal care evolved. Participants agreed that a more systematic way is needed to evaluate interventions as they are developed.

Therefore, participants offered the following suggestions for future research:

- Standardize key data elements, measures, definitions, and fields and validate existing data systems to determine which are useful for research.
- Initiate a collaborative perinatal study to gather and analyze obstetric and pediatric information from selected hospitals across the country.
- Develop a primary clinical information database linked to secondary data (e.g., administrative data, managed care ambulatory data) for a standardized clinical database for the continuum of reproductive health to link with outcomes, financial, and registry databases. Examine the cost-effectiveness (and other implications) of an electronic medical record.
- Use Medicaid data to study the role of Medicaid in family planning and abortion services.
- Collect better data via vital records, longitudinal studies on prenatal care, and other services to women to better explain population risk.
- Expand the medical component of the national standard birth certificate, fetal death certificate, and infant and maternal death certificates, making them electronically available. Teach institutions to use these data to establish benchmarks.
- Develop and evaluate measurement tools and monitoring systems for maternal health, maternal outcomes, and health services support.
- Develop and systematically validate practice guidelines across all areas of women's lives for use by internists, family practitioners, and obstetricians, including prenatal care

guidelines for high-risk and vulnerable populations.

- Observe how data elements are linked to outcomes by studying centers of practice that use computerized systems incorporating ACOG standards for measuring quality of care.
- Initiate demonstration projects to collect primary data based on a minimum data set and integrate data into a clinical information system.
- Develop national normative data of sentinel events or rate-based indicators that have already been described and stratified by age and race/ethnicity and use these to develop a consensus for standardized measures for case-mix adjustment.
- Combine data into a repository of clinical and administrative data and use the data to develop a methodology to link structure-process variables with outcomes of interest.

Translating Research Into Practice

Carolyn Clancy, M.D., Director of AHRQ's Center for Outcomes and Effectiveness Research initiated a discussion about mechanisms and strategies for building partnerships to facilitate translation of research-based evidence. She reviewed mechanisms through which existing evidence could be evaluated and disseminated, including:

1. AHRQ-supported Evidence-based Practice Centers (EPCs), which review and synthesize existing evidence on specific clinical topics.
2. The Cochrane Collaboration, which has a group that evaluates effective obstetrical practices.
3. AHRQ's Excellence Centers for Eliminating Disparities, which is a grant program that has the goal of strengthening the science base for evaluating and implementing strategies to eliminate differences in outcomes and health status in minorities for six specific conditions.

Dr. Clancy noted that there is an opportunity to explore issues related to infant mortality. What remains to be known is how researchers can work with representatives of different professional organizations first to prioritize a research agenda and then throughout the research project.

In response, participants suggested establishing a better partnership between the practice community and the practice evaluation community, perhaps through an ongoing consensus conference that would provide a better link between the evaluation of practices and the ultimate practices themselves. This type of mechanism could facilitate the dissemination of information about harmful or ineffective interventions. This mechanism would be greatly enhanced if the EPCS or other centers for evidence synthesis could function as a virtual knowledge base for findings, publications, and decisions that are current.

One participant raised the point that although prenatal care is constantly being examined by various groups, it is a haphazard examination. If too many groups are examining prenatal care from too many perspectives and make many different kinds of recommendations, improvements in quality and/or outcomes will not be achieved. Therefore, a forum could be beneficial in bringing together the medical and public health communities so an ongoing dialogue can be established.

The following other suggestions for future research were offered:

- Support research and education to create a culture in which policymakers, providers, payers, patients, and legislators recognize the value of evidence-based practice.
- Develop a process for periodically revisiting the evidence and a mechanism for disseminating what is known about both effective and ineffective interventions.
- Require that grants propose a plan for the dissemination of research findings and provide funding for dissemination activities.

- Identify appropriate methodologies for dissemination research.
- Develop stronger interagency communication and cooperation and work with the private sector where cooperation would lead to better initial designs for studies, analyses, and applications.
- Promote the concept of a virtual knowledge base in maternal health which posts (possibly on the Internet) findings as they are published, as well as standards, guidelines, and results of consensus conferences.
- Coordinate and regularly update best practices by linking and synthesizing information from ACOG, AHRQ, the Health Resources and Services Administration (HRSA), and the Centers for Medicare & Medicaid Services (CMS).
- Develop a mechanism for training the next generation of clinical scientists to conduct health services research.

Getting Started: A Dialogue with Senior DHHS Officials

During the concluding session of the conference, a representatives from each of the sponsoring Federal agencies discussed their agency's interest and related activities in the area of maternal health care and highlighted particular issues or research questions that are important to their own agency.

Doris Barnette, M.S.W., noted that HRSA, sometimes called the "access agency," links with safety net providers and funds more than 700 community health centers and 2,100 National Health Services Corps physicians. Between these two groups, 11-12 million patients are served, many of whom are pregnant women and even more of whom are in the preconception/interconceptional phase. Ms. Barnette noted that HRSA has developed a strategic plan for dealing with disparities in health care, but although the plan sets forth strategies, it lacks detail on specific activities. She

identified the following as key questions the agency hopes to answer:

- Are there specific activities and services that are needed, along with more global actions like increasing access, to eliminate disparities?
- Is there a sense among participants that a major investment of new funds will be necessary? If so, Federal agencies will require help from the medical, academic, and other communities to justify this.
- How can providers be encouraged to change ineffective or harmful behaviors, and what is the best way to communicate with isolated rural providers?
- Where do program evaluations fit into the evidence? Are they considered at all?
- How can patient preferences be better understood?
- What are the implications of managed care on the content of care and the delivery of services?

Lynne Wilcox, M.D., M.P.H., of the Centers for Disease Control and Prevention (CDC), the "prevention" agency, noted that the CDC is involved in two activities that are relevant to the discussion: public health monitoring/surveillance and prevention research. A data system that is currently in use is the Pregnancy Risk Assessment Monitoring System (PRAMS), which is designed to capture population-level information that can be used by programs to design appropriate responses to maternal and child health issues within their State. The CDC also convened a conference last year to examine maternal morbidity issues and how to capture this type of information on a population level and across health systems, to determine the Nation's status with regard to maternal morbidity. To address issues of disparity, Dr. Wilcox emphasized that not only issues of mortality must be considered, but also morbidity (which affects many more women). Some of the important questions that she raised were:

- What can help explain disparities in outcomes?

- What are appropriate interventions taken in the context of an individual woman's lifestyle (i.e., community-based experience)?
- How may the discussion of maternal health be bridged with the broader women's health discussion?

Dr. Clancy explained that AHRQ will publish the first ever national report on the quality of health care in 2003. She noted that the Agency will have to arrive at some consensus regarding quality measures before then, possibly by looking into mechanisms for bringing together practitioners and public health experts to develop quality indicators for high-priority conditions. She also raised the following questions that are of importance to AHRQ:

- Where does investigator-initiated research fit into the forthcoming agenda? AHRQ needs guidance from professional organizations on how to advertise maternal health services research opportunities to the clinical community in order to build the talent for carrying out maternal health services research.
- Why do disparities in maternal health care exist, and what is the reason(s) for those disparities?
- What errors occur in maternal health, and what are the possible strategies to reduce those errors?

Sumner Yaffe, M.D., of the National Institute of Child Health and Human Development (NICHD), which the National Institutes of Health component dedicated to maternal and neonatal research, noted that NICHD has two broad-based ongoing efforts in the area of maternal health: studying the epidemiology of birth defects and studying the molecular mechanisms underlying the detection of birth defects. Dr. Yaffe emphasized that unless basic biological mechanisms of disease are well understood, any other data will not be particularly useful on their own. He highlighted the following ongoing and future activities of NICHD that are related to maternal and neonatal health care:

- NICHD funds 13 centers, as part of its Maternal-Fetal Medicine Network, to study various factors involved in preterm delivery.
- The Institute has partnered with the National Institute of Neurological Disorders and Stroke (NINDS) to study the beneficial effects of antenatal magnesium and partnered in the past with the National Heart, Lung, and Blood Institute (NHLBI) to study pediatric asthma.
- NICHD plans to convene two joint conferences with the Food and Drug Administration (FDA) to examine what is known about the 2,000 drugs used during pregnancy and how these drugs can be properly studied for efficacy.

Beth Benedict, Dr.P.H., J.D., explained that the Centers for Medicare & Medicaid Services (CMS, at the time of this conference the Health Care Financing Administration [HCFA]), unlike many of its sister agencies, directs the majority of its research funds and efforts in response to Congressional mandates. Dr. Benedict noted that CMS does not offer grants but primarily participates in cooperative agreements and contracts. The agency does, however, have a very strong intramural research group that works with other agencies on a women's health research agenda. CMS relies on other agencies and the private sector to move research initiatives forward.

Within CMS, there is a Center for State Medicaid Operations (which handles policies, demonstrations, and waivers) and a separate Office of Information Systems (which handles Medicaid data). CMS has already begun to convert Medicaid data files into research-ready formats.

Christine Schmidt, M.P.A., of the Office of the Assistant Secretary for Planning and Evaluation (OASPE) noted a number of similarities between the issues discussed at this meeting and other policy areas that OASPE is involved in. Ms. Schmidt commented that the abundance of issues and suggestions for research provided at

the meeting were indicative of the complexity of the maternal health care arena. She highlighted some of the priority questions from the perspective of OASPE:

- What is the future of e-health and information technology in general and in maternal health care?
- What are the strategies for developing quality indicators?
- What are the topics for data collection, and what are the best ways to collect data?
- Are there stakeholders not present at the conference who should have been engaged in the discussion?

The meeting concluded with a further discussion of these interests and activities with participants and with the recognition that future interagency collaboration will be critical in developing a maternal health research agenda capable of enhancing the knowledge base and moving it forward.

Conclusion

In an effort to develop a conceptual framework for the next generation of research on the quality, content, and use of maternal health care services, experts from various disciplines and representatives from five DHHS agencies identified research gaps and priorities for research.

A call to develop a rigorous science knowledge base and to enhance the research infrastructure resonated throughout the discussion. The panel identified a rich array of priorities. It is hoped that with continued dedicated effort these recommendations will lay the groundwork for the next generation of research on maternal health.

Recommendations

Following is a categorized, cumulative list of research priorities in maternal health as identified by conference participants.

Content of Maternal Health Care

- Define the objectives of maternal health care services in relation to a range of specific outcomes.
- Expand research on the impact of prenatal care to alternative outcomes beyond preterm delivery and low birthweight (e.g., maternal, perinatal, infant, and child mortality and morbidity, health behaviors, use of health care services).
- Disentangle which specific content of care components within comprehensive prenatal care packages may be beneficial for targeted outcomes. Advance the use of randomized controlled trials for assessing the impact of these components.
- Examine the recommendations of the Expert Panel on Content of Prenatal Care to determine which prenatal care interventions are supported with adequate evidence and which unproven interventions will require further research.
- Reframe health care services to improve birth outcomes from an exclusive focus on prenatal care to a continuum of care starting at preconception through menopause, and fund more research on the full spectrum of women's experiences with reproductive health services.
- Study the impact of reproductive health management during the continuum of maternal health care, focusing not only on the index pregnancy but also on subsequent pregnancies to determine if specific types of interventions have an impact on overall reproductive health.

Quality of Maternal Health Care

- Perform systematic evaluations of guidelines or proposed indicators and define optimal management and expected outcomes.
- Foster efforts to periodically evaluate proposed prenatal care guidelines and standards.

- Develop indicators across the continuum of care and across all provider levels.
- Support networks and collaboration to foster sharing of data and resources, perform multimethod research design, and disseminate findings.
- Identify the most effective communication and education practices for maternal health, and study how physician-patient communication affects satisfaction and other outcomes in different types of settings.
- Develop potential quality indicators for conditions or services specific to maternal health care.
- Develop and validate new methods for the measurement of quality in maternal health care, to include optimal outcomes, impact on subsequent pregnancies, and unconventional outcomes (e.g., decreased morbidity and developmental handicaps).
- Examine how the coordination of obstetrical and primary care in different types of organizations affects quality of care.
- Expand research on the adequacy of prenatal care use, including improving the current definition and measurement of adequate use, exploring normal use patterns, and defining adequate use for high-risk women.
- Understand patient variation (e.g., attitudes, preferences, interpretation of informed consent), and develop tools to integrate patient satisfaction and expectations in measuring quality.
- Explore the quality of maternal health care services from women's perspectives by simultaneously collecting quality/service data from both patients and their providers to identify differences in perspectives.
- Create mechanisms and tools for providers that promote adherence to and use of standards.

Disparities in Access, Use, and Delivery of Services

- Expand research to explore the varying impact of prenatal care on diverse populations as defined by medical, demographic, cultural, and socioeconomic characteristics, and use multi-level statistical modeling techniques to determine how each of these factors independently affects perinatal outcomes.
- Develop methods to find variations or “pockets” of high rates of adverse outcomes, researching the reasons for the concentrated poor outcomes and evaluating targeted interventions to reduce the high rates.
- Investigate the consequences on women's maternal health of being born and raised in communities segregated on the basis of socioeconomic status, race, and/or ethnicity.
- Examine whether there are racial and ethnic disparities in the advice, content, or quality of care provided by health care professionals and how to enhance cultural sensitivity among providers.
- Identify factors that drive higher rates of prematurity and other adverse outcomes in black women.
- Identify and measure how structural phenomena like social, economic, and power inequalities (e.g., racism) directly influence health outcomes.
- Examine the relationship between social determinants and population-level determinants in preterm delivery.
- Examine social, biological, economic, and environmental contributors to racial and ethnic disparities in maternal and infant outcomes.
- Examine the various barriers that keep women from entering systems of care.

Intervention Models

- Focus on the social determinants of maternal health, including screening and interventions for domestic violence and substance abuse.
- Develop better interventions (and evaluations of interventions) for multifaceted problems (e.g., behavioral, social, biological, cultural) arising in a diversity of communities.
- Examine what influences women's health knowledge and behaviors (e.g., where they get their information) and identify the types of care different groups of women prefer.
- Research the impact of social marketing strategies (e.g., talk shows, soap operas) on various behaviors.
- Improve the training of alternative types of providers (e.g., nurses, midwives) to provide care to women.

Data and Information Needs

- Standardize key data elements, measures, definitions, and fields.
- Develop demonstrations of information systems for health services research at the local, regional, and national levels to determine the feasibility and barriers to implementing such systems.
- Initiate a second Collaborative Perinatal Study that would gather obstetric and pediatric information from selected hospitals across the country.
- Develop a primary clinical information database linked to secondary data (e.g., administrative data, managed care ambulatory data).
- Use Medicaid data to study the role of Medicaid in family planning and abortion services.
- Validate existing data and clinical data systems to determine whether their quality is sufficient for use in research.
- Collect better data via vital records, longitudinal studies on prenatal care, and

other services to women in a way that helps to explain and quantify population risk.

- Improve data quality for monitoring and surveillance, including improved reporting.
- Provide resources for a standardized clinical database for the continuum of reproductive health to link with outcomes, financial, and registry databases and examine the cost-effectiveness (and other implications) of an electronic medical record.
- Expand the medical component of the national standard birth certificate, fetal death certificate, and infant and maternal death certificates, making them electronically available. Teach institutions to use these data to establish benchmarks.
- Develop and evaluate measurement tools and monitoring systems for maternal health, maternal outcomes, and health services support.
- Develop and systematically validate practice guidelines across all area of women's lives for use by internists, family practitioners, and obstetricians.
- Develop prenatal care guidelines for high-risk and vulnerable populations.
- Observe how data elements are linked to outcomes by studying centers of practice that use computerized systems incorporating ACOG standards for measuring quality of care.
- Initiate a demonstration project to collect primary data based on a minimum data set into a clinical information system.
- Develop national normative data of sentinel events or rate-based indicators that have already been described and stratified by age and race/ethnicity and use these to develop a consensus for standardized measures for case-mix adjustment.
- Combine data into a repository of clinical and administrative data and use the data to develop a methodology to link the structure-process variables to outcomes of interest.

Translating Research into Practice

- Support research and create a culture, through education, where policymakers, providers, payers, patients, and legislators have an understanding and appreciation of the value of evidence-based practice.
- Develop a process for periodically revisiting the evidence and a mechanism for disseminating what is known about both effective and ineffective interventions.
- Require that grant applications include a proposed plan for the dissemination of research findings, and provide funding for such dissemination activities.
- Determine the appropriate methodological approaches to conducting dissemination research.
- Develop stronger interagency communication and cooperation, and work with the private sector where cooperation could lead to better initial designs for studies, analyses, and applications.
- Promote the concept of a virtual knowledge base in maternal health which posts (possibly on the Internet) findings as they are published, as well as standards, guidelines, and results of consensus conferences.
- Coordinate and regularly update best practices by linking and synthesizing information from ACOG, AHRQ, HRSA, and CMS.

Training

- Develop a mechanism for training the next generation of maternal health clinical scientists to conduct health services research.

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Appendix A. Improving Maternal Health Care: The Next Generation of Research on Quality, Content, and Use of Services

U.S. Department of Health and Human Services

Office of the Assistant Secretary for Planning and Evaluation
Agency for Healthcare Research and Quality
Centers for Disease Control and Prevention
Health Resources and Services Administration
National Institute of Child Health and Human Development

September 18-19, 2000

Airlie House Conference Center
Warrenton, VA

Meeting Agenda

Monday, September 18, 2000

10:00 a.m. Welcome and Introductions

Carolina Reyes, Chair
Agency for Healthcare Research and Quality
Panel Members

10:30 a.m. Opening Remarks: Issues and Challenges

Christine Schmidt
Office of the Assistant Secretary for Planning and Evaluation
Lisa Simpson
Agency for Healthcare Research and Quality

10:50 a.m. Overview: Are We Ready to Assess the Content of Prenatal Care?

Linking prenatal care to outcomes
Assessing use of prenatal care services

Milton Kotelchuck
School of Public Health, University of North Carolina
Greg Alexander*
School of Public Health, University of Alabama at Birmingham
Panel Discussion

*Dr. Alexander was unable to attend. His paper was presented by Milton Kotelchuck.

Monday, September 18, 2000 (Continued)

12:00 p.m. Lunch

Keynote: A National Perspective on Maternal Health

Margaret Hamburg
Assistant Secretary for Planning and Evaluation

**1:30 p.m. Pre-term Birth: Next steps after the LBW Patient Outcomes
Research Team Study**

Robert Goldenberg
University of Alabama at Birmingham
School of Medicine
Panel Discussion

**2:40 p.m. A Critical Reexamination of Models of Intervention in
Perinatal and Maternal Health**

Vijaya Hogan
Centers for Disease Control and Prevention
Panel Discussion

**4:00 p.m. Translating Research Into Practice Focusing on Priority Populations:
Health Care Outcomes and Effectiveness**

Carolyn Clancy
Agency for Healthcare Research and Quality
Panel Discussion

5:15 p.m. Next Steps for the Panel

Carolina Reyes
Agency for Healthcare Research and Quality

Tuesday, September 19, 2000

- 8:00 a.m. Assessing Maternal Quality of Care
Definitions and Measures of Quality of Care**
Kimberly Gregory
Cedars-Sinai Medical Center/UCLA
Panel Discussion
- 9:00 a.m. What Have We Missed?**
- 9:30 a.m. Where Next? Priorities for the Next Generation of Research on
Maternal Health Care Services**
Panel Discussion on Content and Quality Issues
- 1:00 p.m. Research Priorities Continued**
Panel Discussion on Access, Cost Benefit and Use of Services
- 2:00-3:30 p.m. Speed Planning: Can We Get Started?**
An Action Plan in Ninety Minutes
Priorities, Strategies and Partnerships
Dialogue with Senior DHHS Officials
Doris Barnette, HRSA
Christine Schmidt, OASPE
Lisa Simpson, AHRQ
Lynne Wilcox, CDC
Sumner Yaffe, NICHD
Panel Experts
- 3:30 p.m. Closing**

Appendix B. List of Participants

Improving Maternal Health Care: The Next Generation of Research on Quality, Content, and Use of Services

September 18-19, 2000

Airlie House

Warrenton, VA

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Appendix C. Prenatal Care Research Sponsored by DHHS, September 2000

The following matrix is a compendium of recent prenatal care research sponsored by agencies within the Department of Health and Human Services (DHHS). It was current as of September 2000. This list was compiled from various resources from DHHS agencies (e.g., agency research plans, compilations of agency research as provided through Internet resources, informal surveys within agencies, additional information provided by agency staff). Although we attempted to be as comprehensive as possible, we expect that there are additional research projects that are not included in this chart. The research projects are sorted by sponsoring agency.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Prenatal Care Barriers for Low and Moderate-Income Women	Paula Braveman	National Library of Medicine	University of California San Francisco	Agency for Healthcare Research and Quality (AHRQ)	Study access to prenatal care in California women (with income below 250% of poverty in different insurance & ethnic groups) following expansions of poverty level and demographic change due to immigration. Determine the extent to which personal and systems barriers act alone or in concert with financial barriers to deter adequate use of prenatal care.
Low Birthweight in Minority Women and High-Risk Women	Robert L. Goldenberg	AHRQ	University of Alabama, Birmingham Albert Einstein College of Medicine	AHRQ	Advance the scientific knowledge base about variation in and effectiveness of obstetrical practices and other interventions aimed at the prevention of LBW and negative sequelae.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Medicaid Managed Care and the Oregon Health Plan	Alison Buist	National Library of Medicine	Johns Hopkins University	AHRQ	Identify and explore the extent to which prenatal care for low-income women has changed in Oregon as a result of changes following implementation of the Oregon Health Plan (OHP), which requires that Medicaid beneficiaries enroll in managed care.
Childbirth PORT (Patient Outcomes Research Team)	Emmett Keeler	AHRQ	RAND	AHRQ	Examine use and outcomes of cesarean delivery versus alternatives, including oxytocin, trial of labor, and normal and assisted vaginal delivery.
Developing Culturally and Linguistically Appropriate Prenatal Care Education	Virginia Gonzales	National Library of Medicine	University of Washington	AHRQ	Improve prenatal care for Spanish-speaking women in managed care populations by increasing their access to effective prenatal health education and develop general guidelines for culturally and linguistically appropriate health education materials.
Evaluating a Decision Tool for Prenatal Testing	Miriam Kuppermann	National Library of Medicine	University of California, San Francisco	AHRQ	Evaluate computerized prenatal testing decision-assisting tool for making choices about diagnostic testing for fetal chromosomal abnormalities.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Pregnancy Risk Assessment Monitoring System (PRAMS): numerous studies	Mary Rogers, Mary Lyn Gaffield, Suzanne Zane	Centers for Disease Control and Prevention (CDC), Division of Reproductive Health (DRH) Survey	State Health Departments, CDC/DRH	State Health Departments, CDC/DRH	Recent focus areas of study at CDC include: -content of prenatal care -characteristics of women who do not receive ACOG-recommended messages -barriers to oral healthcare services -effects of welfare reform on prenatal care use -effects of intimate partner violence on delayed entry into prenatal care -socioeconomic disparity in use of prenatal care -factors related to early entry into prenatal care.
Surveillance for Prenatal Care among Native American Populations	Health depts of various Native American Tribes; technical assistance from CDC/ DRH	DRH Survey	Native American tribes	Indian Health Service	Conduct household based surveys: face to face interviews of American Indian women and men 18 years of age and older; including questions on prenatal care.
Maternal Infant Rapid Intervention at Delivery		CDC, DRH Survey		CDC/DRH	Develop, implement and evaluate strategies to provide integrated reproductive health services to women who present in labor with no prenatal care. Includes counseling on contraception and reproductive decisionmaking, early enrollment in prenatal care for future pregnancies, screening and treatment for STDs, provision of barrier methods of contraception; and for HIV-positive women, provision of HIV-related medical care.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Reproductive Health Status of Incarcerated Women in the State of Georgia	Lori deRavello, Dabo Brantley	DRH Survey	CDC/DRH	CDC/DRH; Georgia Department of Corrections; Georgia Division of Public Health	Conduct a retrospective study comparing birth outcomes among pregnant women incarcerated in Georgia for 1998-99.
SPEAC: Preterm Birth Among Inner City Women: Bacterial Vaginosis, Stressors and Race	Virginia Rauh, Jennifer Culhane	DRH Survey	Health Federation of Philadelphia	CDC/DRH	Conduct a cross-sectional study of the prevalence of bacterial vaginosis (BV) and stress and determine other factors that are associated with these; use a prospective cohort design to study the association among BV, stressors, and preterm delivery.
Maternal Effects of Treatment for Bacterial Vaginosis	Jane Hitti	DRH Survey	University of Washington	CDC/DRH	Conduct a prospective, randomized trial of oral vs. intravaginal metronidazole for the treatment of bacterial vaginosis among pregnant women at low risk for preterm delivery. Study side-effect profiles of each administration mode, compare the efficacy, and compare the effects on reduction of preterm delivery.
Harlem BirthRight	Leith Mullings, Alaka Wali	DRH Survey	New York Urban League	CDC/DRH	Document the contexts of pregnancy among African American women in Central Harlem, New York City and disseminate this information to other public health and medical professionals.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Healthy African American Families (HAAF)	Loretta Jones	DRH Survey	Drew University	CDC/DRH	Define the context of pregnancy among African-American women and their families in Los Angeles. Qualitative research was conducted to understand the roles of health care, stress, family relationships, spirituality, nutrition, and work during pregnancy and to develop community and family asset models for prevention and intervention activities.
An Analysis of the Use of Urine Cotinine as a Measure of Tobacco Exposure in Pregnant Women	Lucinda England	DRH Survey	CDC/DRH	CDC/DRH	Evaluate the relationship between reported cigarette consumption and urine cotinine and the relationship between exposure and birthweight by analyzing Smoking Cessation in Pregnancy (SCIP) data.
Tobacco Exposure and Birthweight at Term	Lucinda England	DRH Survey	CDC/DRH	CDC/ DRH	Analyze Smoking Cessation in Pregnancy (SCIP) data to evaluate effects of smoking reduction on birthweight in term infants.
Multi-Site Collaboration on Infection During Pregnancy	Sabina Cauci	DRH Survey	CDC/DRH	CDC/DRH	Conduct a multi-center collaborative study to assess the effect of IgA on levels of preterm delivery, particularly its effect in women with diagnosed bacterial vaginosis.
Social Networks Project	Michelle Kelley	DRH Survey	University of Illinois at Chicago Prevention Research Center	CDC/DRH	Through the use of community-university partnered research, document and understand the impact of social networks on access to prenatal care.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Uterine Rupture Associated with Trials of Labor for Vaginal Birth after Cesarean Section (VBAC)	Judy Weiss, Linda Bartlett	DRH Survey	Massachusetts Dept. of Health, CDC/DRH	Massachusetts Dept. of Health, CDC/DRH	Study uterine rupture rates for 1990-1997, describe the characteristics of the women who have ruptured uteri associated with a trial of labor for VBAC, explore the feasibility of predicting which women will have more severe ruptures and describe the outcomes of the women and their infants.
Investigation of Factors Associated with Maternal Mortality	Stacy Geller	DRH Survey	University of Illinois at Chicago	CDC/DRH	Evaluate prenatal and intrapartum quality of care and effect on survival among women with severe pregnancy morbidity.
Maternal Morbidity Caused by Infectious Agents	Linda Cushman	DRH Survey	Columbia University	CDC/DRH	Study the extent of maternal morbidity due to infectious agents among low-income, predominantly Hispanic and African American, clinic patients at a large urban medical center; identify racial, ethnic, and sociodemographic differences in infection-related maternal morbidity; share findings with practitioners and community groups to develop culturally sensitive prevention strategies.
Evaluation-Demonstration Improving Access to Care for Pregnant Substance Abusers	Embry Howell	National Library of Medicine	Mathematica Policy Research, Inc	Centers for Medicare & Medicaid Services (CMS), (formerly Health Care Financing Administration, HCFA)	Evaluate a demonstration to improve Medicaid access to care for pregnant substance abusers that is being implemented in five States: Maryland, Massachusetts, New York, South Carolina, and Washington State.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Maternal Birthweight and Reproductive Outcomes	Irvin Emanuel	National Library of Medicine	University of Washington	HRSA/MCHB	Investigate the intergenerational relationships between the mother's birthweight and other maternal factors with several complications of pregnancy and birth outcomes.
Satisfaction with and Use of Prenatal Care	Arden Handler	National Library of Medicine	University of Illinois	HRSA/MCHB	Determine whether the characteristics of prenatal care are related to a woman's satisfaction (independent of the woman's personal characteristics). Hypothesize that relationship between care characteristics and satisfaction do not differ for black Medicaid and non-Medicaid recipients.
Birth Record Enhancements of the New York State Medicaid Managed Care Encounter System	Patrick Roohan	National Library of Medicine	New York State Department of Health	HRSA/MCHB	Monitor and assess the effects of the State's mandatory Medicaid Managed Care (MMC) program on MCH goals and objectives by incorporating birth record data and prenatal and birth outcome reports into the New York State Medicaid Encounter Data System (MEDS).

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Healthy Families in a Healthy Community	Stephen Weeg	National Library of Medicine	Harms Memorial Hospital	HRSA/MCHB	Study a frontier county with a large population of Hispanic migrant farm workers and a deficit of health services where mothers are 47% less likely than mothers statewide to receive adequate prenatal care. The objective is to increase the number of women using adequate prenatal care services to the Healthy People 2000 goal of 90%.
Honoring Our Children	Dale Wolf	National Library of Medicine	Great Lakes Inter-Tribal Council, Inc. (GLITC)	HRSA/MCHB	Improve the health and well being of Native American children including assisting tribal partners with their efforts to reduce infant mortality and to increase the utilization of prenatal visits and well-child care.
Asthma Observational Study	Mitch Dombrowski	National Institute of Child Health and Human Development (NICHD) Maternal Fetal Medicine Units (MFMU) Network	Wayne State University	National Institute of Child Health and Human Development (NICHD) & National Heart, Lung, and Blood Institute (NHLBI)	Assess the relationship between moderate to severe asthma and adverse perinatal outcome, as compared with non-asthmatic controls.
Asthma Randomized Clinical Trial	Mitch Dombrowski	NICHD MFMU Network	Wayne State University	NICHD & NHLBI	Determine whether regular inhaled beclomethasone for patients with moderate asthma during pregnancy results in better asthma control than oral theophylline.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
BEAM Randomized Clinical Trial	Dwight Rouse	NICHHD MFMU Network	University of Alabama at Birmingham	NICHHD & National Institute of Neurological Disorders and Stroke (NINDS)	Determine whether intravenous magnesium sulfate given to women remote from term, and for whom delivery is imminent can reduce the risk of cerebral palsy in their children.
Bacterial Vaginosis Randomized Clinical Trial	Chris Carey and Mark Klabanoff	NICHHD MFMU Network		NICHHD	Test whether administration of metronidazole to asymptomatic women with bacterial vaginosis reduces the risk of preterm delivery.
Cesarean Registry Observational Study	Mark Landon	NICHHD MFMU Network	Ohio State University	NICHHD	Determine the characteristics of women undergoing a trial of labor and determine the efficacy and safety of a trial of labor; determine cesarean delivery rates by payer and provider status and describe complications and factors influencing outcome in women undergoing cesarean delivery.
Cervical Ultrasound Observational Study	John Owens	NICHHD MFMU Network	University of Alabama at Birmingham	NICHHD	Assess the relationship between shortened cervical length before 24 weeks gestation and subsequent spontaneous preterm delivery.
Factor V Leiden Observational Study	Donna Dizon-Townson	NICHHD MFMU Network	University of Utah	NICHHD and Office of Research on Women's Health (ORWH)	Determine the incidence of pregnancy-related thromboembolism in women carrying the FVL mutation and determine the effects of thrombophilia on the risk of thromboembolism.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Fetal Fibronectin Randomized Clinical Trial	William Andrews	NICHD MFMU Network	University of Alabama at Birmingham	NICHD	Test whether prophylactic antibiotic therapy administered to women with elevated mid-trimester fetal fibronectin decreases the risk of spontaneous preterm delivery.
Progesterone Randomized Clinical Trial	Paul Meis	NICHD MFMU Network	Wake Forest University	NICHD	Establish whether weekly progesterone injections for women who have experienced a previous spontaneous preterm delivery reduces the risk of preterm birth.
Repetitive Steroids Randomized Clinical Trial	Ronald Wapner	NICHD MFMU Network	Thomas Jefferson University	NICHD	Test whether a regimen of weekly courses of steroids is safe and effective compared with the single course.
Trichomonas vaginalis Randomized Clinical Trial	Chris Carey and Mark Klabanoff	NICHD MFMU Network		NICHD	Test whether administration of metronidazole to asymptomatic women with Trichomonas vaginalis reduces the risk of preterm delivery.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Mild Gestational Diabetes Randomized Clinical Trial	Mark Landon	NICHD MFMU Network	Ohio State University	NICHD	Determine whether identification and dietary treatment of women with mild gestational diabetes reduces the risk of delivering a large for gestational age infant compared with standard care.
Preeclampsia Prediction	Les Myatt and Menachem Miodovnik	NICHD MFMU Network	University of Cincinnati	NICHD	Determine whether biochemical or biophysical markers, individually or in combination, can predict the development of preeclampsia.
Genetic Asthma Study	Mitch Dombrowski	NICHD MFMU Network	Wayne State University	NICHD	Determine whether homozygosity of specific polymorphisms is associated with clinically significant functional changes in asthma severity.
Antioxidant Trial	Jim Roberts	NICHD MFMU Network	University of Pittsburgh	NICHD	Determine if antioxidant therapy prevents preeclampsia.
Fetal Pulse Oximetry	Steven Bloom	NICHD MFMU Network	University of Texas Southwestern	NICHD	Measure the impact of fetal oximetry as an adjunct to conventional electronic fetal heart rate monitoring on the overall cesarean delivery rate.
Smoking Cessation	Robert Goldenberg	NICHD MFMU Network	University of Alabama at Birmingham	NICHD	Determine whether smoking cessation therapy results in increased birthweight and/or an increased rate in smoking cessation during pregnancy.
Prenatal Care Use and Adverse Health Behaviors During Pregnancy	L. A. Maiman	National Library of Medicine	NICHD	NICHD	Study behavioral and social support interventions to improve early entry to prenatal care and adherence to the visit schedule and decrease adverse health behaviors during pregnancy.

Title	Investigator	Source	Performing Organization	Sponsoring Agency	Objective
Cost-Effectiveness of Perinatal Substance Abuse Programs	Jerry Cromwell	National Library of Medicine	Center for Health Economics Research	National Institute on Drug Abuse (NIDA)	Identify and quantify a wider range of costs and assess the extent to which alternative treatments are effective in reducing those costs.
Drug Treatment and Care During Pregnancy in HIV-Positive Women	Stephen Crystal	National Library of Medicine	State University of New Jersey, New Brunswick	NIDA	Study the impact of drug use, drug abuse, treatment, psychiatric comorbidity, characteristics of HIV-related health care, and other factors on access to prenatal care and adherence to recommendations to prevent vertical transmission of HIV.
Perinatal Assessment, Referral, and Service Use	Dorie Klein	National Library of Medicine	Western Consortium for Public Health	NIDA	Examine the formulation and implementation of California's 1990 law (SB 2669) mandating protocols for identifying and intervening in cases of prenatal substance use or exposure.
Use of Health Care by Drug-Using Pregnant Women	Donna Strobino	National Library of Medicine	Johns Hopkins University	NIDA	Describe the prenatal and other health care use of drug-abusing pregnant women and examine the factors that are related to the Health Belief Model.