

MANAGEMENT OF THE PREGNANCY  
TESTING ENCOUNTER  
THE DEMANN ALGORITHM

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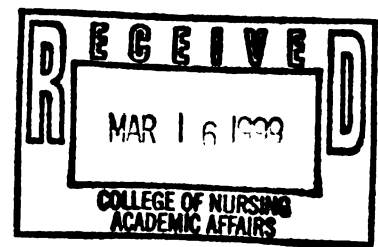
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**MANAGEMENT OF THE PREGNANCY TESTING ENCOUNTER:  
THE DEMANN ALGORITHM**

**By**

**Donna J. DeMann**

**A SCHOLARLY PROJECT**

**Submitted to  
Michigan State University  
in partial fulfillment of the requirements  
for the degree of**

**MASTER OF SCIENCE IN NURSING**

**College of Nursing**

**1999**



## **ABSTRACT**

### **MANAGEMENT OF THE PREGNANCY TESTING ENCOUNTER: THE DEMANN ALGORITHM**

**By**

**Donna J. DeMann**

There are many opportunities to intervene in the lives of women at the time of the pregnancy testing encounter. Interventions could include one or more of the following: preconception care, infertility services, pregnancy options counseling, evaluation for amenorrhea, prenatal care, or family planning. While the pregnancy testing encounter is often viewed as simply a time to perform a pregnancy test, it should be viewed as a complex contact which requires in-depth knowledge, assessment and critical thinking in order to best serve the needs of the woman seeking a pregnancy test. This project presents an algorithm to guide the advanced practice nurse (APN), when assessing and offering interventions at the time of pregnancy testing. APNs must utilize evidence-based practice in order to deliver quality health care to the clients. The DeMann Algorithm, which is based upon current research and is guided by Starfield's Health Service System Model for primary care service delivery, provides the APN with a systematic approach in responding to a woman's request for pregnancy testing. The algorithm can be utilized by other health care providers, i.e., physicians and physician assistants, and its use can decrease health care costs and enhance health outcomes for women and their families. Health care agencies which provide pregnancy tests can also The DeMann Algorithm; this action should promote more comprehensive services at a crucial time in a woman's life.

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With love to Greg.

## **ACKNOWLEDGMENTS**

My sincerest thanks to the chairperson of my committee, Joan Wood, RN, PhD. I appreciate all of the encouragement, time, and assistance that Joan offered throughout this project. I would also like to thank my committee members, Rachel Schiffman RN, PhD and Brigid Warren RN, MSN for the input and expertise that they gave to this project. Finally, I would like to thank Dorothy Sharp, without her, I may have never learned the value of education.

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## Introduction

"The classic evidence of early pregnancy in women is the secretion of (hCG) human chorionic gonadotropin by the placenta (Wasley, 1988, p. 42)". Pregnancy tests measure changes in levels of the hCG to determine pregnancy viability and status (Pernoll, 1991). Women and health care providers (HCPs), i.e., advanced practice nurses (APNs), physician assistants (PAs), and physicians, rely on pregnancy tests for early pregnancy diagnosis. While the pregnancy test is generally perceived as an innocuous test, the process of pregnancy testing requires considerable assessment in order to identify a woman's needs and promote her health and the health of her family. Due to the complex nature and the implications of performing a pregnancy test, HCPs need to manage the pregnancy testing encounter in a manner which responds to the needs of the woman and is based on empirical evidence.

## Problem Statement

Current pregnancy test practices are failing women. The pregnancy testing encounter is a critical moment in a woman's life; the encounter offers many opportunities to assess the needs of women and to provide interventions appropriate to her needs. Unfortunately, HCPs do not view pregnancy testing as a complex task and some tests are ordered strictly based on the woman's request for a pregnancy test. Current practices have resulted in increased health care costs related to inappropriately ordered tests which are either inaccurate, need repetition or are unnecessary. This practice pattern has resulted in missed opportunities to offer services to women which could optimize their health status (Jack, Culpepper, Babcock, Kogan, & Weismiller, 1998).

Health care providers interacting with women at the time of pregnancy testing must possess a substantial knowledge base. The HCP must use the most current knowledge to determine when and if to perform the pregnancy test. The HCP must assess the needs of the woman who is having a test, e.g., her desire to continue the pregnancy and offer interventions and referrals appropriate to the woman's needs. Many possible

interventions exist. The woman with a negative test may need intervention for secondary amenorrhea, contraception, infertility, or preconception care. The woman with a positive test may need services for abortion, adoption, prenatal care, and/or she may need counseling to explore her options.

Despite the complexity of pregnancy testing, there are health settings which allow support staff, e.g., medical assistants (MA's) and licensed practical nurses (LPNs) to order pregnancy tests (Jack, Campanile, McQuade, & Kogan, 1995). While support staff may be capable of assessing the last menstrual period and the date of possible conception, support staff typically do not have the knowledge base to further assess the woman and her presenting concern, to intervene when test results are delivered to the woman, and to advise the woman when interventions are necessary.

There is also a lack of standardization among HCPs when assessing a woman and ordering the pregnancy test. This may be due to complacency and/or the HCP's belief that the pregnancy test is innocuous. There is current need for the development of a systematic process which guides HCPs during the pregnancy testing encounter.

#### Purpose of Project

The purpose of this project is to develop an algorithm to guide HCPs, specifically the advanced practice nurses (APNs), actions and interventions at the time of pregnancy testing. The algorithm offers direction to the APN on the assessment of when and if the test should be performed, on the assessment of the woman's needs regardless of the test results, i.e., positive or negative; and provides guidance on the proper interventions or referrals to meet her needs. Since all APNs do not have the same experience or knowledge base, the algorithm provides guidance to APNs to assess/intervene more thoroughly.

#### Conceptual Framework

Starfield (1973) proposed that there are four factors that effect an individual's state of health. The factors include: genetic structure, social and physical environment, individual behaviors, and health services. In 1973, Starfield combined these factors with

Donabedian's (1966) classification of health services variables, i.e., structure, process, and outcome, to produce the Health Services System Model. Starfield proposed that for the health care system to be effective, it had to include aspects of each of Donabedian's variables and the factors which effect the individual's state of health. In 1992, she revised her model (see Figure 1). The new model added three additional components to the structure variable which are characteristics of services but are unrelated to clinical care. She further described the several components which make up each variable of the health care services.

The structure variable describes the components that enable the health services system to provide services. It includes the following components: (a) personnel: the number, type, training and motivation of each person delivering care; (b) facilities and equipment: the number and type of facilities, the accreditation, and the standards; (c) range of services: the kinds of services offered; (d) organization: the mechanisms for coordination, accountability, and responsibility of personnel; (e) continuity: the mechanisms for follow-up and communication with other entities of the health care system, i.e., laboratories, specialists; (f) accessibility: the ability of the patients to reach services; (g) financing: the method of payment by patients for services and employees for their work; and (h) population eligible: the people eligible for services.

The process variable includes two major components which have their own subcomponents. The first, provision of care, refers to the activities of the provider and includes: problem recognition, diagnosis, management and reassessment and the second, receipt of care, refers to the activities of the client, i.e., utilization, acceptance and satisfaction, understanding and compliance.

The outcome variable reflects the impact of the structure and process variables on one's state of health. There are seven components of outcome. The components are rated on a continuum and include: (a) longevity, the life expectancy of the individual;

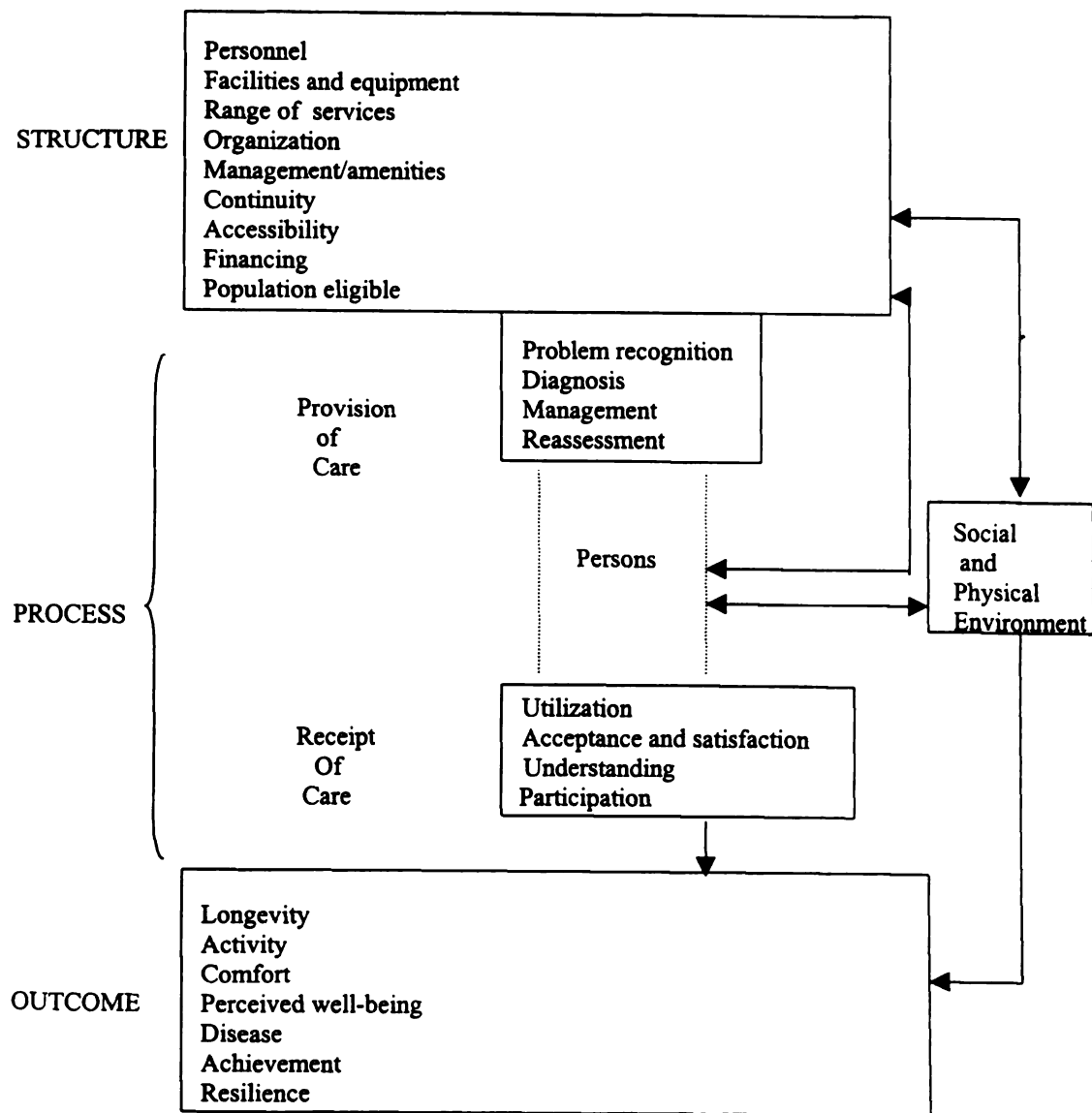


Figure 1. The Health Services System Model (Starfield, 1992).

(b) activity, the individual's ability to carry on normal activity; (c) comfort, the pain or other sensations which interfere with work or pleasure; (d) perceived well-being, the view a person has of their own health and their satisfaction with it; (e) disease, the presence of conditions which potentially or actually interfere with the individual's physical and/or mental well-being; (f) achievement, the level of development or accomplishment and the potential for future development of better health; and (g) resilience, the ability to cope with adversity and the potential for resisting a range of possible threats to health.

#### Application of the Starfield Model to the Project

Starfield's Health Services System Model provides a good framework for evaluating the care provided in the primary care setting (Starfield, 1992). While algorithms are not specified in this model, they have been utilized to improve the quality of care, as well as to decrease the cost of care. In order to solve a problem, an algorithm offers specific orderly steps, with decision points to direct the user to the solutions. An algorithm can decrease the potential for fragmented care (Bridgeman, Flores, Rosenbluth, Pierog, et al., 1997). In order to utilize the proposed algorithm in the health setting, structural components must be in place, but, because an algorithm directs the provision of care, the proposed algorithm is specifically placed within the process variable in The Health Services System Model (see Figure 2).

The algorithm is written for APNs for utilization at the time of pregnancy testing. Schaffner, Ludwig-Beymer and Wiggins (1995) define APNs as nurses who have furthered their education to perform advanced assessment, nursing and medical diagnosis, and interventions. APNs provide care which emphasizes early intervention and ongoing management and encompasses several categories of care providers including nurse practitioners, clinical nurse specialists, certified nurse midwives, and certified registered nurse anesthetists (Schaffner, Ludwig-Beymer, & Wiggins, 1995). The working definition of APN for this project is a nurse who has had formalized education



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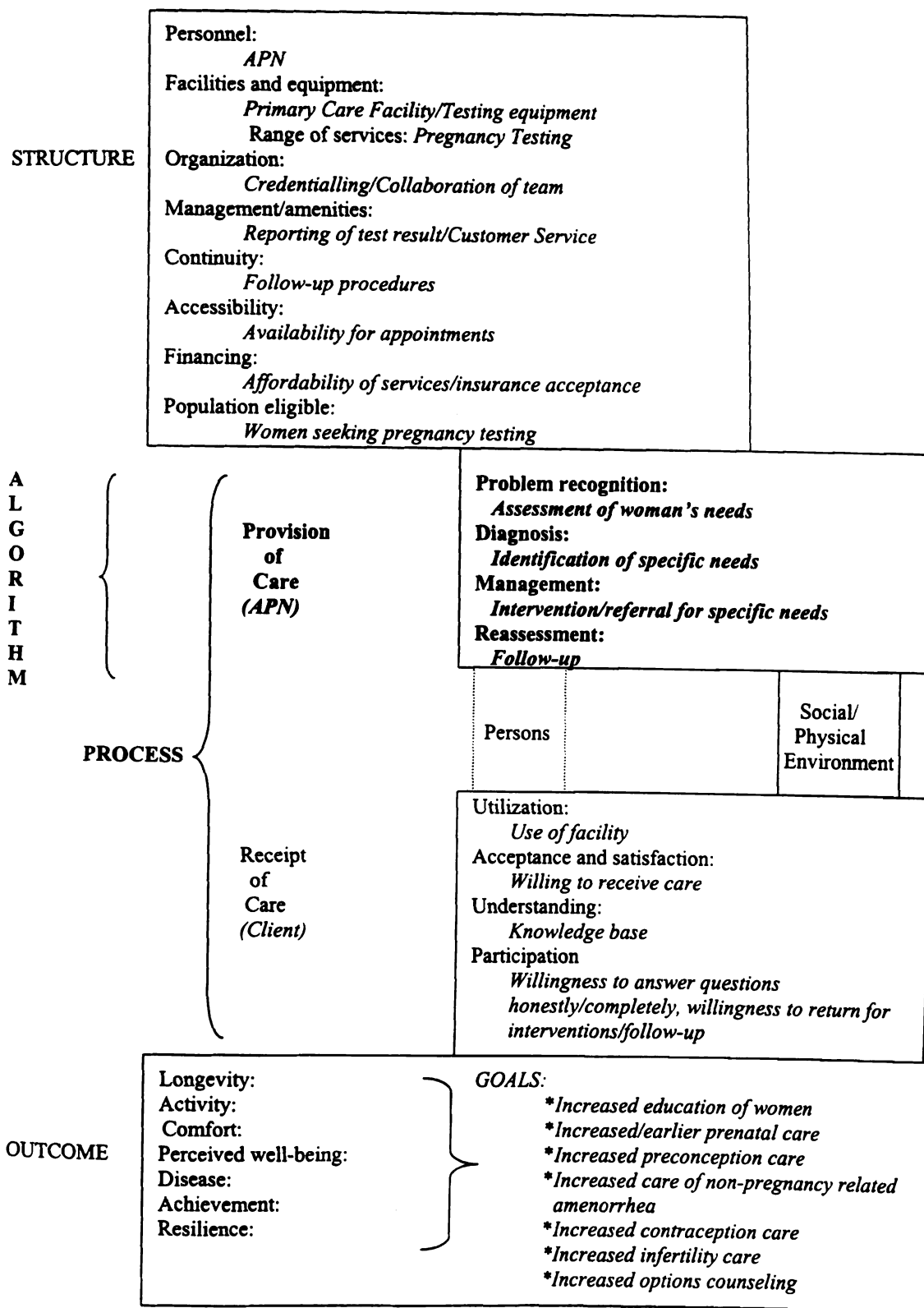


Figure 2. Modified Health Services System Model Applied to the DeMann Algorithm.

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in either a graduate, or a certification program and is prepared to perform advanced assessment, formulate nursing and medical diagnosis, and implement advanced interventions. Within Starfield's structural component is the personnel variable. Starfield defines personnel as the individuals involved in the provision of services. For the purpose of this project, personnel refers to APNs who utilize the DeMann Algorithm to provide services to the woman at the pregnancy testing encounter. The pregnancy testing encounter for this project is defined as the contact between the APN and client, i.e., in person or by phone, when a woman indicates her interest in having a pregnancy test.

Within the structural component of Starfield's model, is another variable, the facilities and equipment, which refers to the types, equipment, accreditation, and the standards of the facilities. While this project is not specifying a specific health setting in which to perform pregnancy testing, the health setting will need either a contract with a laboratory or access to the test kits available to carry out the pregnancy test.

Starfield's model describes the range of services as the types of services offered. The range of services specified by the algorithm is pregnancy testing. Pregnancy testing refers to the encounter between the APN and the client, in which a request for a pregnancy test, i.e., the APN and woman interact to determine the need for the test, a serum or urine test which identifies hCG (Wasley, 1988) is performed, and if the test is performed, the interventions necessary to meet the woman's needs are identified.

As appropriate to Starfield's model, accountability and responsibility of the APN are part of the organizational component. This recognizes that the facility must have a mechanism for credentialing APNs in order to insure that they are properly prepared to follow the algorithms and to collaborate, consult with or refer to other health care providers. The facility must have management and amenities established to insure timely reporting of the pregnancy test result and to insure that clients are treated with courtesy and respect. The facility must have mechanisms to ensure follow-up when the patient is referred to an outside agency to ensure continuity of care. The facility needs services

which are accessible and affordable to the woman seeking a pregnancy test. And finally, the population eligible as specified in the algorithm refers to the women seeking a pregnancy test.

The structural components which are reflected in this project include the personnel, the range of services, and the population. The main focus of the project, nonetheless, is the algorithm which fits within the process variable.

Algorithms are defined in different ways. Costello (1991) define an algorithm as a formula or set of steps for solving a problem. Bridgeman, et al. (1997) define an algorithm as a decision tree. Gonthier and Habel (1994) define an algorithm as a systematic, step-by-step visual representation of a decision-making process, which describes the essential parts of a process and poses questions to be answered in solving a problem or completing a project. Clinical practice guidelines are also stepwise evaluations of either a diagnosis or management strategy (Hoyt, 1997); protocols are plans or rules for carrying out a client's treatment regimen (Costello, 1991). For this project the distinguishing factor of the algorithm is that it is a visual representation, of a decision-making process, which involves assessment, diagnosis, and intervention, in order to address a problem. Thus, algorithm is the term selected to describe the proposed project, and Gonthier and Habel's definition is selected as the working definition for this project.

Starfield's process variable is broken down into two components, the provision of care, and the receipt of care. The algorithm offers assistance to the APN in the provision of care. The systematic, step-by-step visual representation leads the APN through problem recognition to make decisions which will assist in reaching a diagnosis and lead to interventions/referrals within Starfield's treatment/management component.

For the process variable to be effective, according to Starfield's Model (1992), there must be input from both the APN and the client. The same principal holds true when considering an algorithm. The APN must ask the pertinent questions in order to obtain an accurate assessment and to follow the pathways of the areas of need for provision of care.

The client must provide accurate information and engage in honest communication so that the assessment reflects the true needs of the client for receipt of care. The algorithm is a main focus of the process variable, and although, the client's receipt of care is necessary, it is not determined by the algorithm.

While the algorithm does not evaluate outcomes, an algorithm can facilitate positive outcomes, decrease costs, and enhance collaboration (Bridgeman, Flores, Rosenbluth, & Pierog, 1997). The goals for positive outcomes are related to maternal and/or infant longevity, activity, comfort, perceived well-being, disease, achievement, and resilience.

Pregnancy testing, although seemingly straight forward, can offer many opportunities to the APN for assessment, problem/need identification and intervention. The proposed algorithm placed within Starfield's Health Services System Model offers a process which the APN can follow which could have a significant impact on the woman seeking care, her child/ren, and her family/significant other.

### Literature Review

A review of the literature revealed no algorithms, guidelines, protocols or other tools which address the comprehensive care of a woman seeking pregnancy testing. There is, however, literature to support the use of algorithms in health care in general, and there is evidence that pregnancy testing can be utilized for interventions which can enhance the health of women. Algorithms in health care is discussed to support the use of an algorithm as a vehicle for this project; the opportunities pregnancy testing offers the APN to assess the needs of women and provide interventions are also included.

### Algorithms in Health Care

There is considerable literature which supports the use of algorithms in health care. There is also evidence that positive outcomes can occur through the use of algorithms (Akers, 1991; Hudzinski, 1995; Bridgeman, et al., 1997; Stengrevics, 1997).



Bridgeman, et al. (1997), using a case management analyst, described algorithm use in an emergency department. They found that patients: (a) with asthma had decreased lengths of stay (LOS) from an average of 180 minutes to 94 minutes; (b) with diabetic ketoacidosis had decreased LOS from 240 minutes to 130 minutes; and (c) with gastroenteritis the LOS was decreased from 210 minutes to 77 minutes. This study also found that there was better documentation in the client's chart and that the clinical approach was more coordinated among caregivers when an algorithm was used.

Hudzinski (1995) in a case study format, evaluated the use of algorithms in a rural hospice for cancer pain management. Two years of client situations were evaluated to assess for evidence of increased interdisciplinary collaboration and communication, and evidence of flexibility when dealing with individual clients. Hudzinski noted that in using algorithms interdisciplinary collaboration and communication were increased and that clients were treated with more flexibility. These circumstances resulted in a decreased length of time for clients to receive pain management, i.e., from 24 to 48 hours to just one to two hours.

Finally, Stengrevics (1997) cited the use of algorithms in caring for cardiac surgery patients who had been sent home from the hospital. Algorithms were developed for the most frequently occurring problems that home bound cardiac surgery patients encounter. Weekly review of a log of 300 telephone calls revealed that the nurses had used the algorithm, and that appropriate recommendations had been made by the nursing staff. Also, a case study analysis and client survey revealed improved client outcomes with 50% of clients indicating that they had used the services, and 90-100% of the clients indicating satisfaction with their care.

Algorithms have been used within the health care system, and have improved the quality of care. An algorithm for APNs performing pregnancy testing has the potential to: (a) decrease the number of inappropriately performed tests thus decreasing costs, (b)

improve the assessment and interventions offered to women, and (c) theoretically, improve the health of the woman, her unborn child/ren, or both.

#### The Negative Test as an Opportunity to Provide Preconception Care

The preconception literature suggests that there is a need for increased preconception care. In 1990, the United States Public Health Service published Healthy People 2000: National Health Promotion and Disease Prevention Objectives. One objective was: "Increase to at least 60 percent the proportion of primary care providers who provide age-appropriate preconception care and counseling." Preconception services, which are services to reduce the risk of adverse outcomes prior to conception, should be offered to all women of child-bearing age. Preconception care has been documented to produce positive outcomes in women with diabetes, women with phenylketonuria (PKU), and women with a history of a previous birth with a neural tube defect (Perry, 1996). Summers (1993) wrote that just as counseling and referral are usually provided to the woman with a positive test, preconception care and/or contraceptive counseling and care should be provided to a woman with a negative test.

A study of preconception risks was completed by Jack, Campanile, McQuade, and Kogan (1995). They studied 136 women who had a negative pregnancy test, and determined that 94% had reported at least one factor which required further evaluation, counseling or intervention before pregnancy. In this study, they concluded that the negative pregnancy testing encounter is an opportunity for preconception risk assessment and counseling.

#### The Negative Test as an Opportunity to Offer Contraception Services

Contraception services include assessment and intervention to provide contraception either pre or postcoitally. The statistic that more than 60% of pregnancies are unintended indicates that contraception is an area of increased need which should be addressed by professionals (Ward-Morgan & Deneris, 1997). It is estimated that as many as 687,000 unintended pregnancies could be avoided with improved contraceptive method

use (Rosenberg, Waugh, & Long, 1995). Jack, Culpepper, Babcock, Kogan, and Weismiller (1998) studied women with negative pregnancy tests and found that the negative test is also a significant event and thus a time to address the contraceptive needs of the woman.

Schwab-Zabin, Sedivy, and Emerson (1994) studied the subsequent risk of childbearing among adolescents with a negative pregnancy test. They found that 45% of adolescents had a negative test result before their first pregnancy. The study looked at 2926 clients aged 17 and under and used a questionnaire format for assessment. They noted in their study that in 1982 more than 2.5 million women under the age of 25 obtained pregnancy tests, and of the clinics studied, the rates of negative test results ranged from 50%-88%. They further discussed the opportunities these negative tests offer providers, i.e., to offer contraception services; they caution that the young woman whose test is negative will require more intensive counseling if unintended birth is to be prevented.

#### The Negative Pregnancy Test as an Opportunity to Assess Amenorrhea

Amenorrhea can have physical as well as psychological ramifications for women, and should be evaluated promptly and efficiently (Armstrong & South-Paul, 1996). Armstrong and South-Paul examined the causes of both primary and secondary amenorrhea, i.e., ovarian failure, hypothalamic-pituitary failure, outflow tract obstruction (imperforate hymen, uterine adhesions), uterine absence, and chromosomal abnormalities and discussed their implications if left untreated. They provide the reader with an algorithm to assist the provider to assess the client, to arrive at a diagnosis, to provide appropriate, cost-effective care, and to make appropriate referrals. The article stressed the need for accurate prompt diagnosis and interventions, the need to first rule out pregnancy through pregnancy testing, and the need for further evaluation.

### The Negative Test as an Opportunity to Provide Infertility Services

Ittner, Himmel, and Kochen (1997) studied whether the general practitioner is interested in infertility counseling and whether the client seeks help from the family doctor. Based upon the replies of 21 general practitioners, the authors noted that the practitioners did not ask childless clients about their desire to conceive; however, the clients did believe the practitioners to be an important source of information and advice. One-half of the men, and one-quarter of the women studied expressed a wish that their doctor would have asked about their desire to conceive, and expected emotional support from their general practitioner. The authors concluded that providers must assess the infertility needs of couples and offer interventions.

### The Positive Test as an Opportunity to Offer Options Counseling

There is support for the need for options counseling when a woman has an unintended pregnancy. There are essentially three options when a woman becomes pregnant: (a) continue the pregnancy to raise the child, (b) continue the pregnancy but relinquish the child for adoption, and (c) terminate the pregnancy. The woman faced with an unintended pregnancy faces a very difficult choice, and she may need support in making her decision (Brien, 1996). A woman must be given information that will help her make an informed choice, and she needs support for the intense emotions she may feel when a choice is made (Lauderdale & Boyle, 1994; Resnick, 1992; Timpson, 1996).

Lauderdale and Boyle (1994) studied women who relinquish their child. They used the knowledge that adoption causes feelings of loss and grief, and conducted a study which examined the experience of infant relinquishment in open versus closed adoption. They found that open adoption facilitated prenatal care and helped birthmothers make the decision to relinquish with a sense of purpose and control, and enabled better coping about the loss. They comment that given the facts that: (a) adoption can foster positive outcomes for women, i.e., completed education, participation in the work force, delayed marriage, and higher incomes, and (b) due to the differences in the experience of

relinquishment through open versus closed adoption, providers should be knowledgeable about referral sources, help the woman make an informed choice and support the woman in her choice.

#### The Positive Test as an Opportunity to Offer Abortion Services

Slonim-Nevo (1991) studied Israeli women who were terminating their pregnancy, their psychological experiences when facing abortion, and the types of assistance they thought they needed. The study found that the most common feeling when faced with the confirmation of the unintended pregnancy was that of sorrow. Other reactions cited were those of surprise, nervousness, a wish to terminate as soon as possible, apathy, and mixed emotions, i.e., happiness because they were fertile, yet sadness because the pregnancy was unwanted. Once the woman decided to have the abortion, the overwhelming emotion was fear of the procedure. The second part of the study looked at the services the woman wished she had received at the time of confirmation of pregnancy, and before the abortion. At confirmation of pregnancy, the woman wanted: (a) information about where to go to have an abortion and how to fund it; (b) emotional support and comfort; (c) help in making a decision; and (d) medical counseling. Before the abortion procedure, the woman wanted: (a) information about the abortion procedure, risks and side effects; (b) emotional support and comfort; and (c) humane treatment by the medical staff. In conclusion, Slonim-Nevo commented that any social worker, public health nurse, family physician, or psychologist in health-maintenance organizations, high schools, women's shelters, runaway shelters, and other welfare agencies should be able to provide the first phase of counseling at the positive test encounter.

#### The Positive Test as an Opportunity to Offer Prenatal Services

Studies show that a child born to a mother who has not received prenatal care will be three times more likely to be low birth weight, and more likely to die before it's first birthday (Machala & Miner, 1991). Roberts, Yawn, Wickes, Field, Garretson, and Jacobsen (1998) studied barriers to prenatal care for women in a midwestern middle-class

community. This study showed that for 813 women aged 14–47 years, the crucial factors in initiation of prenatal care were: the perceptions about the importance of prenatal care, the ease of obtaining an appointment, and the ability to obtain child care for other children. Lia-Hoagberg, Rode, and Skovholt (1990) also studied barriers and found that women who had not planned the pregnancy or who viewed the pregnancy negatively were less likely to seek early prenatal care and some did not seek prenatal care at all. Decreasing barriers was identified as very pertinent to increasing prenatal care, as well as decreasing maternal and infant mortality rates. These researchers emphasize that it is the role of the provider who delivers the positive pregnancy test result to stress the importance of prenatal care, to assist the woman in obtaining an appointment, and if possible to decrease her barriers to prenatal care.

The literature review supports the use of algorithms in health care in general. While the literature does not support a specific need for a pregnancy testing algorithm, it does provide evidence which acknowledges pregnancy testing as a complex task which offers many opportunities to APNs to intervene in a woman's health. This project's product, the DeMann algorithm for the pregnancy testing encounter, recognizes these opportunities and incorporates them into an algorithm to assist the APN.

### Algorithm Development

Effective care of the woman seeking a pregnancy test means that the person performing the test understands that the test encounter is not as simple as ordering the test and communicating a positive or negative test result. The person performing the test must be able to: (a) accurately identify if there is a need for the test, (b) assess the woman's needs, (c) identify the possible interventions which can be offered to meet the needs of the woman, and (d) either treat the woman's needs or make appropriate referrals when necessary interventions are outside the APN's scope of practice. Thus, the creation of an algorithm should assist the APN in completing the above tasks. The DeMann algorithm consists of a primary algorithm plus a series of secondary algorithms (see Appendix A for

the complete algorithm). The primary algorithm, Figure 3, The DeMann Algorithm: The Primary Assessment of the Woman Seeking Pregnancy Testing, reflects the overall picture of the woman's request for pregnancy testing, while Figures 3a-3f represent the secondary algorithms' specific targeted subspects. The decision making points within both the primary and the secondary algorithms are supported by the literature, and are cited as each algorithm is explained to the reader.

### Assumptions

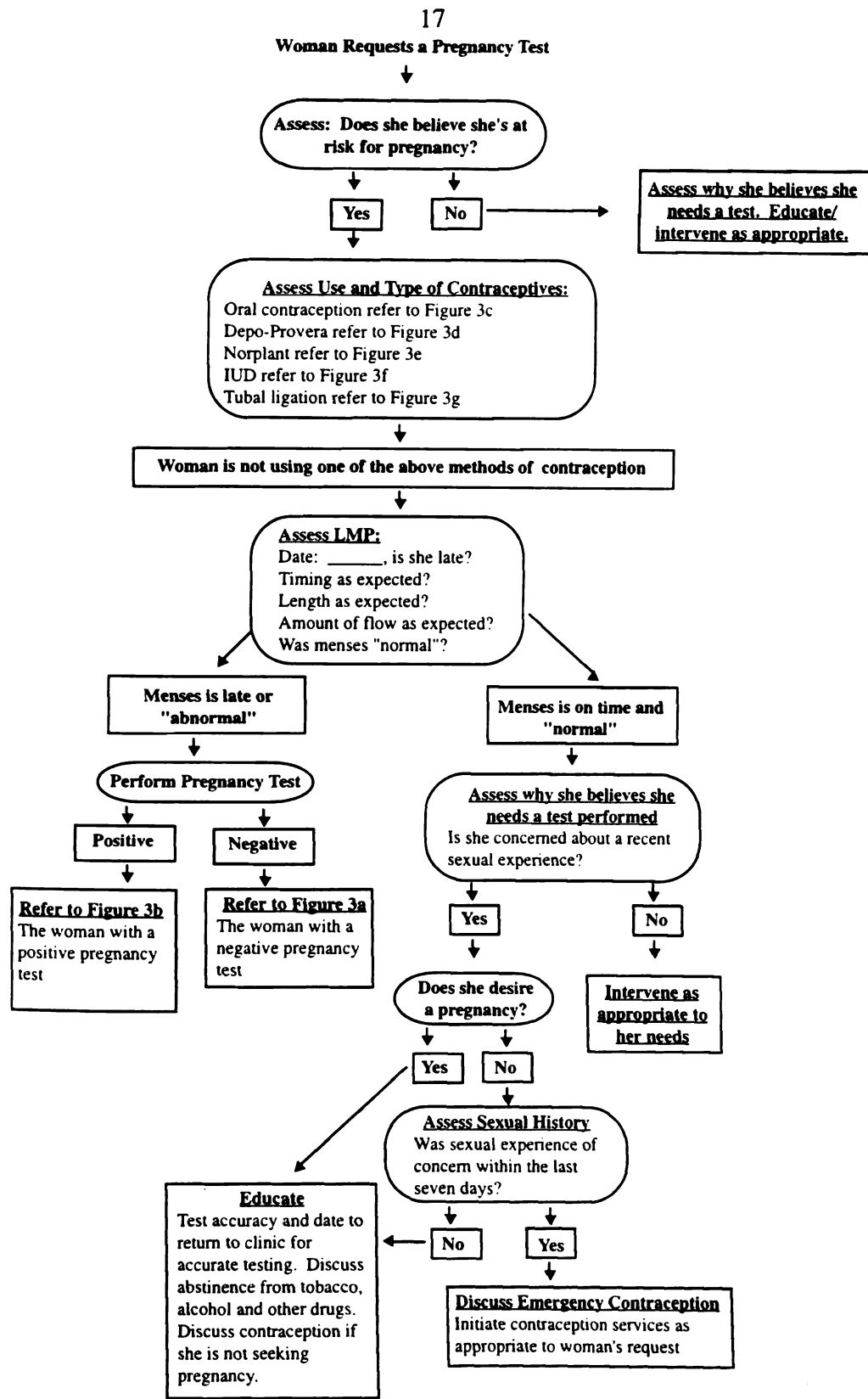
Two assumptions have been made in the development of the proposed algorithm:

(a) The algorithm addresses the encounter in which the woman requests a pregnancy test from an APN, and (b) the algorithm does not apply to a pregnancy test to rule out pathology, e.g., dysfunctional uterine bleeding, and miscarriages.

### The Primary Assessment of the Woman Seeking Pregnancy Testing

The primary algorithm (see Figure 3) begins with the assessment of whether the woman believes she is at risk for pregnancy. If she does not believe she is at risk, the APN should assess why she believes she needs a test, and intervene/educate as necessary. If she does believe she is at risk, the APN should assess if she is using a method of birth control since birth control use poses special challenges for the APN. Hormonal contraception can cause menstrual changes including amenorrhea while IUDs and tubal ligation can increase a woman's risk of ectopic pregnancy and miscarriage if she becomes pregnant (Hatcher, et al., 1994). The APN faced with these circumstances is directed to one of the other algorithms within the series to address these issues appropriately.

Once contraception has been ruled out, the primary algorithm addresses the assessment of the last menstrual period (LMP). The APN should assess the date of the menses, the timing of the menses, the length of the flow, and the amount of flow. This assessment is necessary to determine if the woman is indeed late for her period, or if there have been changes which could indicate that she is pregnant (Hatcher, et al., 1994). Some women will have implantation bleeding at approximately the same time a period is due.



**Figure 3.** The DeMann Algorithm: The Primary Assessment of the Woman Seeking Pregnancy Testing.



The implantation bleeding usually lasts for a shorter length of time and has less blood flow than the normal cycle; and this may cause concern for the woman (Hatcher, et al., 1994). A decision of the "normalcy" of her period is made based on the answers to these questions. Normal is defined as the individual woman's usual menstrual cycle. The algorithm then directs the APN based on the woman's response.

The APN assessing the woman whose menses is not late and has not changed, is directed to assess why she believes she needs a test. Many women will present because they are concerned about a recent sexual experience (Hatcher, et al., 1994). The APN must address the woman's concerns, and is directed to proceed with appropriate interventions if she has not had a recent sexual encounter of concern. The APN who determines the woman is concerned about a recent encounter, is directed to assess whether or not she desires a pregnancy.

The woman who desires pregnancy, yet has not missed a menses, is seeking the test too early for the hCG to be detected. Human chorionic gonadotropin is not detected until 10-14 days after conception (Pernoll, 1991), therefore, the APN must educate the woman about the accuracy of pregnancy tests, and when to return to the health care setting for testing. She should be encouraged to abstain from smoking, tobacco, alcohol, and other activities which could cause harm to a pregnancy.

The woman who does not desire a pregnancy should be further assessed to determine the date of the sexual intercourse which she believes places her at risk for a pregnancy. Emergency contraception, i.e., postcoital contraception, may be an option to reduce a woman's risk of pregnancy if coitus has been within the last seven days. The most common emergency contraception is the use of hormone pills which reduce the risk of pregnancy by 75% if the pills are given within 72 hours of intercourse (Ward-Morgan & Deneris, 1997). Intrauterine devices can also be used for postcoital contraception up to seven days after sexual intercourse. The postcoital IUD is thought to reduce the risk of pregnancy even more than hormone pills but is used much less frequently (Ward-Morgan

& Deneris, 1997). The postcoital IUD can cause increased risk of pelvic infection if the woman has a sexually transmitted disease, and is not recommended in nulliparous women (Ward-Morgan & Deneris, 1997).

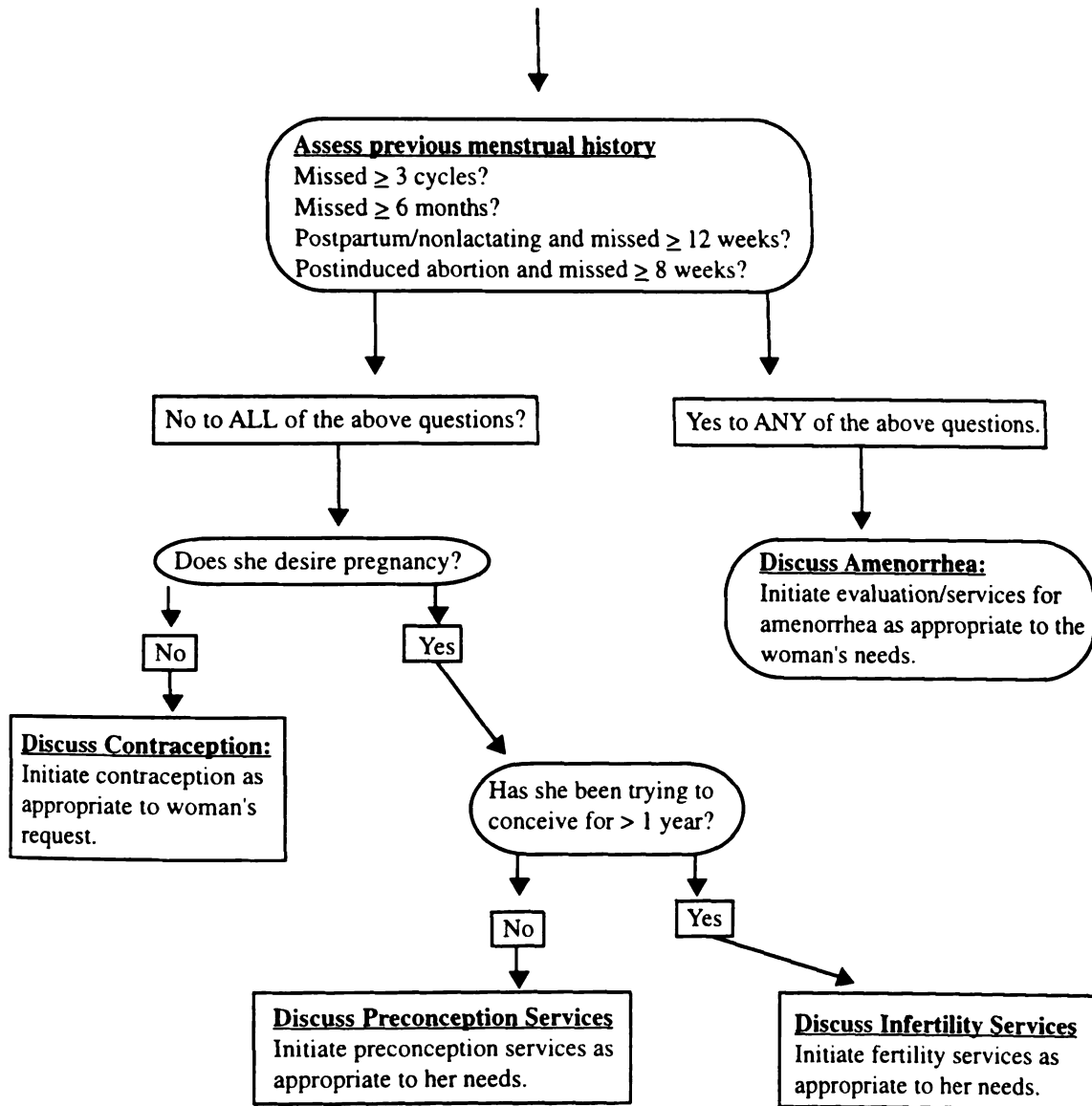
The APN who assesses the woman and finds that she fits the criteria for emergency contraception should discuss emergency contraception with her and offer services if she desires to use one of the methods. The APN who assesses the woman and finds she does not fit the criteria for emergency contraception should educate her on the accuracy of pregnancy tests, when to return to the health setting for a test, about contraceptive options available to her and when she should return to the health setting for testing.

The APN assessing the woman who is late for her menses or whose menses is "abnormal", should perform a pregnancy test. When the test is negative, the APN is referred to Figure 3a, The DeMann Algorithm: The Woman with a Negative Pregnancy Test; when the test is positive, the APN is referred to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test. These figures will be discussed in the following sections.

#### The Woman with a Negative Pregnancy Test

The woman with a negative pregnancy test may have several needs, i.e., amenorrhea services, contraception services, preconception services, and infertility services (see Figure 3a). The APN is directed to assess the woman's previous menses in greater detail to determine if the woman may need intervention for non-pregnancy related amenorrhea.

Literature about secondary amenorrhea states that the amenorrhea may not be transient, and that the woman should be assessed when any one of four criteria are positive: 1) the woman has not had a menses for three or more cycles, 2) the woman has

**The Woman with a Negative Pregnancy Test**

**Figure 3a:** The DeMann Algorithm: The Woman with a Negative Pregnancy Test

not menstruated for six or more months, 3) the woman is postpartum/nonlactating and without menses for twelve or more weeks, 4) the woman is postinduced abortion and has not had a period for eight or more weeks (Chikotas, 1995; Armstrong & South-Paul, 1996). The APN who determines that a woman fits any of the above criteria should discuss amenorrhea with her and initiate evaluation to determine its cause.

If the woman does not fit any of the criteria, the APN progresses as though the amenorrhea is transient. The APN assesses to determine if the woman is seeking pregnancy. The woman who does not desire pregnancy should be counseled regarding contraception, and contraception services should be provided as desired.

If it is determined that the woman does desire pregnancy, the APN should assess the length of time in which the woman has been trying to conceive. Infertility is a concern when a woman has been unable to produce a viable pregnancy within one year of unprotected intercourse (Pernoll, 1991). The woman who is having difficulty with conception may benefit from infertility services and these should be discussed, offered and initiated as appropriate to her needs.

The woman who is not infertile and is trying to conceive, should have preconception services discussed and initiated as appropriate to the woman's request. Preconception care includes a comprehensive assessment and attempts modification of medical, psychological, and behavioral risk factors to help the woman actively prepare for pregnancy. The goal is to provide the healthiest environment possible to the earliest embryonic cells and reduce the chances of poor maternal and infant outcomes (Moos, 1989; Jack, et al., 1995).

The negative pregnancy test encounter can offer many opportunities to the APN to assess and intervene in the needs of a woman. While many APNs see the positive pregnancy testing encounter as an opportunity for woman to assist with prenatal care, women with negative tests may have other needs which should be assessed and interventions should be offered.

### The Woman with a Positive Pregnancy Test

When the APN has performed a pregnancy test and the test result is positive, assessment, intervention, and education should be offered (see Figure 3b). First, the estimated date of confinement (due date) must be determined. This is done by using Nagele's rule, i.e., subtract three from the month of the last normal menstrual period and add seven to the first day that this menses started (Pernoll, 1991). For example, if the LMP is 10/14/98, the EDC will be 7/21/99.

Next, the APN needs to assess the implications of the positive test result to the woman: What is her reaction? Was she seeking pregnancy? Does she want to raise or relinquish the child? Does she want an abortion? Is she undecided? (Hatcher, et al. 1994). Once the woman's wishes have been determined, the APN should offer her supportive interventions. The woman who wishes to continue the pregnancy to raise the child will need prenatal care, as will the woman who wishes to relinquish the child for adoption. The woman who wishes to relinquish, however, will also need initiation of adoption services (Lauderdale & Boyle, 1994). The APN should discuss and initiate prenatal services and, if the woman is relinquishing, the APN should discuss and initiate adoption services.

The woman who is undecided needs discussion and initiation of options counseling as soon as possible (Brien, 1996). The APN should provide education on the importance of a prompt decision to decrease poor outcomes. The woman may have questions about what types of services and the types of personnel to expect at the agency of which she is referred (Lauderdale & Boyle, 1994).

The woman seeking abortion will need referral and/or initiation of abortion services as soon as possible (Slonim-Nevo, 1991). The APN should educate her to the importance of early termination. The APN should answer her questions or find a resource who can answer her questions.

Each woman with a positive test should be provided documentation of proof of a positive test result; this can decrease the need for repeating the test when she is referred to

## The Woman with a Positive Pregnancy Test

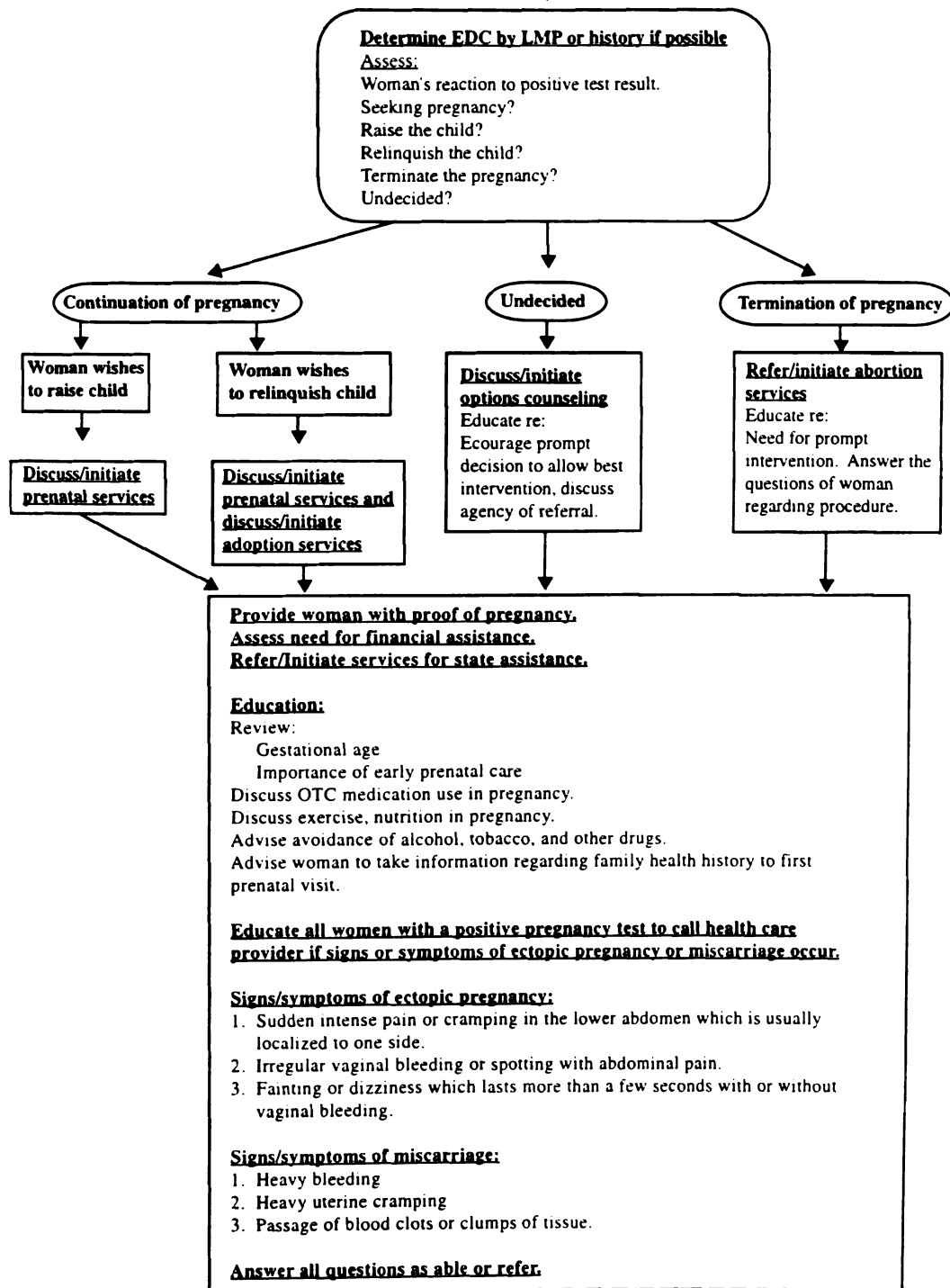


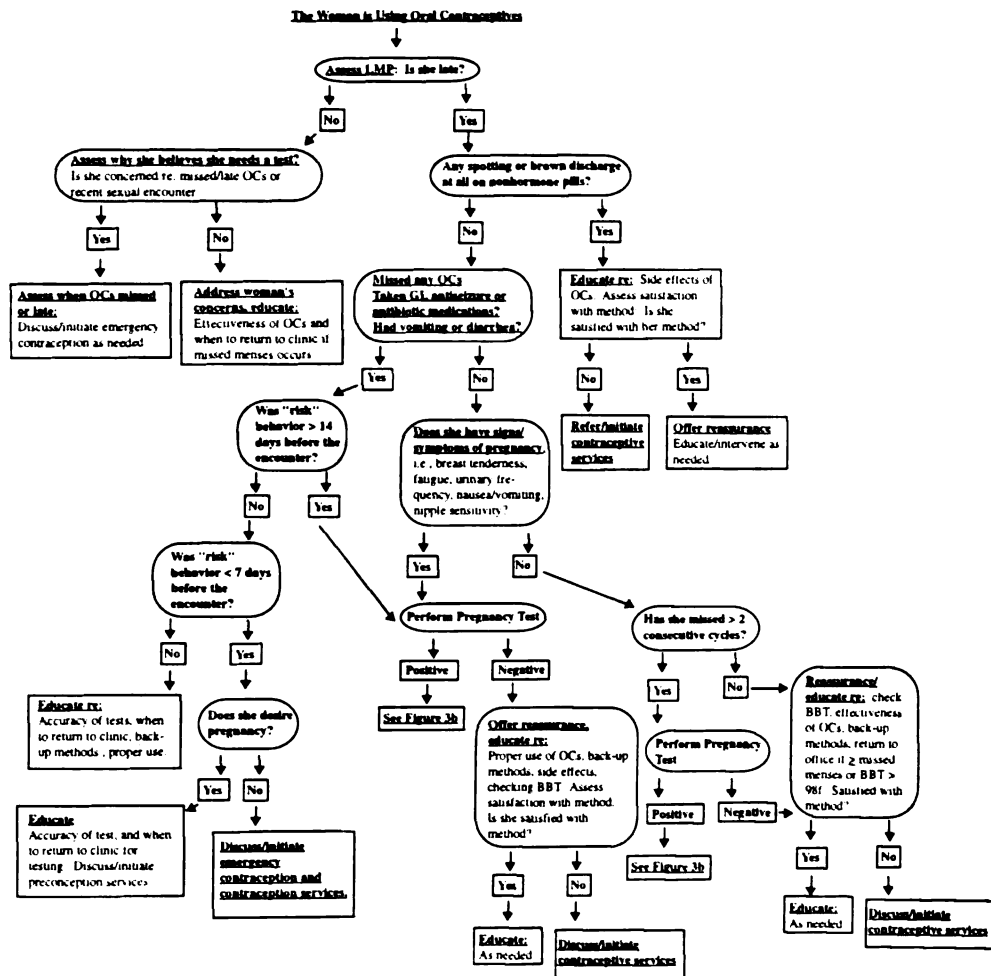
Figure 3b: The DeMann Algorithm: The Woman with a Positive Pregnancy Test.

other agencies (Christmas, Pirani, Heagarty, & Schwartz, 1993). The APN should assess her need for financial assistance no matter what her choice and refer/initiate services for state assistance. The APN should provide education to the woman with a positive test about the gestational age of the pregnancy (Hatcher, et al., 1994). The importance of prenatal care should be discussed if the pregnancy is to be continued (Roberts, et al., 1998). The woman should be educated to avoid over-the-counter medications unless her APN is aware and confirms their use (Hatcher, et al., 1994). The woman should be educated about exercise and nutritional information in pregnancy (Hatcher, et al., 1994). She should be educated to avoid alcohol, tobacco, and other drugs (Pernoll, 1991). The APN needs to instruct her on the necessary family and medical history information she will need to provide when seeking prenatal care (Pernoll, 1991). Every woman with a positive test should be educated about the signs/symptoms of ectopic pregnancy and miscarriage (Hatcher, et al., 1994). Finally, the woman should be allowed to ask questions of the APN who should take the time to answer them or refer her to someone who can (Pernoll, 1991).

The pregnancy test encounter in which a woman is not using contraception is a complex encounter, but when contraceptive methods are considered, the APN must consider still more data. The following sections will address assessment and interventions which should occur when a woman is using: oral contraceptives (OCs), Depo-Provera (DMPA), Norplant, intrauterine devices (IUDs), or has had a tubal ligation.

#### The Woman Using Oral Contraceptives

When the APN has determined that the woman is using oral contraceptives (OCs), the algorithm directs the APN to determine if the woman has missed a menses (see Figure 3c). If she has not, the APN is directed to determine if she is concerned about missed or late OCs, or a recent sexual experience. If she is not concerned about these, the APN is directed to address her concerns, and to provide information about the effectiveness of OCs, including when to return to the health setting if amenorrhea occurs (Hatcher, et al.,



**Figure 3c.** The DeMann Algorithm. The Woman Using Oral Contraceptives.



1994). If the woman is concerned about missed or late OCs, or a recent sexual experience, the APN needs to assess when the OCs were missed or taken late in respect to the sexual experience of concern; the APN should consider the woman's candidacy for emergency contraception. The woman who fits the criteria for emergency contraception, should be offered emergency contraceptive services (Ward-Morgan & Deneris, 1997).

If she has missed a menses, the APN should assess if she has had any vaginal spotting or brown vaginal discharge while taking the nonhormonal reminder pills, since these are considered a withdrawal bleed when using OCs (Hatcher, et al., 1994). For the woman who has had spotting or brown discharge, the APN should educate the woman regarding the menstrual changes which can occur (Hatcher, et al. 1994). The woman should also be assessed to determine if she is satisfied with her method, since satisfaction is directly related to proper and continued use (Rosenberg, Waugh, & Long, 1995). The woman who is unsatisfied should be referred for contraceptive services to decrease her chances of discontinuation and unintended pregnancy (Hatcher, et al., 1994). The woman who is satisfied with her method may benefit from reassurance, and education about when to return to the clinic for testing (Hatcher, et al., 1994). The APN should intervene as appropriate to the woman's needs.

The woman who has not had any bleeding or spotting should be assessed to determine if she has been using her pills correctly, i.e., taking them daily and at approximately the same time; is using medications which can alter the effectiveness of OCs, i.e., gastrointestinal, antiseizure, or antibiotic medications; or has had vomiting/diarrhea which can also alter effectiveness (Hatcher, et al., 1994). The woman who has not been using the OCs correctly is at an increased risk of pregnancy, and should be evaluated for timing of risk behavior to determine if testing will be accurate, and assessed for the possible use of emergency contraception if pregnancy is not desired (Ward-Morgan & Deneris, 1997). The APN who finds that the recent sexual experience was more than 14 days prior to the encounter, should perform a pregnancy test. If the test

result is positive, the APN is referred to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test. If negative, the APN educates the woman about the proper use of OCs, the use of back-up methods when she is using GI, antiseizure, or antibiotic medications, has had vomiting or diarrhea, or has missed OCs or taken several late. The APN should educate the woman to check her basal body temperature (BBT) as indication of ovulation and pregnancy (Hatcher, et al., 1994). A BBT of less than 98.0 F means she has not ovulated, if she has BBTs greater than 98.0F, she should be educated to return to the office for testing (Hatcher, et al., 1994). The APN also needs to assess if the woman is satisfied with her method, offer education and reassurance to the woman who is satisfied, and initiate contraceptive services if she is not.

If the sexual experience was less than fourteen days prior to the encounter, the APN needs to determine if the recent sexual experience was less than or equal to seven days before the encounter, since emergency contraception may be an option (Ward-Morgan & Deneris, 1997). If the sexual experience was more than seven days before the encounter, the APN is directed to educate the woman on the accuracy of tests, when to return to the health setting for an accurate test, the use of a back-up method for the rest of the cycle, and proper use of the OCs (Pernoll, 1991; Hatcher, et al., 1994).

The APN who determines that the sexual experience was within the last seven days needs to assess whether the woman is seeking pregnancy. When the woman is not seeking pregnancy, the APN discusses emergency contraception and initiates services if the woman desires, and discusses contraceptives and initiates services if the woman wants to change her method (Hatcher, et al., 1994; Ward-Morgan & Deneris, 1997). The woman who desires pregnancy, yet whose sexual experience was within fourteen days of the encounter, should be educated as to when to return to the clinic for accurate testing, and preconception services should be discussed and initiated appropriate to the woman's needs (Hatcher, et al., 1994).

The woman who has not missed pills, taken pills late, used antibiotics, antiseizure or GI medications, and has not had vomiting or diarrhea, should be assessed for signs/symptoms (S/S) of pregnancy. Hatcher, et al. (1994) recommended a pregnancy test if two consecutive cycles have been missed unless S/S of pregnancy are present. If they are present, the APN is directed to perform a pregnancy test. The APN is again directed to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test if the test is positive. If negative, the APN needs to offer reassurance, and educate regarding proper use of OCs, back-up methods, side effects of OCs, and checking BBTs as previously discussed. The APN should also assess the woman's satisfaction with her method (Hatcher, et al., 1994). The woman who is not satisfied should have available contraceptive services discussed and selected as appropriate to her needs (Rosenberg, Waugh, & Long, 1995). The woman who is satisfied should receive education and reassurance as needed.

For the woman who has not had S/S of pregnancy and has not missed two or more consecutive cycles, reassurance about the effectiveness of OCs should be offered. She should be educated to return to the office if she has two consecutive missed menses (Hatcher, et al., 1994). The APN also needs to educate her to check her basal body temperature (BBT) as an indication of ovulation and pregnancy (this procedure was discussed earlier in this section on page 27) (Hatcher, et al., 1994). Furthermore, the woman should be educated to use a back-up or interim method when she has been using medication that decreases the effectiveness, has vomiting or diarrhea, has missed pills or taken pills late (Hatcher, et al., 1994). Finally, the woman should be assessed for satisfaction with her method (Rosenberg, Waugh, & Long, 1995). If she is not satisfied initiation of contraceptive services should occur. If the woman is satisfied, the APN should educate and intervene as needed.



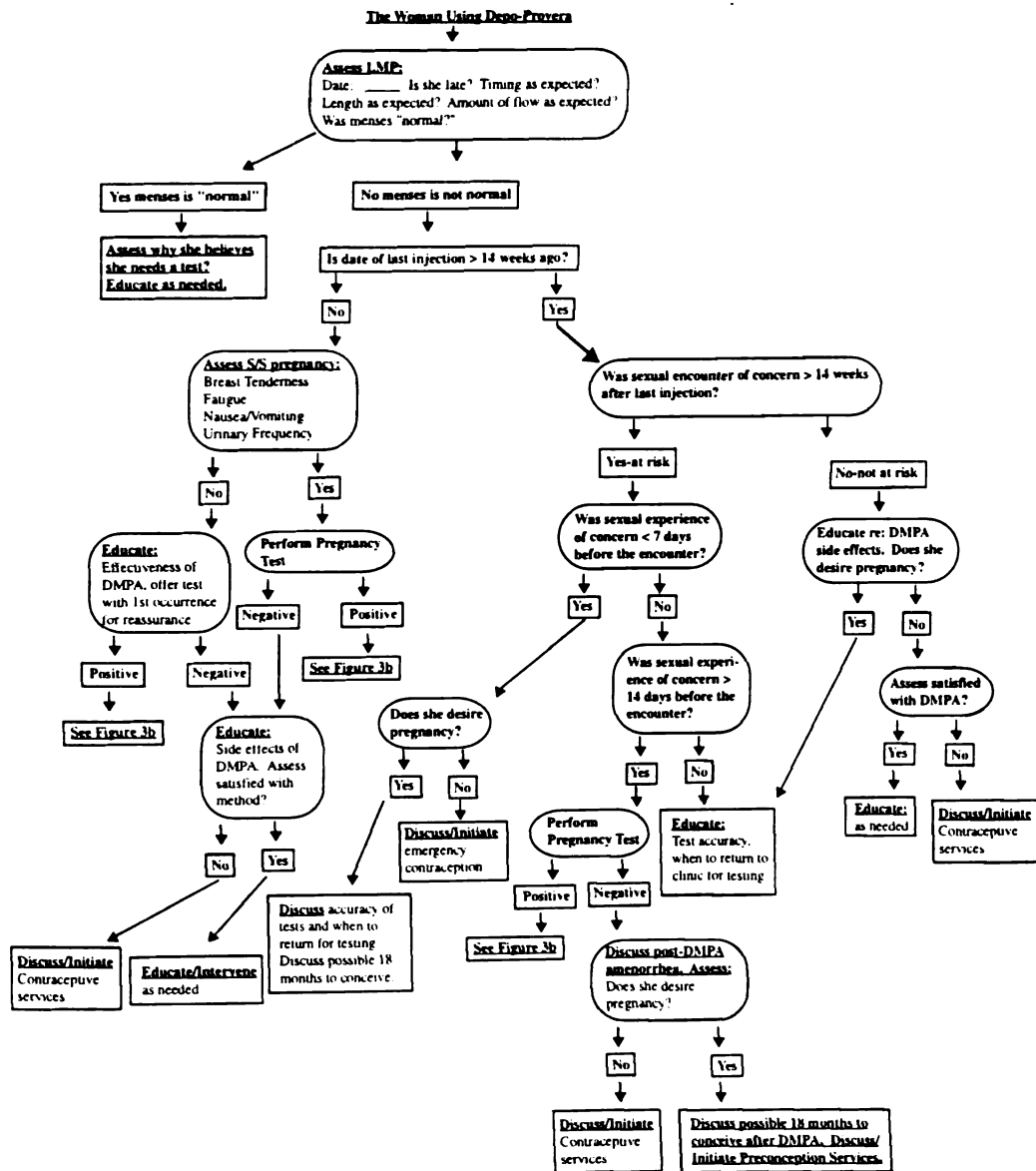
### The Woman using Depo-Provera

Depo-Provera (DMPA), a progestin only injection, is yet another method of contraception which can cause amenorrhea and concern from the user regarding pregnancy status (Hatcher, et al., 1994). Figure 3d, The DeMann Algorithm: The Woman Using Depo-Provera, applies specifically to the woman using DMPA who presents for a pregnancy test (see Figure 3d).

The woman using Depo-Provera (DMPA) should be assessed for a missed menses. If she is not late, the LMP should be assessed to determine if it is "abnormal" for her. If the menses was "normal", the woman should be assessed to determine why she believes she needs a test, and education should be offered which is appropriate to her needs (Hatcher, et al., 1994).

If the woman has missed her menses or her menses is "abnormal", the APN should determine if she has missed a dose of DMPA, i.e., has not received a dose in more than fourteen weeks. If she is not late for her shot, and/or she has had changes in her cycle, the APN is directed to assess for S/S of pregnancy (Hatcher, et al., 1994). The woman who is not having S/S of pregnancy should be offered a test at the first missed menses (Hatcher, et al., 1994). The woman who is having S/S of pregnancy should have a test performed (Hatcher, et al., 1994). The APN is directed to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test, when a test is positive. For a negative test, the APN should offer education about the side effects of DMPA, and assess the woman's satisfaction with the method. If unsatisfied the APN should discuss and offer contraceptive services to decrease discontinuation, and risk of unintended pregnancy (Rosenberg, Waugh, & Long, 1995). If the woman is satisfied with her method, the APN should educate and intervene as needed.

When a woman is late for her DMPA, another direction is advised. The risk behavior should be assessed for timing. If it was less than fourteen weeks after her last shot, she was protected, and she should be educated about DMPA side effects, and the



**Figure 3d: The DeMann Algorithm: The Woman Using Depo-Provera.**

APN should determine if she is seeking pregnancy (Hatcher, et al., 1994). If the woman does not desire pregnancy, the APN should assess if she is satisfied with her method (Hatcher, et al., 1994). If the woman is not satisfied, the APN should discuss/initiate contraception services as needed (Hatcher, et al., 1994). If the woman is satisfied, the APN should educate/intervene as needed (Hatcher, et al., 1994).

The woman who is late for her injection, is at risk for pregnancy, and should be assessed to determine if the sexual experience was less than seven days before the pregnancy test encounter. If the sexual experience was less than seven days before the encounter, the woman should receive discussion and/or initiation of emergency contraception as appropriate. If the woman desires pregnancy, she should be educated regarding the accuracy of tests, and when to return to clinic for testing. She should also be educated regarding the possibility that conception could take up to 18 months to occur after her last DMPA dose (Hatcher, et al., 1994). If emergency contraception is not possible because her risk behavior was more than seven days before the encounter, the APN should assess if the sexual experience was more than 14 days prior to the encounter; if it was not, the woman should be educated about test accuracy, and when to return to the office for a test (Hatcher, et al., 1994). If the risk behavior was more than fourteen days before encounter, a test should be run (Pernoll, 1991). The APN is referred to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test, if the test is positive. If the test is negative, the APN is directed to discuss post-DMPA amenorrhea and assess if pregnancy is desired (Hatcher, et al., 1994). If the woman does not desire pregnancy, the APN should discuss and initiate contraceptive services. If the woman desires pregnancy, education on return to fertility after DMPA should be given and preconception services should be discussed and initiated as needed (Hatcher, et al., 1994). The woman who is late for her shot because she is seeking pregnancy should be educated to the possibility that conception can take up to 18 months after the last dose (Hatcher, et al., 1994).

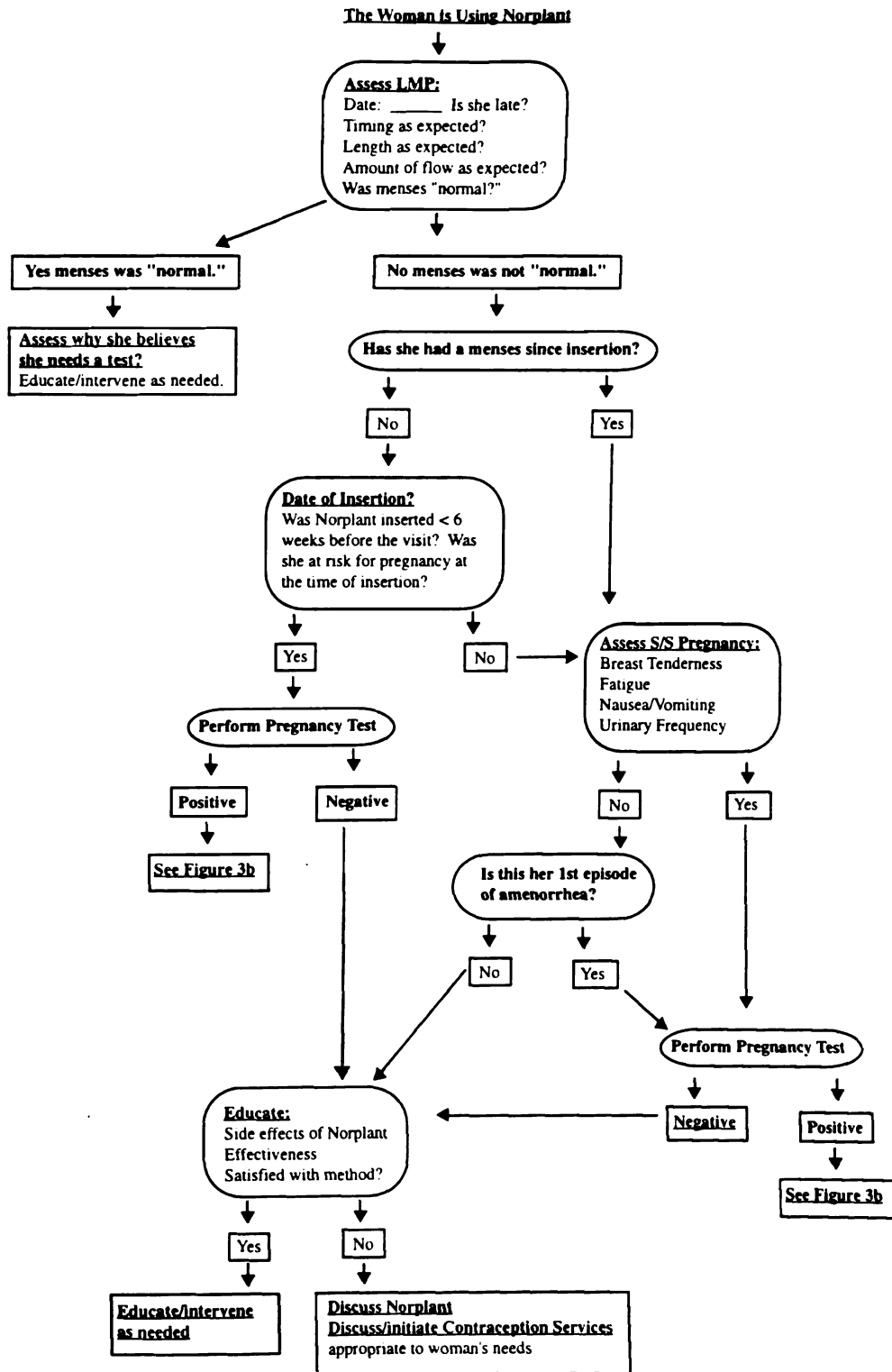
### The Woman Using Norplant

Norplant is another progestin-only contraceptive method. It consists of six implants of levonorgestrel inserted under the skin (Hatcher, et al., 1994). Unlike DMPA which causes amenorrhea after a nine months to one year use of DMPA, Norplant causes most amenorrhea within the first year of insertion (Hatcher, et al., 1994). The APN assessing a woman using Norplant must consider the side effects of Norplant, the cost of the Norplant, and the cost of insertion and removal when intervening with the woman with Norplant (Hatcher, et al., 1994). Hatcher, et al., discussed that education is the key to intervening with women using Norplant and DMPA that are having changes in their menstrual cycle.

First, the APN should assess the LMP, i.e., date, timing of cycle, length of flow, and amount of flow (see Figure 3e). If the woman's menses is not late, or has not changed, the APN is directed to assess the reason the woman believes she needs a test and to educate and intervene as appropriate to her needs. If the woman's flow has changed, or she has missed a menses, the APN is directed to assess whether she has had any menses since insertion (Hatcher, et al., 1994).

The woman who has been having periods since insertion should be assessed for signs and symptoms (S/S) of pregnancy (Hatcher, et al., 1994). If the woman is having S/S of pregnancy and she has missed a menses, a pregnancy test should be performed (Hatcher, et al., 1994). The APN is referred to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test, if the test is positive. If the test is negative, the woman should be educated about the side effects of Norplant, the effectiveness of the method should be reviewed, and the APN should assess her satisfaction with the method (Hatcher, et al., 1994). Hatcher, et al., suggest the APN discuss the importance of education/reassurance since menstrual changes with Norplant tend to self correct after one year of use, and Norplant is a very effective yet costly method if not kept for the five year effectiveness period. If the woman is not satisfied with her method the APN should





**Figure 3e: The DeMann Algorithm: The Woman Using Norplant.**

discuss and/or initiate contraception services appropriate to the woman's needs (Hatcher, et al., 1994). If the woman is satisfied, education and intervention should be offered appropriately (Hatcher, et al., 1994).

The woman who has had no S/S of pregnancy with the amenorrhea should be assessed to determine if this is her first episode of amenorrhea. Hatcher, et al., (1994) recommend a test for the first episode of amenorrhea, and the APN is directed to perform a pregnancy test as previously discussed. If this is not the woman's first episode of amenorrhea, and she does not have S/S of pregnancy, the APN needs to educate about the side effects of Norplant, the effectiveness of the method, and to discuss and assess her satisfaction with the method (Hatcher, et al., 1994). The APN who finds an unsatisfied Norplant user must discuss Norplant and discuss/initiate contraceptive services appropriate to the woman's needs (Hatcher, et al., 1994). If the woman is satisfied, the APN should educate and intervene according to the woman's needs (Hatcher, et al., 1994).

The woman who has had no menses since insertion should be assessed for insertion date, and risk of pregnancy at the time of insertion (Hatcher, et al., 1994). If the APN finds that the Norplant was not inserted within seven days of the LMP and the woman did not use an interim method for the first two weeks, the woman may be at risk for pregnancy, and the APN should perform a pregnancy test. The APN is directed to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test, if the test is positive. If the test is negative, the APN is directed to educate about side effects of Norplant, it's effectiveness, and to discuss and assess the woman's satisfaction with the method. If unsatisfied, the APN is directed to further discuss Norplant, and to discuss and initiate contraceptive services as appropriate to her needs (Hatcher, et al., 1994). The woman who is satisfied, should receive interventions appropriate to the woman's needs.

When the Norplant has not been inserted within the last six weeks, there is not a risk for pregnancy at the time of insertion and the woman has amenorrhea, the APN

should assess for S/S of pregnancy and complete the algorithm as previously discussed for the woman who has missed a menses after having had menses with Norplant (Hatcher, et al., 1994).

### The Woman Using an IUD

The IUD user who presents for pregnancy testing must be assessed carefully. While the IUD is another very effective method of contraception, the method is not 100% effective when in place, and an IUD may be expelled from the uterus (Hatcher, et al., 1994). Two-thirds of the IUD-related pregnancies occur with the IUD properly in place. Thus, the woman who becomes pregnant with an IUD has a greater risk of ectopic pregnancy, and an increased risk of miscarriage and should contact her family planning APN when she misses a menses (Hatcher, et al., 1994). Another issue the APN must consider is that the woman using an IUD who finds herself pregnant was probably not seeking pregnancy, and she may be highly emotional. Furthermore, because some of the IUDs can be left in place for 10 years, it is possible that the woman using an IUD may have it in place when perimenopausal symptoms begin, and assessment will be necessary to assess if this is indeed the case (Hatcher, et al., 1994).

The APN who encounters the woman using an IUD should first assess her menses (see Figure 3f). The APN should assess the date of the LMP, the timing of cycle, and if the woman has had changes in length or amount of flow to determine if the menses was "normal" for the woman. If her menses is "normal" the APN must assess why she believes she needs a test, and provide education and intervention as needed (Hatcher, et al., 1994).

The woman whose menses is late or "abnormal" should be tested for pregnancy (Hatcher, et al., 1994). The APN is referred to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test, if the test is positive and she should be educated regarding the increased risk of miscarriage and ectopic pregnancy (Hatcher, et al., 1994). If the test is negative, an assessment should take place to assess for other causes of secondary amenorrhea (Chikotas, 1995; Armstrong & South-Paul, 1996). The APN

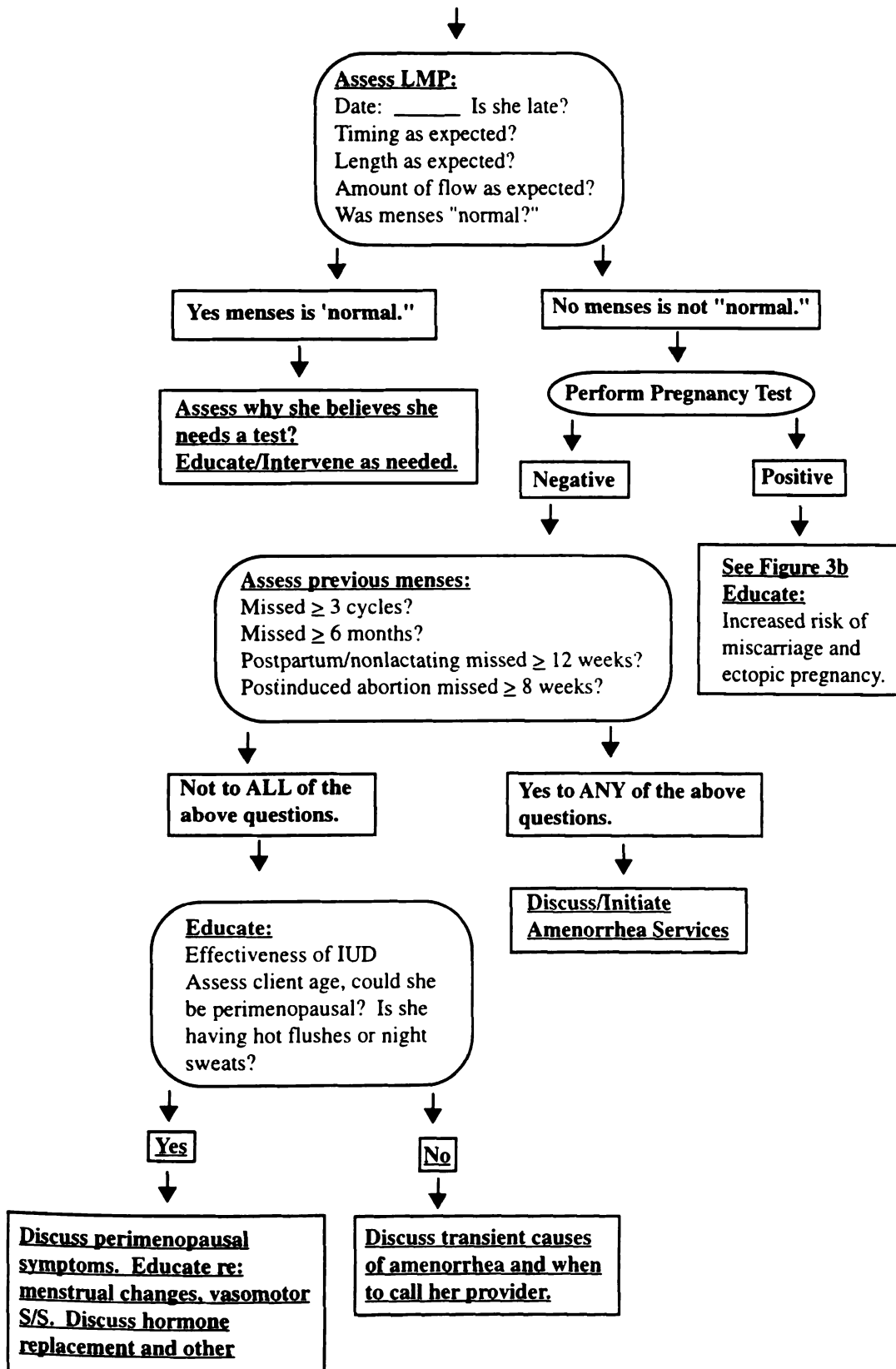
**The Woman is Using an IUD**

Figure 3f: The DeMann Algorithm: The Woman Using an IUD

should ask several questions which can determine if the amenorrhea is not transient. These questions were identified in relation to Figure 3a, The DeMann Algorithm: The Primary Assessment of the Woman Seeking Pregnancy Testing, (Chikotas, 1995; Armstrong & South-Paul, 1996). If the woman answers yes to any of the questions assessing previous menses, the APN should discuss and initiate evaluation for secondary amenorrhea (Chikotas, 1995; Armstrong & South-Paul, 1996).

When the woman answers no to all of the questions assessing for secondary amenorrhea, the APN is directed to educate about the effectiveness of the IUD and to assess the woman's age to determine if the woman could be perimenopausal; i.e., does she have hot flashes or night sweats (Pernoll, 1991). The woman who is having S/S of the perimenopausal period should be educated about menstrual changes and vasomotor symptoms. Hormone replacement therapy and other therapies to decrease symptoms should be discussed (Pernoll, 1991). The woman who is not having perimenopausal symptoms can be educated about transient causes of amenorrhea and when to call the APN with concerns (Pernoll, 1991; Chikotas, 1995; Armstrong & South-Paul, 1996).

#### The Woman with Tubal Ligation

The woman who is seeking pregnancy testing and has had a tubal ligation must be carefully assessed because of the increased risk of ectopic pregnancy (Hatcher, et al., 1994). Tubal ligation has a failure rate of only .4% but the woman who becomes pregnant has up to a 73% increase in her risk of ectopic pregnancy (Hatcher, et al., 1994). Tubal ligation is a permanent method of contraception, and the woman will go into menopause with this method (Hatcher, et al., 1994). The APN must take this into consideration when presented with a woman requesting a pregnancy test.

The algorithm directs the APN to assess the woman's LMP to determine if she is late for her menses and to determine "normalcy" of menses (see Figure 3g) (Hatcher, et al., 1994). If menses is not late, and is "normal" for the woman, the APN assesses why the

woman believes she needs a pregnancy test and should educate/intervene as appropriate to her needs (Hatcher, et al., 1994).

The woman who has missed her menses or has had an "abnormal" cycle should be assessed for S/S of pregnancy. If S/S of pregnancy are present, a test should be performed (Hatcher, et al., 1994). If the test is positive, the APN is referred to Figure 3b, The DeMann Algorithm: The Woman with a Positive Pregnancy Test, and education should be given on increased risk of ectopic pregnancy (Hatcher, et al., 1994). If the pregnancy test is negative, the woman's previous menstrual history should be assessed to determine if another cause of secondary amenorrhea should be explored (Chikotas, 1995; Armstrong & South-Paul, 1996).

If the APN assesses that other causes may be present, the APN should discuss and initiate evaluation for amenorrhea appropriate to the woman's needs (Chikotas, 1995; Armstrong & South-Paul, 1996). If the APN assesses that the amenorrhea may be transient, the woman should be educated about the transient causes, effectiveness of tubal ligation, and the woman's age should be assessed to determine if the woman could be perimenopausal (Chikotas, 1995; Armstrong & South-Paul, 1996). If she could be perimenopausal, the APN should discuss the S/S of perimenopausal period, and educate as needed regarding hormone replacement and other therapies (Pernoll, 1991). If she could not be perimenopausal, the APN should educate/intervene as appropriate to her needs.

The woman who has missed a menses and is not having S/S of pregnancy should also be assessed for causes of amenorrhea other than pregnancy as discussed in the above paragraph. If the woman answers yes to the questions assessing for secondary amenorrhea, a pregnancy test should be ordered. (Chikotas, 1995; Armstrong & South-Paul, 1996). If the test is positive, the APN refers to Figure 3b, The DeMann Algorithm, The Woman with a Positive Pregnancy Test. If the test is negative, the APN should discuss/initiate services for amenorrhea (Chikotas, 1995; Armstrong & South-Paul, 1996).

The Woman has had a Tubal Ligation

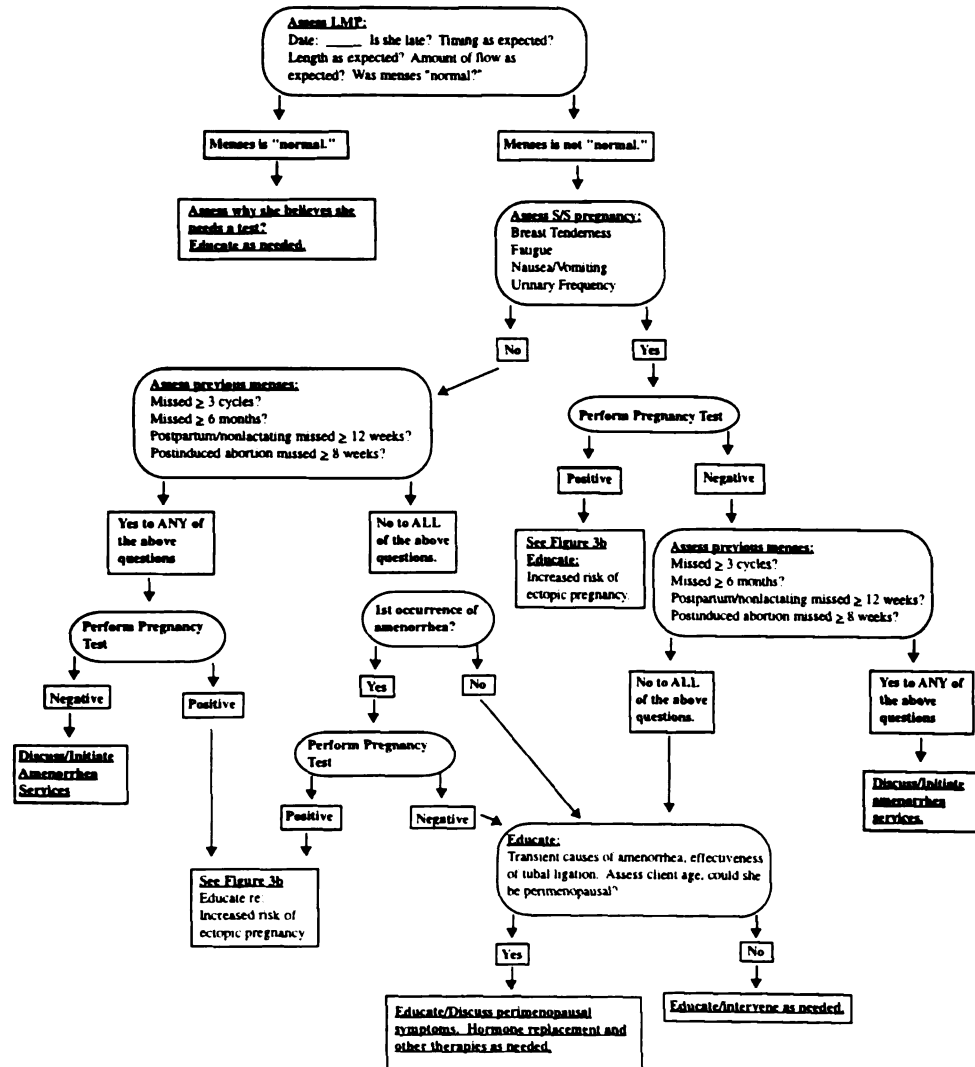


Figure 3g. The DeMann Algorithm: The Woman with a Tubal Ligation.

If the woman does not answer yes to any of the questions, secondary amenorrhea should be assessed to determine if this is her first occurrence of amenorrhea. The woman who has had her first episode of amenorrhea should have a pregnancy test performed (Hatcher, et al., 1994). If the test is positive, the APN is referred to Figure 3b, The Woman with a Positive Pregnancy Test, and the APN should educate about the increased risk of ectopic pregnancy (Hatcher, et al., 1994). If the test result is negative, the APN should educate regarding transient causes of amenorrhea, and the effectiveness of tubal ligation. The APN should also assess the client's age, and S/S of perimenopause (Hatcher, et al., 1994). If perimenopausal symptoms are present, the APN should discuss the S/S of perimenopausal period, hormone replacement therapy and other therapies available as desired by the woman (Hatcher, et al., 1994).

### Implications

Implementation of the proposed algorithm offers a variety of opportunities for APNs and health agencies which could enhance the care of the woman seeking a pregnancy test. Implications related to its use in the areas of research, education, and practice are discussed.

### The DeMann Algorithm and Practice

Implementation of the DeMann Algorithm into practice requires a plan. One possible plan is to obtain organizational administrative support for the algorithm; once administrative support is obtained, the algorithm can be shared with others in the agency. To obtain administrative support, it is necessary to show the benefits the algorithm holds for the agency. It may be helpful to discuss the potential for lower expenditures, since fewer tests are likely to be ordered unnecessarily or inappropriately if the algorithm is followed. Also, administrators might appreciate that the use of the algorithm could initiate preconception, family planning, infertility, and other services which could initiate additional revenue for the agency. Contracting with the agency for a trial period and developing tools to evaluate the effectiveness of the algorithm will be necessary to fully



gain administrative support. To evaluate the algorithm, it will be necessary to collect data, e.g., the number of encounters which resulted for the agency when client needs were identified, the number of pregnancy tests performed, and the various outcomes of the pregnancy testing encounters. These could occur through chart review, and/or patient survey.

Another consideration in implementing the algorithm is that of the advantages and disadvantages of the use of algorithms in the health care setting could be examined. A significant advantage to the use of an algorithm is that it standardizes the care offered to clients. An algorithm also provides a visual representation which may assist APNs with less expertise to include all necessary entities of the pregnancy test encounter, and enhance client outcomes. Another advantage is that algorithm use has the potential to decrease the cost of services to the organization while increasing the quality of care. Algorithms also offer management strategies which could benefit both APNs and the women seeking care, however, disadvantages to algorithms also exist. Some APNs believe that an algorithm takes away from the individualized care that the APN has to offer; other APNs believe that an algorithm is an elementary tool, much like following a cookbook.

Despite the advantages and disadvantages, the algorithm will not be utilized by APNs or other HCPs if the information is not disseminated to them appropriately. The algorithm could be presented at conferences around the country or in APN education programs. Using conferences and college courses, the algorithm would reach APNs in a more formal educational format. Unfortunately, conferences and course offerings would not reach large numbers of APNs, would be limited only to the disciplines the conference attracted and would involve the cost of transportation, lodging, and lost work time.

Another means of dissemination of The DeMann Algorithm could be to publish it in nursing journals. The advantage of publishing the algorithm would be that it would reach many APNs of many disciplines. Two journals which could be appropriate for

publishing the DeMann algorithm are the Journal of Obstetric, Gynecologic, and Neonatal Nursing and Patient Care Nurse Practitioner.

### The DeMann Algorithm and Research

The algorithm offers many opportunities for research. First, APNs' attitudes about using the algorithm and their satisfaction with the format of the proposed algorithm could be evaluated. The knowledge of APNs about the complexities of pregnancy testing and their attitudes about the algorithm as a guide to practice could also be evaluated.

Second, the number of women who present with needs for education, prenatal care, preconception care, secondary amenorrhea, contraception, infertility and options counseling could be determined. Along with this, researchers could look at the length of time it takes women to obtain services for prenatal care, family planning, infertility, options counseling, amenorrhea, preconception care, and adoption when referred and the type and frequency of referrals made.

Third, a study could be done to determine the level of satisfaction of the woman when the APN uses the algorithm at the pregnancy testing encounter. This study might also assess the length of time necessary for the APN to use the algorithm as proposed.

Fourth, a study could be implemented to determine if the algorithm actually does identify the needs of women. This study might also assess if needs identification demonstrated improved education for women, an increase in the women's ability to receive earlier prenatal care, the adequacy and the appropriateness of preconception services offered, a reduction in the number of unintended pregnancies, an increase in the use of contraception, the number and length of time it takes women with infertility to seek and receive services, and the number of women who are referred and/or receive options counseling.

Fifth, research could also look specifically at the number of women who present within seven days of the sexual encounter, and the attitudes/acceptance of these women for emergency contraceptive services. Research could also assess the number and attitudes

of women who want a pregnancy test performed but are declined pregnancy testing and advised to return for a pregnancy test at a later date, which can occur due the time it takes for hCG to be detected in either a serum or urine sample.

Sixth, the number of tests performed unnecessarily and inappropriately could be studied. This would give a better indication of the dollars which could be saved through the implementation of the algorithm.

Finally, the extent to which support staff are ordering tests, the reasons this occurs, the educational preparation of these staff members, and the satisfaction of women who have pregnancy testing performed by support staff could be examined. The attitudes of APNs, PAs, and physicians and health agencies in regards to support staff performing pregnancy testing can be assessed. Finally, research could take place which compares the support staff to the APN in regards to the needs identified and the interventions offered at the time of the pregnancy testing encounter.

#### The DeMann Algorithm and Education

This project and the algorithm suggest multiple implications for education. Education can occur for both the APNs, for companies who sell over-the-counter pregnancy tests and for the clients who are seen. Colleges and certification programs, which prepare APNs for practice must recognize the complexity of the pregnancy testing encounter and offer curriculums which educate the APN appropriately. In addition, companies which sell over-the-counter pregnancy tests must be knowledgeable about the many implications for women at the time of pregnancy testing. Every pregnancy test package insert should include information regarding where to seek prenatal services, when to consult a health care provider, and information on other causes of amenorrhea.

Health settings which allow support staff who have contact with clients at the time of the pregnancy testing encounter must be educated to understand the opportunities pregnancy testing offers both women and their health care agencies. Education could

focus on more thorough assessment of the woman to determine the need for preconception care, family planning services and amenorrhea services.

### The DeMann Algorithm and Practice

There are many implications for APNs who follow the DeMann Algorithm. First, the APN must be aware of his/her feelings regarding contraception, pre and postcoitally. Since some methods of contraception are viewed negatively by some APNs, the APN must be able to recognize his/her ability to offer comprehensive services and may need to refer the woman to another APN if he/she is unable to offer the woman the freedom to choose methods which best suit her needs. Second, the APN must be aware of his/her feelings regarding adoption and abortion. The APN who can not be objective should refrain from caring for women seeking pregnancy testing. The pregnancy testing encounter should be performed by a APN who is devoted to women's health and wants to deliver only the highest quality of care (Hatcher, et al., 1994).

There are implications for APNs to fulfill many roles within their practice. As an assessor the APN must ask questions and listen to the client in order to assess her needs. Application of this algorithm provides many opportunities for the APN to increase client knowledge in the areas of women's health care by fulfilling the role of an educator. As a collaborator the APN who follows the algorithm may refer the client to a reproductive endocrinologist, an obstetrician/gynecologist (OB/GYN), an abortion clinic, or an adoption agency. This role requires the exchange of information, and participation in the management of the overall health care of the woman with other members of the health care team. The APN may also act as a case manager who monitors the client's progress through the referrals. The APN may act as a counselor, as well. It may be necessary to provide support to the client who has an unintended pregnancy and is overwhelmed with a positive test result. If a woman is seeking a test before the test could reveal an accurate result will act as a planner in scheduling a date to return for testing. Finally, the APN who uses the algorithm can act as a role model to other health care providers, e.g., in peer

review, the APN using the algorithm can evaluate other APNs pregnancy testing encounters, and offer the algorithm as a tool to APNs who are not offering comprehensive care.

Next, there are implications for the primary care setting in which the algorithm is used. The primary care setting will need to have orientation/in-service procedures in place to educate APNs in the appropriate use of the algorithm. The setting will also need to determine the services which it is able to provide and those which require referral to other services in the area in order to meet the needs of the women appropriately.

While this project focuses on the APN as the personnel to use the algorithm, the algorithm could also be utilized by physician assistant, and physician providers.

Furthermore, in health settings in which there is a APN shortage, settings might consider modifying the algorithm in a fashion which would allow support staff, i.e., medical assistants (MAs), licensed practical nurses (LPNs), registered nurses (RNs), to use the algorithm to assess whether a test should be ordered and determine when the woman would need to see an APN for advanced assessment and intervention. Some agencies, such as Planned Parenthood settings, orient their support staff to properly assess last menstrual periods, contraception use, desire for pregnancy, and a risk of pregnancy. Support staff, with education could fulfill these portions of the DeMann Algorithm. Registered nurses, who have had course work which is specific to obstetrics/gynecology could perform the assessment and make referrals for intervention as discussed in the algorithm.

The primary care setting will need to determine if any of the services included in the DeMann Algorithm conflict with funding sources or the philosophy of the organization. Agencies such as school-based health centers in Michigan must refer a woman to an agency which offers options counseling and can not discuss abortion or refer a woman directly for abortion services or grant funds will be forfeited (Minimum Program Requirements of School-Based Health Centers, 1997). The primary care settings in which

there are conflicts must modify the algorithm and/or find referral services which meet the needs of women. Finally, there are opportunities for health settings to gain revenue by identifying and intervening when needs other than that of the chief concern, the pregnancy test, are identified, e.g., preconception services, amenorrhea services, and contraception services.

### Conclusion

There are many opportunities to intervene in the lives of women at the time of the pregnancy testing encounter. While the pregnancy testing encounter is often viewed as simply performing a pregnancy test, it should be viewed as a complex contact which requires in-depth knowledge, assessment and critical thinking in order to best serve the needs of women seeking a pregnancy test.

Starfield's framework has provided an appropriate approach, i.e., the structure, process, and outcome variables, for evaluating services/care provided in the primary care setting. The proposed DeMann Algorithm represents a process which the APN can follow when providing services to the woman seeking a pregnancy test. Just as algorithms have become a part of health practices and have improved the quality, the consistency of service and the cost of care; the proposed algorithm for the pregnancy testing encounter has the potential to enhance positive outcomes for women and their children and may reduce fragmentation of care.

Health care agencies need to review their practices related to the provision of pregnancy tests. Agencies who adopt the DeMann Algorithm should be in a more positive position to promote comprehensive services at a crucial time in a woman's life.

## **APPENDIX**

**MANAGEMENT OF THE PREGNANCY TESTING ENCOUNTER:  
THE DEMANN ALGORITHM**

**By**

**Donna J. DeMann**



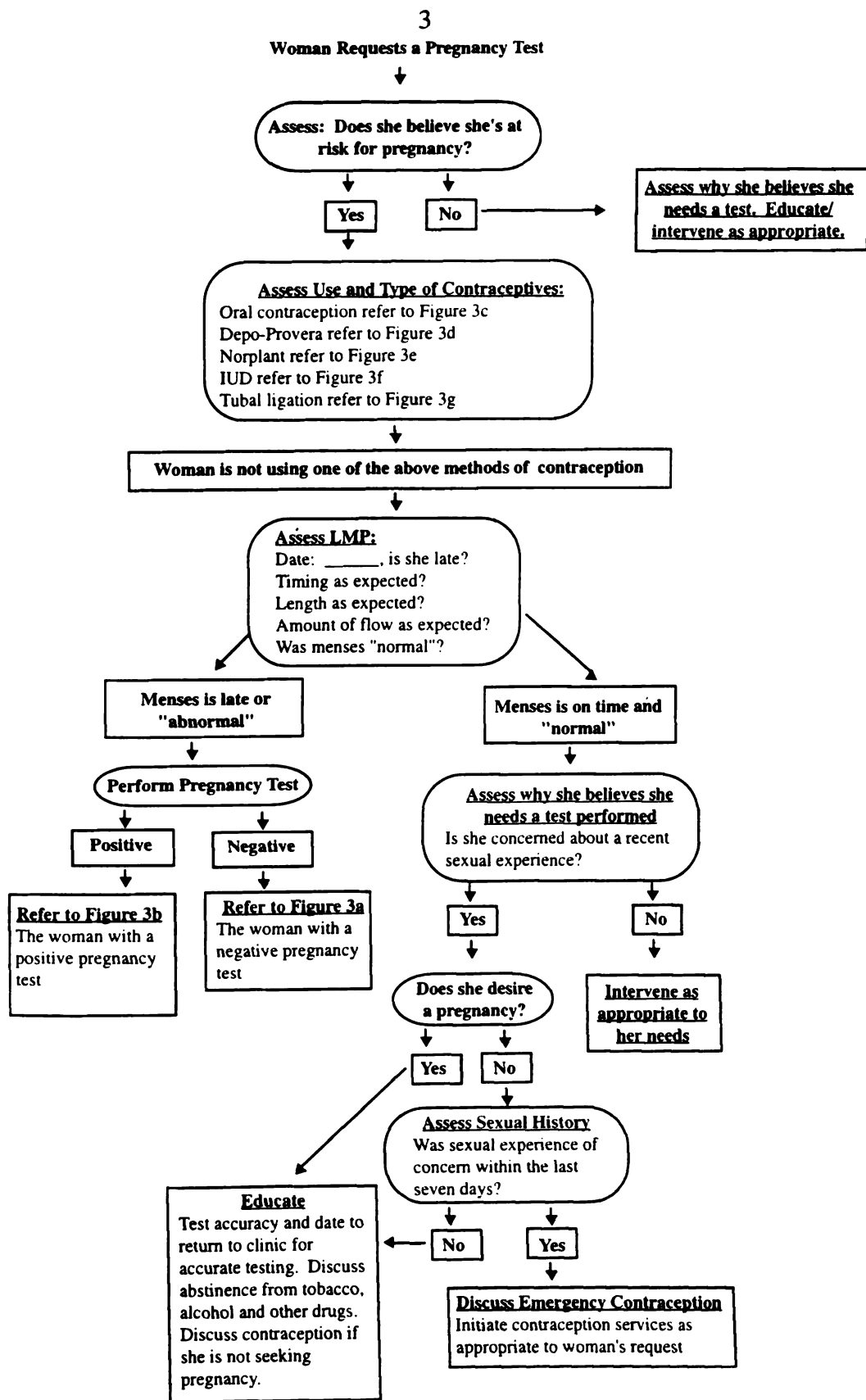
There are many opportunities to intervene in the lives of women at the time of the pregnancy testing encounter. Interventions could include one or more of the following; preconception care, infertility services, pregnancy options counseling, evaluation for amenorrhea, prenatal care, or family planning. While the pregnancy testing encounter is often viewed as simply a time to perform a pregnancy test, it should be viewed as a complex contact which requires in-depth knowledge, assessment and critical thinking in order to best serve the needs of the woman seeking a pregnancy test. This algorithm was developed to guide the health care provider (HCP), specifically the advanced practice nurse (APN) who cares for the woman seeking a pregnancy test. The DeMann Algorithm consists of a primary algorithm plus a series of secondary algorithms, which will guide the APN to determine the needs and interventions appropriate to each woman seek a pregnancy test. The primary algorithm (Figure 3-The DeMann Algorithm: The Primary Assessment of the Woman Seeking Pregnancy Testing) reflects the overall picture of the woman's request for pregnancy testing. The primary algorithm directs the APN to the secondary algorithms (Figures 3a-3g) when the woman is using certain methods of contraception, or once a positive or negative test result is determined.

The decision making points within both the primary and the secondary algorithms are supported by the literature, and are cited as each algorithm is explained to the reader. While the algorithm offers information to direct the APN to ask specific questions, it can not include all of the information the APN should know related to client assessment, client education and interventions appropriate to each client's needs. The APN who provides pregnancy testing services needs to keep current with research and literature in women's health care.

This algorithm reflects information and process components which are based on current literature and empirical evidence. A primary resource for practical information about family planning and contraception upon which this algorithm was developed is

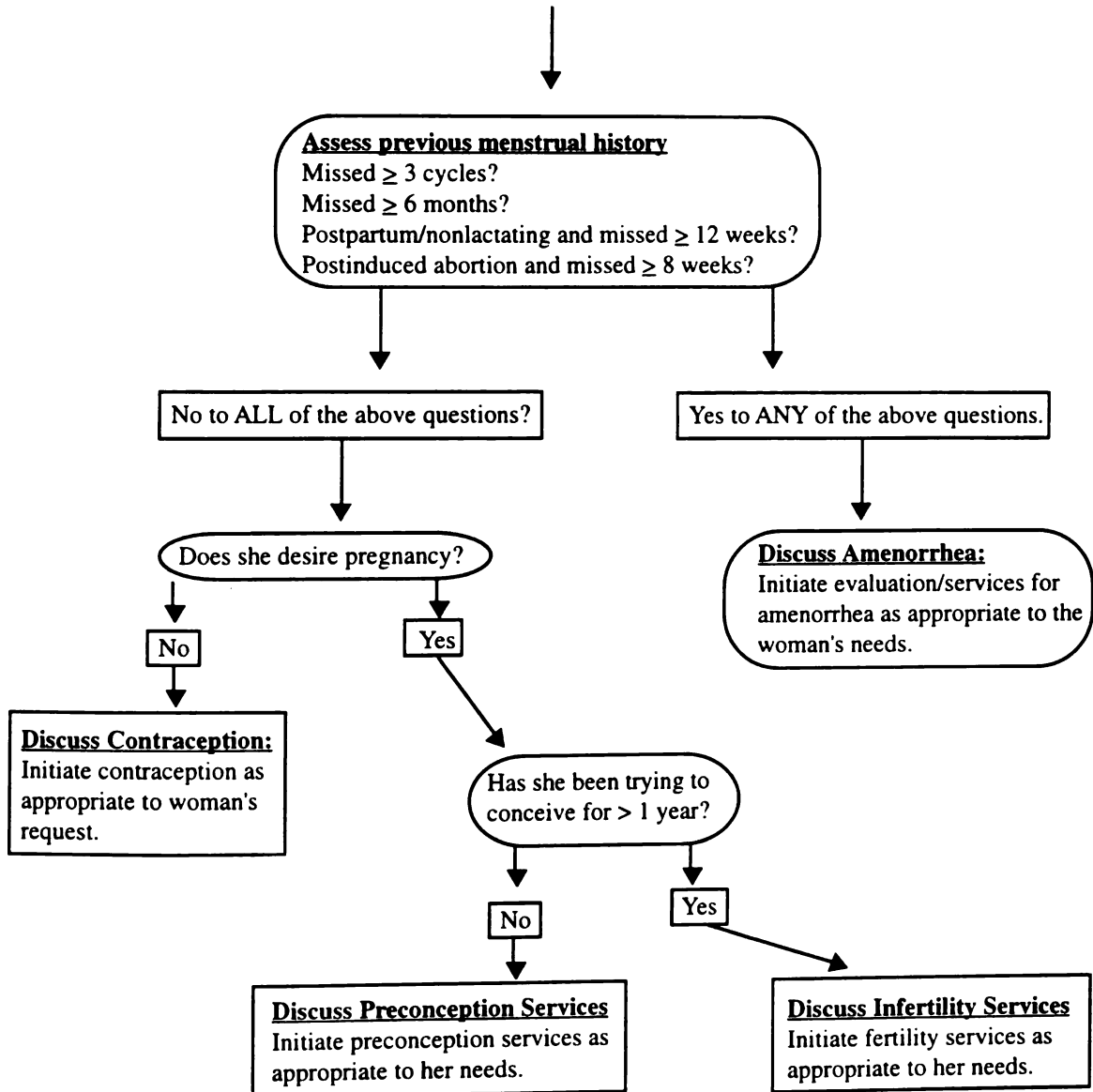
Contraceptive Technology by Hatcher, Trussell, Stewart, Stewart, Kowal, Guest, Cates, and Policar (1994). APNs who interact with women at the time of pregnancy testing need to be familiar with this reference.

Use of The DeMann Algorithm could decrease health care costs, and enhance health outcomes for women and their families. Agencies who adopt The DeMann Algorithm could be in a more positive position to promote comprehensive services at a crucial time in a woman's life.

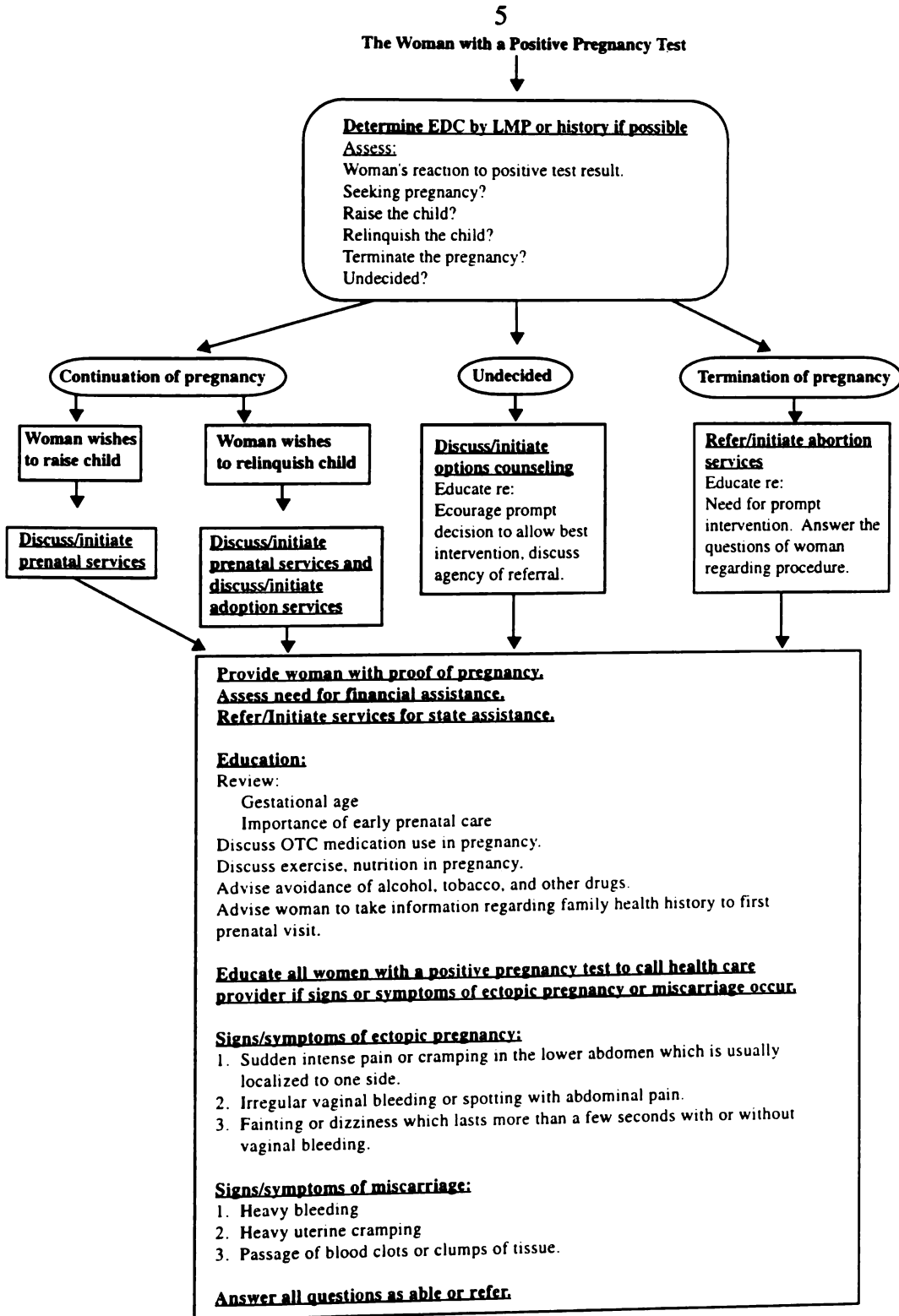


**Figure 3. The DeMann Algorithm: The Primary Assessment of the Woman Seeking Pregnancy Testing.**

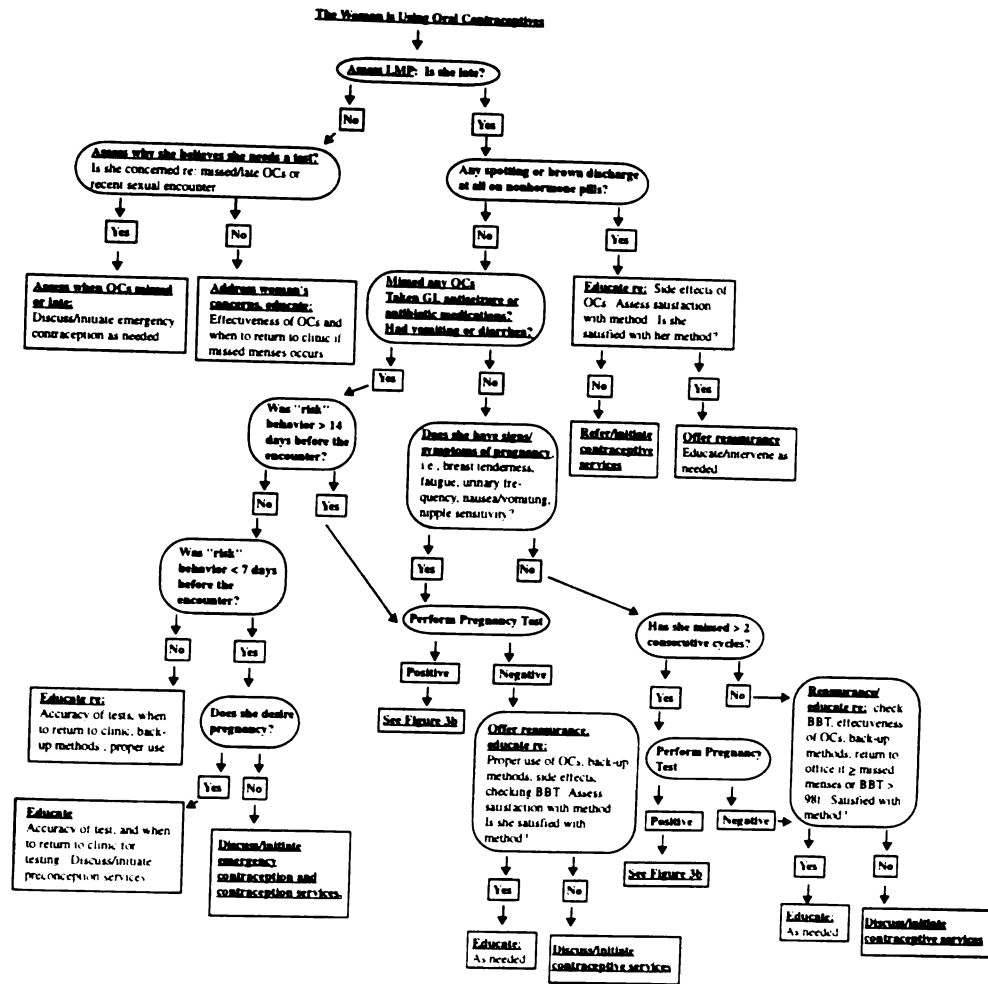
### The Woman with a Negative Pregnancy Test



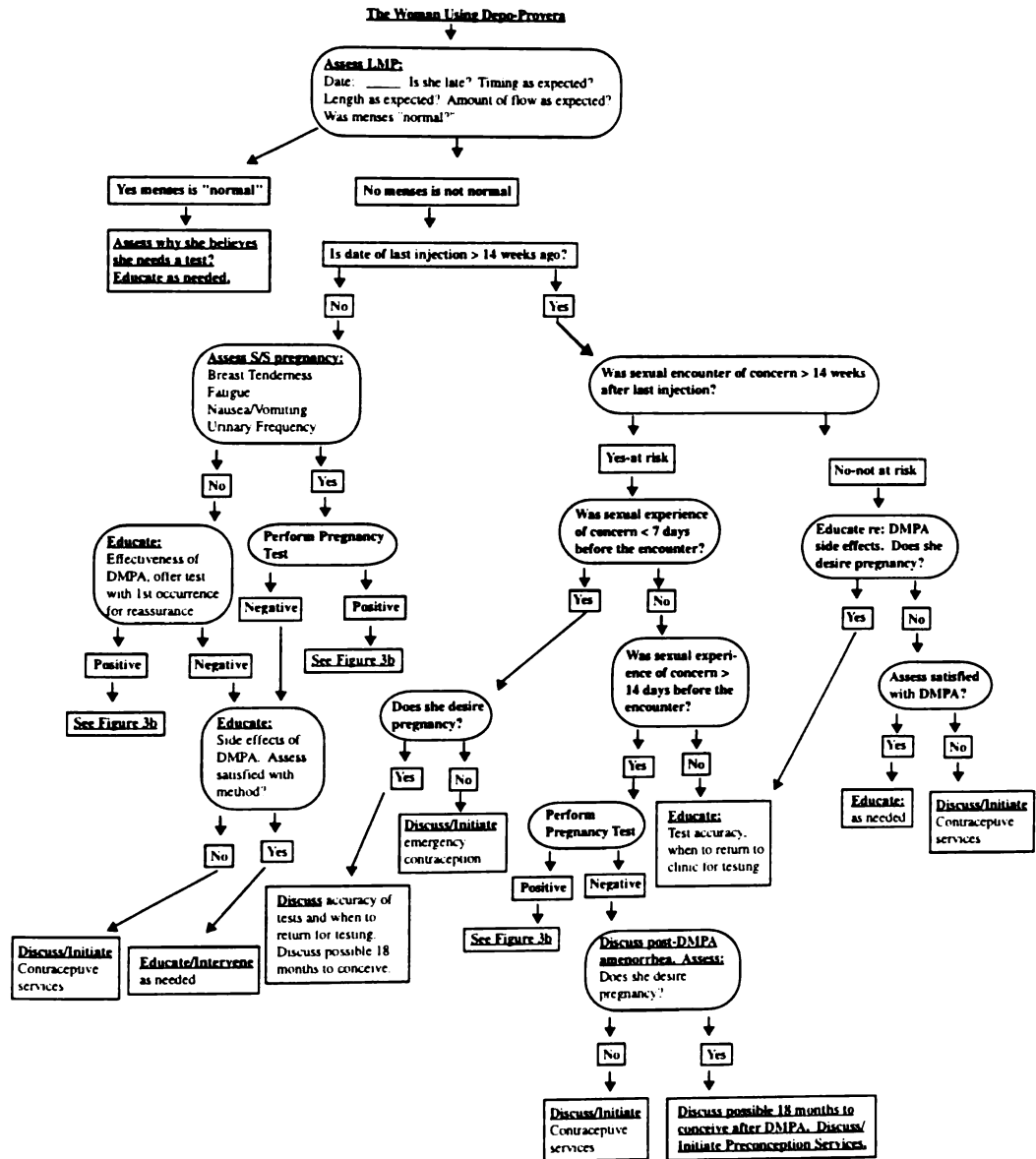
**Figure 3a:** The DeMann Algorithm: The Woman with a Negative Pregnancy Test



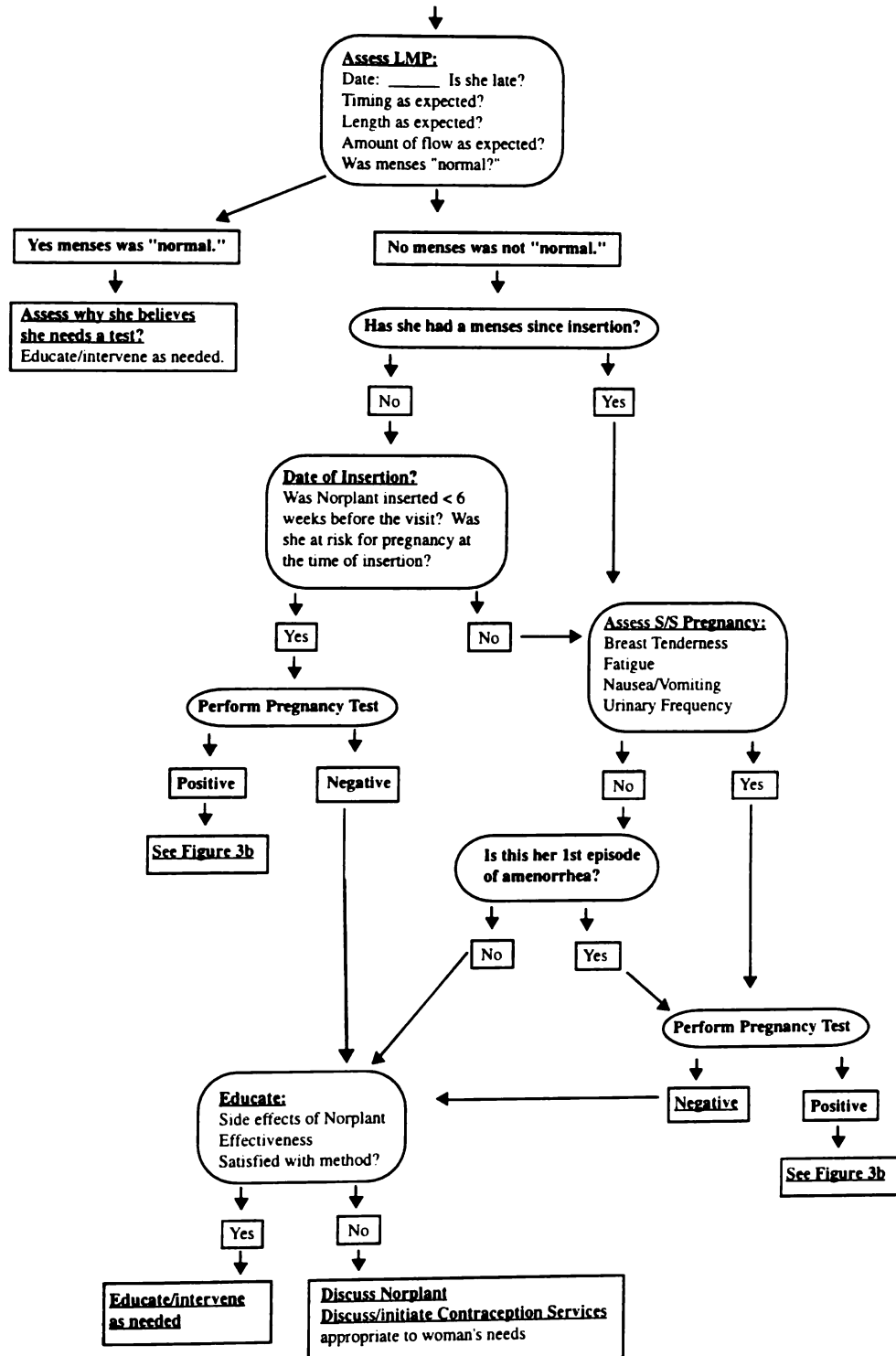
**Figure 3b:** The DeMann Algorithm: The Woman with a Positive Pregnancy Test.



**Figure 3c.** The DeMann Algorithm. The Woman Using Oral Contraceptives.



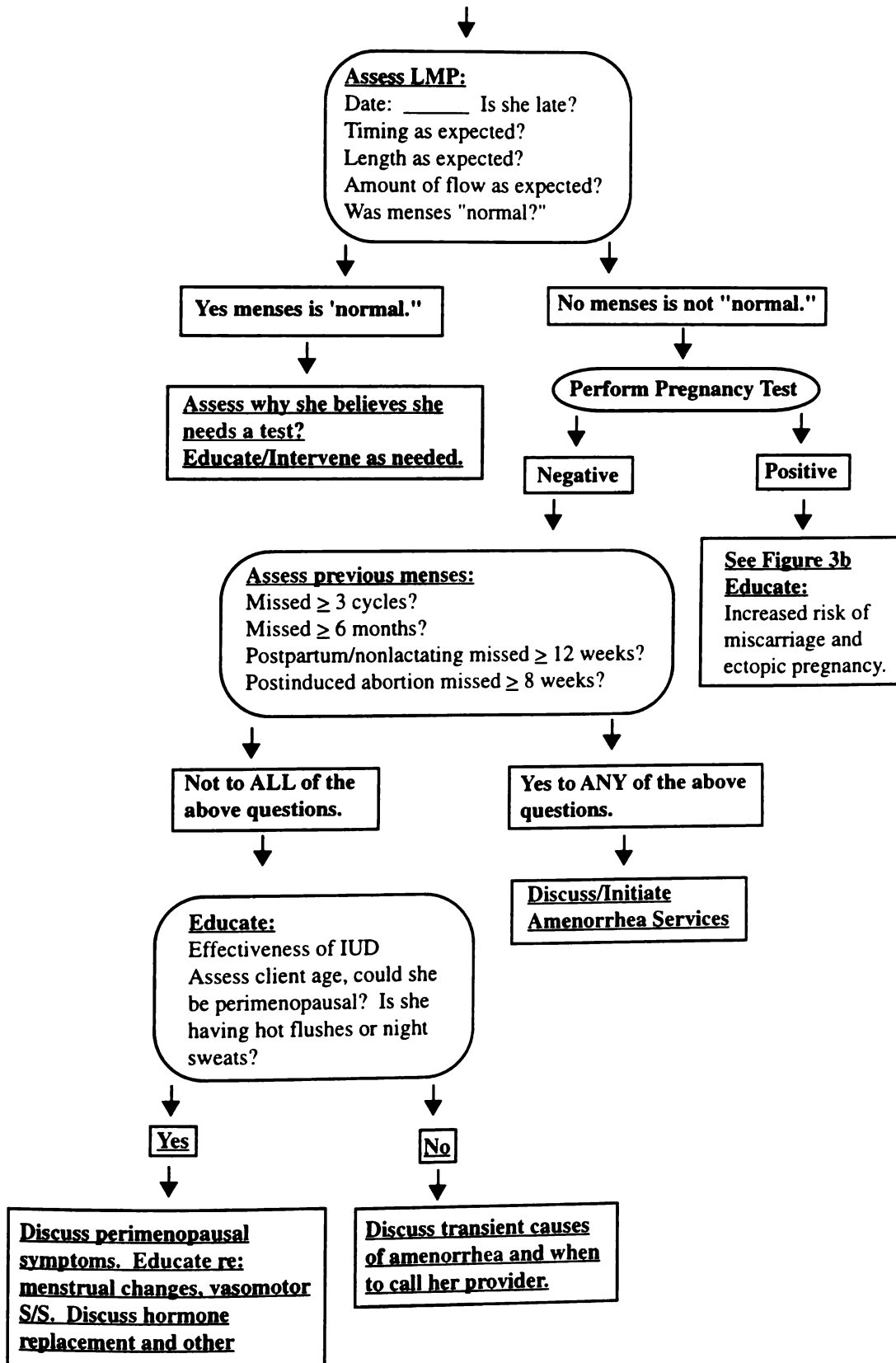
**Figure 3d:** The DeMann Algorithm: The Woman Using Depo-Provera.

**The Woman is Using Norplant**

**Figure 3e:** The DeMann Algorithm: The Woman Using Norplant.



**The Woman is Using an IUD**



**Figure 3f: The DeMann Algorithm: The Woman Using an IUD**

The Woman has had a Tubal Ligation

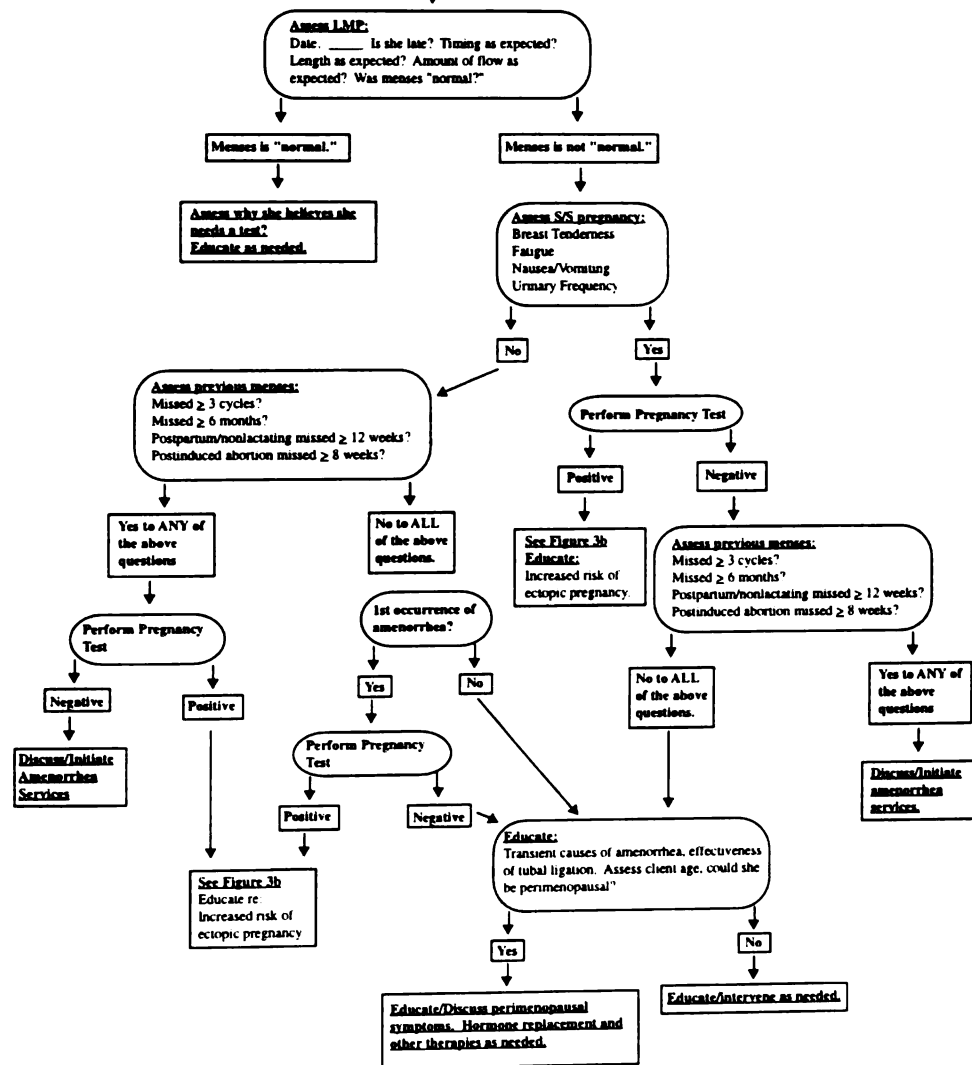


Figure 3g. The DeMann Algorithm: The Woman with a Tubal Ligation.

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