CAN THE TRANSTHEORETICAL MODEL
BE APPLIED TO
SMOKING CESSATION INTERVENTIONS
WITH PREGNANT WOMEN?

by
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ABSTRACT

Smoking during pregnancy significantly increases health risks for both the woman and her fetus and causes 20% to 30% of the low birthweight rate and 10% of the infant mortality rate in the United States. Although there has been a decline in overall smoking prevalence in recent years, and an increasing tendency for women to quit smoking during pregnancy, 20% to 25% of pregnant women in this country still do smoke throughout their pregnancy.

Smoking cessation interventions based on the Transtheoretical model and matched to the smoker's stages of change have shown effectiveness in clinical studies with other diverse populations, but have not been widely studied with pregnant smokers. The purpose of my investigative paper is to discover what smoking cessation interventions have been utilized with pregnant women, and to determine if the Transtheoretical model could be effectively applied to them.
IDENTIFICATION OF A PRACTICE PROBLEM

The burden of smoking-related morbidity and mortality is well documented. As part of its Healthy People 2000 public health initiative of 1991, the United States has set as a year 2000 objective to reduce cigarette smoking among those age 18 and older to a prevalence of less than 15%, and the smoking prevalence rate during pregnancy at 10%. Smoking during pregnancy significantly increases health risks for both the woman and her fetus, and is responsible for 20% to 30% of the low birthweight rate, 14% of preterm deliveries, and 10% of the infant mortality rate in the United States (Healthy People 2000, 1991). Healthy People 2000 defined the prevention of both low birthweight and infant mortality as major public health priorities for our nation, and set target rates for low birthweight at ≤5% and the infant mortality rate at ≤7‰/1000 live births (Healthy People 2000, 1991).

Smoking cessation in pregnant women is a priority public health issue because approximately 1 million women in the United States do smoke at their first prenatal visit (Windsor et al, 1993), and 20% to 25% of pregnant women continue to smoke throughout their pregnancy (Ruggiero et al, 1997). Only about 25% of pregnant smokers are able to quit smoking (Oncken, 1996). Healthy People 2000 also identified five high-priority tobacco-related research needs, including the need for the evaluation of the impact of interventions on overall tobacco use and within special populations (Healthy People 2000, 1991). Pregnant smokers are one of these target special populations whose unhealthy choice to smoke makes them high-priority for smoking cessation interventions.

The purpose of this investigative paper is: 1) to review the literature to discover what smoking cessation interventions have been effectively utilized with pregnant women, and 2) to determine what smoking cessation interventions nurse practitioners could apply to pregnant women. Smoking cessation must become a clinical priority for all health care providers, and adopted as part of routine prenatal care, in order to decrease the adverse consequences of maternal smoking. Nurse practitioners are in a pivotal position to disseminate this intervention due to their collaborative skills and working relationships with all levels of health care providers, both within their own
The statistical evidence provides the rationale for the adoption of routine smoking cessation interventions with pregnant smokers. Over the past 35 years, more than 100 epidemiologic studies have identified maternal smoking "as exerting an independent, adverse effect on numerous reproductive outcomes" (Dolan-Mullen, Ramirez, & Groff, 1994) (p.1328). Babies born to women who smoke during pregnancy weigh an average of 200 grams less than babies born to non-smokers, and smoker's babies are twice as likely to weigh <2500 grams due to prematurity and intrauterine growth retardation (Dolan-Mullen et al, 1994). Smoking's unfavorable effects on pregnancy also include an increased risk of ectopic pregnancy, abruptio placentae, placenta previa, spontaneous abortion, perinatal mortality, preterm delivery, and stillbirth (Niebyl, 1994). Women who smoke also have increased risks of cervical cancer, early menopause, osteoporosis (Andrews, 1998), and adverse reactions from oral contraceptives (Larson, 1997). Children who live with smokers are more likely to experience respiratory and middle ear infections, and impaired development of pulmonary function, than children who are not exposed to household smoke (American Cancer Society, 1995). Exposure to cigarette smoke both before and after birth has also been linked to Sudden Infant Death Syndrome (SIDS) (Haglund, 1994).

PREGNANCY IS A WINDOW OF OPPORTUNITY FOR SMOKING CESSATION

The health care provider's clinic is an ideal setting for smoking cessation interventions, as approximately 70% of smokers will see a health care provider during a calendar year, often for treatment of a smoking-related illness (Danis & Seaton, 1997). Pregnancy provides an optimal opportunity to intervene with women smokers, as this is a time of frequent contacts with health care providers, whose chief goal is to initiate and facilitate health-enhancing behaviors in the woman (Ruggiero, Redding, Rossi & Prochaska, 1997). The frequency of prenatal visits offers repeated opportunities for health care providers to educate and counsel women on smoking, and to address their cessation issues and concerns (Secker-Walker, Solomon, Flynn, Skelly, Lepage, Goodwin & Mead, 1994). Edwards and Sims-Jones (1998) found that pregnancy did influence a women's smoking-related decisions, and provided a new
source of motivation to try to quit smoking. The pregnant smoker's concerns for the health of her unborn child heightens her awareness of the problems of tobacco use in pregnancy, creating a powerful teachable moment (Ruggiero et al, 1997) to begin smoking cessation interventions.

Over the past decade numerous health education projects have developed smoking cessation interventions for pregnant women. These projects have subsequently been tested, evaluated for behavioral impact, and cost-effectiveness, and then been applied in clinical trials and evaluation studies in both public and private obstetrical settings. Their documentation revealed that cessation rates of 14-27% were possible among pregnant women, however, their availability alone has not automatically increased their use. (Windsor, Lowe, & Perkins, 1993). Pregnancy is an ideal time to assist women with smoking cessation, as motivation for behavior change now exists, and most pregnant women do decrease their smoking in the first trimester (O'Connor, Davies, Dulberg, Buhler, Nadon, Hastings, Benzie, 1992).

REVIEW OF LITERATURE

This literature review looked for research on all smoking cessation interventions with pregnant women, and also for research which employed the Transtheoretical Model of behavior change. Research on behavior change with this model has shown efficacy with facilitating change with a variety of unhealthy behaviors. The first two studies examined women's motivation and self-identified learning needs regarding smoking cessation.

A qualitative study by Edwards & Sims-Jones (1998) set out to describe women's smoking experience during pregnancy and postpartum. Forty seven primiparous women were recruited through a randomized selection of women delivering at one of five hospitals in the Regional Municipality of Ottowa-Carleton, Canada. A semi-structured, informal interview was done by a public health nurse trained in informal interviewing techniques. One central theme that emerged was that being pregnant influenced these women's smoking-related decisions, providing strong motivation to
quit. The women described a “sense of fear and guilt about the risks of smoking for the baby”, and some of the participants found that being pregnant made it easier for the women to quit (Edwards & Sims-Jones, 1998) (p.96). The main limitation of this study was the sample size. Of the 47 recruited women, only 22 (44.7%) agreed to be interviewed.

Another qualitative study by Camiletti & Alder (1999) surveyed pregnant women less than or equal to 16 weeks gestation to identify the learning needs of women in their first trimester. Their goal was to assist in the planning and implementation of the Canadian Ministry of Health’s objective of reducing low birthweight and perinatal mortality rates, while increasing the numbers of planned pregnancies as well as those behaviors supportive of a healthy pregnancy. A convenience sample of women confirmed to be less than or equal to 16 weeks gestation were given a self-administered questionnaire designed to provide descriptive information of what they felt was essential early pregnancy learning needs. Of 265 questionnaires distributed through physicians and midwives, 120 were completed. The effects of smoking, alcohol, and drugs on the fetus was listed as an important first trimester learning need by 83% of the respondents, and receiving information on how to quit smoking was listed as important by 72.6% of the women. The researchers felt this underscored the significance of early pregnancy being a teachable moment for smoking cessation interventions (Camiletti & Alder, 1999).

The following studies utilized individual counseling sessions as the intervention with pregnant smokers, with the control groups receiving the usual care, brief advice to quit smoking during their pregnancy. O’Connor et al (1992) evaluated two nursing approaches to promote smoking cessation during initial prenatal clinic visits. The participants were 224 pregnant, daily smokers, less than 31 weeks gestation. The study design was experimental, with random assignment to one of two interventions: the usual care, control intervention, a 3 to 5 minute explanation of the hazards of smoking during pregnancy, along with a referral to a group evening class which provided guidance on a self help program; or the experimental intervention, a 20 minute individual counseling session during the routine prenatal appointment, which reviewed the self-help program (O’Connor et al, 1992). During the experimental
intervention, the individual pregnant woman was introduced to a tested Canadian self-help program for smoking cessation, the Windsor’s 7-Day Self-Help Quit Plan (Windsor et al, 1985), and were also given written information. One pamphlet from the American Lung Association outlined the hazards of smoking during pregnancy, another described how to analyze a smoking habit, and provided motivations and strategies for smoking cessation. A mutually agreed upon telephone follow-up by the nurse was also provided. The stages of behavior change were not addressed.

Study results revealed that none of the women referred to the evening class attended, and the group receiving the immediate intervention in clinic had a cotinine-validated quit rate of 14.3%, compared to an 8.5% quit rate among the usual care control group. Cotinine is a nicotine metabolite, which is a more valid measure of smoking cessation than self-report. It was felt to be significant that initially, a high proportion of the smokers were motivated to quit, though none of them would attend the later evening session. These results emphasized to the researchers the importance of intervening during the immediate teachable moment of the first prenatal visit. They also reported that motivation to quit was low in the experimental group, and a cessation program was felt to be premature until the smoker was ready to change (O’Connor et al, 1992).

Secker-Walker et al (1994) also examined the efficacy of individualized smoking cessation counseling in a randomized, controlled trial with women receiving routine prenatal care at the University of Vermont Maternal and Infant Care clinic. The women were randomly assigned to either the usual care group, who received prenatal advice to stop smoking, or the experimental group, who received individualized cessation counseling, in addition to the usual care protocol. The individualized counseling occurred at the first, second, and third prenatal visits, and again at the 36-week visit, and the six week postpartum visit. Counseling included the health benefits of quitting, the woman’s concerns about smoking in pregnancy, problem solving for identified barriers to quitting, a plan to quit, and rehearsal of appropriate skills. Urinary cotinine levels were measured at the first and 36-week visit. Smoking status at the 36-week visit was obtained from 188 women in the intervention group, and 226 women in the usual care group. No significant differences were found in smoking cessation rates. The researchers concluded that only the intention to quit could be influenced, and that
prenatal smoking cessation advice should focus on increasing motivation to quit, and building confidence in ways that this could be done (Secker et al, 1994).

The American Journal of Public Health in 1995 published a summary and evaluation of The Smoking Cessation in Pregnancy (SCIP) project, a federally-funded smoking cessation demonstration project, which lasted from 1987-1991. This research was focused on pregnant women of low socioeconomic status, as they have been found to have high levels of tobacco abuse, and their infants are at high risk for low birthweight (Kendrick, Zahniser, Miller, Salas, Stine, Gargiullo, Floyd, Spierto, Sexton, Metzger, Stockbauer, Hannon, Dalmat, 1995). The project’s goal was to increase smoking cessation among the pregnant women receiving prenatal care and services from the Women, Infants, and Children (WIC) program in the public clinics of Colorado, Maryland, and Missouri. Clinics throughout these states were randomized to provide a new, directed intervention or to provide usual care (control status), a brief message to quit smoking. The experimental intervention consisted of written and verbal information on the fetal effects of maternal smoking, benefits of quitting, techniques for quitting, how to develop social support, prevent relapse, and the importance of limiting exposure to environmental tobacco smoke. This intervention lasted from 1 to 6 minutes, and materials were written at a sixth grade reading level. Enrollment questionnaires, and urine specimens to be evaluated for cotinine levels, were collected at the first or second prenatal visit, with follow-up at the eighth month visit, and the first postpartum visit.

The SCIP project found that women attending the intervention clinics were more likely to report quitting smoking by the eighth month than the control groups. Dichotomous outcomes (quit versus no quit) was the measure of intervention effectiveness. Statistically significant effect was only found in a subgroup of women in the intervention group, who had stated upon enrollment that they did not think they would be able to quit smoking. However, the cotinine-verified quit rates were not significantly different between intervention and control sites (Kendrick et al, 1995). Clinic staff in all three states had initially expressed enthusiasm for the project, but later were overwhelmed by the amount of time they spent on the questionnaire process, specimen collection, and handling. As a result, the state coordinators reported that the
intervention protocols were not consistently applied, and that motivation to provide smoking cessation counseling varied widely among the clinic staff. These results indicated the difficulty of successfully integrating this type of program into our current system of public prenatal care. The researchers also reported that achieving changes in smoking behavior in pregnant women with low-intensity interventions was difficult. In addition, as the duration of a pregnancy is a relatively short time, they felt that future investigations might wish to focus on changes in stage of behavior as the outcome. If interventions were evaluated from this perspective, progress through behavior stages could be noted, that might eventually result in smoking cessation (Kendrick et al, 1995).

A meta-analysis of prenatal smoking interventions by Dolan-Mullen et al (1994) evaluated eleven randomized, controlled trials of smoking cessation which used objective validation of smoking status to assess the effect of the interventions. Most of the experimental interventions used individual counseling sessions of no more than 10 minutes and given by specially trained counselors. The control groups all received the usual care, which consisted of advice to quit smoking, and sometimes referral to a smoking cessation group. Biochemical validation was done with either urinary or salivary cotinine. The researchers found that the experimental interventions did increase the rates of smoking cessation among the pregnant women. Four of the studies also evaluated the effect of the interventions on the outcome of low birthweight (LBW) rates. They reported that their findings were consistent with the epidemiologic literature; that is, a higher rate of smoking cessation correlated with a lower risk of LBW (Dolan-Mullen et al, 1994).

This meta-analysis was limited by the fact that the small number of studies did not permit an analysis of the effectiveness of specific components, yet two points about the interventions did appear significant. One, all the studies used materials specifically directed toward pregnant women; and two, the more intensive interventions with multiple contacts and some form of follow-up, resulted in a greater effect. They also determined the cost-effectiveness of the interventions in one study, which revealed that in 1990 dollars, the intervention was $9.06 per patient, and $67.74 per patient who quit smoking (Dolan-Mullen et al, 1994). Thus the prenatal smoking interventions had
a positive effect on rates of cessation and LBW, and were “feasible and cost beneficial to the sponsoring providers” (Dolan-Mullen et al, 1994) (p.1333).

In summation of these studies, there was an added benefit in individual counseling with these women, usually provided by a trained staff nurse or counselor, versus the usual care, which is the traditional, brief physician advice to quit smoking during pregnancy. Interventions which took advantage of the immediate teachable moment of the first prenatal visit improved the rates of cessation even further. Research which did not demonstrate a statistically significant benefit from the experimental interventions, did note that further studies might focus on the pregnant smoker’s readiness to change.

The following research studies did address the behavioral stages of change and associated processes in their experimental interventions with smokers. Richmond and Mendelsohn (1998) found in two separate studies that physicians trained to use the stages of change concept in brief interventions for smoking cessation and controlled drinking, were still using the interventions six months later. Applying the stage of change concept allowed them to provide tailored brief interventions matched to the smoker’s readiness to change. They appreciated that less time was spent on patients not yet ready to change, and more time was able to be spent with the patient who was ready to initiate a change (Richmond & Mendelsohn, 1998). The Tobacco Reduction and Cancer Control (TRACC) project at the Kaiser Permanente Center for Health Research in Portland, Oregon had identified barriers to physician counseling on smoking cessation as time constraints, lack of reimbursement for illness prevention counseling, and the mistaken impression that efforts are not effective (Vogt et al, 1989).

Pohl and Caplan (1998) found few published reports of effective smoking cessation studies with women in general. They implemented a descriptive study of a group intervention with low-income women that utilized both Prochaska’s stages of change as well as a feminist framework. Study participants were classified by their stage of readiness to change, with the majority being precontemplators, and contemplators. Interventions were then designed to specifically address these stages. Smokers who
were precontemplators were given stage-based consciousness-raising activities. The women measured their respiratory carbon monoxide (CO) level at each session by blowing into a simple handheld device, and they also played a game called *Myths and Facts*, which educated them on how the tobacco industry impacts cigarette use through its advertising. An educational smoking video was utilized, and reasons to quit for one’s overall good were identified. Contemplators were also given these consciousness-raising interventions, as well as assistance in defining their own goals, and in setting quit dates. Problem solving occurred for the women’s specific issues, such as nicotine withdrawal and weight gain. Imagery was also used to encourage the women to visualize themselves as non-smokers. Participants in the preparation stage were assisted with setting their quit date, and developing a specific daily plan for the subsequent one to two weeks. It also included making a decision about nicotine replacement therapy (NRT), support for going public with their decision, and stress management exercises.

Fifty five women entered the study, with only nine completing the six week intervention. Of these nine participants, eight moved from precontemplation to preparation and within the next month, seven of the nine were in the action stage. Though the study sample was small, the researchers uncovered important needs of the women participants:

1) Support and nurturing were essential components.
2) Patience with the smoker was important.
3) The smoker must set their own quit date, they cannot be rushed into this.
4) The approach must be individualized, and the smoker’s suggestions need to be heard (Pohl & Caplan, 1998).

Hollis & Lichtenstein (1991) also utilized the stages of change concept along with nurse-assisted smoking counseling in a study done at a Kaiser Permanente HMO in Portland, Oregon. Those randomized to the experimental intervention received the nurse-assisted counseling along with instructional videos containing content specifically for precontemplators, contemplators, and those ready to take action, as opposed to the control intervention, which was traditional brief physician advice to quit smoking. Their data revealed that the nurse-assisted intervention nearly doubled the
quit rates for participants in the experimental group. Contemplators were almost three
times as likely as precontemplators to be smoke-free three months after the
intervention. The researchers believed the key to success was the component of an
interaction with a second health professional, versus any particular intervention. They
also speculated whether the video content, which included a discussion of common
perceived barriers to quitting, as well as stage-matched information, might have
motivated those subjects to reevaluate and attempt cessation (Hollis, Lichtenstein,
Mount, Vogt, Stevens, 1991). As the experimental component was a package of
interventions, they were not able to assess exactly which component achieved the
results. It is noteworthy that research which did not address the stages of change
(Kendrick et al, 1995) (Secker et al, 1994) concluded that there could have been
significantly improved rates of smoking cessation, if the pregnant smoker's readiness
and motivation to change been considered.

THEORETICAL FRAMEWORK

The central focus of the Transtheoretical model (TTM) developed in 1984 by
Prochaska and DiClemente is to understand and examine the process of change for
smoking cessation and other problematic behaviors (DiClemente, Prochaska,
Fairhurst, Velicer, Velasquez, & Rossi, 1991). They describe two interrelated
dimensions of behavior change in their theoretical model. The first dimension is
comprised of the stages of change, and the second dimension, called the processes
of change, focuses on the activities and events that lead to successful modification of
a problem behavior (DiClemente et al, 1991). Their model of health behavior change
provides a valuable framework for assessing a smoker's readiness to stop smoking,
and then matches tailored, individualized interventions for each stage. Their work has
created a "paradigm shift" in how health care providers "understand and change high-

THE STAGES OF CHANGE

Precontemplation is the period during which a smoker is not thinking about quitting
smoking at all, at least in the next six months.
Contemplation is the period of time in which the smoker is seriously thinking about quitting smoking in the next six months. Preparation is the period during which the smoker who has tried to quit smoking over the past year is seriously considering quitting in the next month. Action is the period from 0 to 6 months, beginning after the smoker has made the overt change to stop smoking. Maintenance is the period of time beginning 6 months after the action stage has started and continuing until smoking is no longer a problem (Prochaska, DiClemente, Velicer, & Rossi, 1993).

This model provides an innovative approach to health promotion by emphasizing behavior change as a progression through a series of stages, and by designing the most relevant and appropriate health promotion intervention to meet an individual’s needs at each stage (Prochaska & Velicer, 1997). The Transtheoretical model recognizes that behavioral change is a point on a continuum, where a person will begin with a firm conviction to maintain a status quo and never change a given behavior, and then proceeds through the conditions of “someday, soon, now, and forever” (Samuelson, 1997) (p.13). If the health care provider assesses and understands the smoker’s stage of change, effective interventions specific for that stage can be utilized to assist with forward movement. Interventions that fit the five stages of readiness for behavior change would support the individual with the right information at the right time. The limitations with other behavior change methods has been that they target only those individuals who are prepared to take action. This assumes a certain level of readiness, and does not address the transitional nature of behavior change (Samuelson, 1997).

Smoking cessation interventions with pregnant women have primarily been developed for women already motivated to quit (Ruggiero et al, 1997). Because individuals are at different levels of motivation to change behavior, a single, fixed intervention for all is not effective (Pohl & Caplan, 1998). The stages of change concept assumes that whether the smoker is in the contemplation, preparation, or action stage, they are in the process of change, and movement along this continuum improves the likelihood that change will occur (Pohl & Caplan, 1998). Prochaska also
recognized that there is a spiral nature to change: contemplation-preparation-action-relapse--contemplation-preparation-action-relapse (Samuelson, 1997). Relapse is the event that DiClemente and Prochaska (1991) say stops the action or maintenance stage, moving the individual back to the precontemplation or contemplation phase. An individual can and frequently does, move through the stages in a cycling and recycling process, especially for addictive behaviors like tobacco abuse (DiClemente et al, 1997). Samuelson (1997), in his commentary on the stages of change, stated that with behavior change there is no such thing as failure; as long as an individual is visualizing positive change, there is a strong likelihood for change to occur, and that we either "leap, or crawl, or slip back" (p.13).

THE PROCESSES OF CHANGE

The majority of smoking cessation research has failed to consider the behavioral process of change, and has viewed smoking cessation as a solely dichotomous outcome (quit versus no quit) (Pohl & Caplan, 1998). The processes of change are the cognitive and behavioral coping strategies and activities relevant to a particular behavior change (Prochaska and DiClemente, 1992). Prochaska identified nine major processes of change, and each one involves a broad strategy comprised of techniques of change common to various theories of psychotherapy. Each stage of change has associated and specific behavioral processes that facilitate movement through that stage. Successful completion of certain stages is linked to the use of specific processes. For example, consciousness-raising and emotional arousal are very useful processes to use with precontemplators (Prochaska et al 1994). The following table provides a summary of the change processes, their goals, and related techniques.
### THE PROCESSES OF CHANGE

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<tr>
<th>PROCESS</th>
<th>GOALS</th>
<th>TECHNIQUES</th>
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<tr>
<td>Consciousness-Raising</td>
<td>Increasing information about the problem</td>
<td>Observations</td>
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<td>Education</td>
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<td>Motivational literature</td>
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<td>Social liberation</td>
<td>Increasing social alternatives for good behaviors</td>
<td>Empowering</td>
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<td>ID public support</td>
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<td>Emotional Arousal</td>
<td>Expressing feelings about problem and solution</td>
<td>Grieve losses</td>
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<td></td>
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<td>Role playing</td>
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<td>Picture the hazards</td>
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<td>Self Reevaluation</td>
<td>Assess thoughts and feelings about self/problem Make change a priority</td>
<td>Value clarification</td>
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<td>Imagery</td>
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<td>Belief in self</td>
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<td>Commitment</td>
<td>Choosing to act</td>
<td>Decision making</td>
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<td>Believe in ability to change</td>
<td>New Year’s Resolution</td>
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<td>Countering</td>
<td>Substitute alternatives for problem behavior</td>
<td>Rehearse strategies</td>
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<td>Assertion</td>
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<td>Environment Control</td>
<td>Avoid stimuli that triggers problem behavior</td>
<td>Environmental restructuring</td>
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<tr>
<td>Reward</td>
<td>Rewarding self for changes</td>
<td>Positive Reinforcement</td>
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<tr>
<td>Helping Relationships</td>
<td>Enlisting help from caring, significant others</td>
<td>Social support</td>
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<td></td>
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<td>Self-help groups</td>
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<td>Empathetic listening</td>
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(Adapted from Prochaska, Norcross, DiClemente, 1994).
Stage-matched interventions have two complementary strategies that assist in moving a smoker from one stage to the next. The first is targeting - delivering a common message to all smokers in that particular stage. A guideline for effective use of targeting is to provide smokers in the less committed stages (Precontemplation, Relapse, and Contemplation) with information which will counter the perceived cons of quitting smoking, and to reinforce the pros of quitting, without stressing that they take immediate action. Smokers in the Action and Maintenance stages should receive messages and materials to reinforce their past actions and to support their future efforts. The second strategy is tailoring, which is providing specific feedback and information to individual smokers in a particular stage (Johnson, Budz, Mackay, & Miller, 1999).

Windsor, Cutter, Morris, Manzella & Bartlett (1985) found that in public health maternity clinics, health education methods were more effective in changing smoking behavior when tailored to the individual pregnant smoker. Tailoring can be an effective tool to address specific issues and barriers to change (Johnson et al, 1999). Information would be given to the smoker that is relevant to where they are in the change process, and information not likely to be helpful at that time is omitted (Lichtenstein & Glasgow, 1992). Interventions based on Prochaska & DiClemente's work matches tailored messages to the needs of the smoker at differing points in their decision-making process about smoking cessation.

IMPLICATIONS

The studies by Pohl & Caplan (1998), Richmond & Mendelsohn (1998), and Hollis & Lichtenstein (1991), have shown the efficacy of smoking cessation interventions for pregnant women based on the stages of change. The TTM of behavior change can be used in clinical practice with pregnant smokers by incorporating the model into the routine anticipatory guidance given to all pregnant women. Research indicates that the pregnant smoker's first prenatal visit is the ideal opportunity to begin interventions for smoking cessation, as her concerns for the health of the developing fetus create a
powerful teachable moment. The frequency of prenatal check-ups provides the repeated contacts and opportunities to consistently apply the TTM. Specific features of the program would include:

1) At the first prenatal appointment, the smoker would be identified, the chart stickered, and the process would begin with an assessment of her stage of change, using a brief, standardized, questionnaire. The following is an example:

   Answer these four questions to determine the stage of readiness you are in to quit smoking:

   1) I quit smoking over 6 months ago. yes no
   2) I have taken action to quit smoking within the past 6 months. yes no
   3) I am intending to quit smoking in the next month. yes no
   4) I am intending to quit smoking in the next 6 months. yes no

   If you answered no to all questions, you are in the Precontemplation stage.
   If you answered yes to #4, and no to all the others, you are in the Contemplation stage.
   If you answered yes to #3 & #4, no to the others, you are in the Preparation stage.
   If you answered yes to #2, no to #1, you are in the Action stage.
   If you answered yes to #1, you are in the Maintenance stage.

   (adapted from Prochaska et al, 1994)

2) A computer-generated, standardized form would then be placed in her chart, to refer to at each clinic visit. It would list the stages of change and provide pregnancy-tailored, stage-matched interventions to apply to the pregnant woman. The woman’s use of the processes of change would also be discussed and encouraged at each visit. Space for personalized data and staff notations would be provided.

   Examples of pregnancy-tailored, stage-matched interventions include:

   **Precontemplation:**
   Explore the woman’s individual pros and cons of quitting smoking.
   Educate: explain how smoking causes fetal hypoxia and intrauterine growth restriction
Explain the benefits of being smoke-free during pregnancy:
* less chance of a miscarriage or a preterm delivery
* a baby born with a healthy weight
* discuss risk of passive smoke on children

Identify her perceived barriers to change.
Use a non-judgmental approach.

**Contemplation:**
Utilize educational interventions.
Confirm again the benefits of quitting smoking for her and her unborn child.
Build her knowledge of the benefits of quitting to her and the fetus.
Determine what triggers make her smoke, keep a diary if helpful.
Encourage visualization of being smoke-free.
Discuss strategies to remove her barriers to quitting.
Identify her supportive relationships.
Listen to her concerns and provide empathetic feedback.

**Preparation:**
Assist her to outline her goals and action plan.
Prepare a list of her reasons for quitting, carry them with her, and reread frequently.
Discuss tips, tools and techniques to quit smoking.
Set a quit date. Encourage her to go public with her decision to quit.
Have her teeth cleaned to remove tobacco stains.
Discard lighters, ashtrays, and any other tobacco-related items in the home.
Clean car, clothes, and home, to remove tobacco odor.
Identify possible pitfalls - places and situations where she would smoke.
Praise her readiness to quit.

**Action:**
Review goals and establish priorities.
Discuss potential pitfalls and reasons for relapse.
Keep oral substitutes accessible - carrots, sunflower seeds, sugarless gum.
Change daily routines that promoted smoking.
Use relaxation techniques - yoga, deep breathing, take a daily walk.
Encourage her to reward her success - do something special that she has put off.
Listen, praise, and reinforce positive behavior.

**Maintenence:**
Renew commitment.
Encourage and support plan for long-term success.
Assist in staying focused in a tobacco-free lifestyle.
Identify situations likely to cause her to relapse.
Use a supportive role and positive reinforcement.

(adapted from Andrews, 1998)

3) Multiple methods of stage-matched intervention delivery would be utilized, such as written materials, educational videos, individual counseling by a trained nurse, and supportive telephone follow-ups by the nurse after a clinic visit. Examples of this include: *March of Dimes* brochures on stopping smoking during pregnancy, and a video presentation on healthy pregnancy which stresses changing unhealthy behaviors.

4) All program components would be designed to help move the woman through her current stage to the next, or to remain smoke-free once successful. Information on recycling back through the stages would also be included, should she slip and restart smoking.

5) Standardized pro-active statements would be taught to all clinic staff to maximize acceptability and effectiveness. Clinic staff involvement in cessation interventions has been shown to have an influential effect when they reinforce the medical and nursing no-smoking message during pregnancy (Lowe, Windsor, Balanda, & Woodby, 1997).
Every pregnant woman should have access to information, counseling, and appropriate interventions which would support the best possible outcomes for her and her developing child. Quitting smoking is a difficult task. The key elements in accomplishing this are motivation, readiness to change, personal support, and behavioral counseling (Larson, 1997). Many variables will influence the implementation of a smoking cessation program, including the cost, the institutional policy, reimbursement issues, and the skills of the health professionals involved. Another possible barrier to implementation would be whether the clinic staff includes smokers. A nurse or receptionist who returns from lunch with tobacco odor clinging to her clothing would hold little credibility with the pregnant smoker, and possibly might not communicate the importance of smoking cessation in a satisfactory manner.

Nurse, physician, and clinic staff cessation “skills” do need to be taught and enhanced, and proven cessation methods must be disseminated and adopted by both public and private sites, to decrease the burden of smoking-related morbidity and mortality on our most vulnerable populations. The prevalence of continued smoking by women who are pregnant, especially low-income pregnant women (Albrecht et al., 1994) illustrates the need for effective interventions for smoking prevention and cessation. Smoking cessation in the pregnant woman not only reduces health risks for herself, but also for her child, her family, and ultimately, for the public health of our nation.

Nurse practitioners also need to consider how to effectively deal with a resistant, precontemplative, pregnant smoker, as individuals do approach change with varying degrees of readiness. The precontemplator is either unaware, unwilling, or too discouraged to change (Berger, 1999). The unaware smoker needs education, but the unwilling smoker needs a different approach. The strategy might be to ask what the smoker likes about smoking. If she responds that it relaxes her, the nurse could respond that “it would be difficult to give up something that is relaxing”, which demonstrates non-judgmental understanding. The nurse’s next question could ask what the smoker sees as the negative side of smoking. After the woman’s response, the nurse would summarize with a statement such as: “On one hand you like smoking
because..., but on the other hand, you see the downside of smoking as...”. This reviews the pros and cons of smoking for the woman, creating dissonance, which can provide motivation to quit smoking (Berger, 1999). Some smokers have no intention of ever quitting, and a therapeutic response to them would be: “It doesn’t sound like you are ready to quit smoking. I am concerned because of the harm it can do to you and your baby, but it really is up to you. Please let me know if you ever get to the point where you would consider quitting, and I will be glad to help you with some methods that I know”.

Future research needs to be done to improve the efficacy of smoking cessation interventions with pregnant women. Nurse practitioners (NPs) should focus on their expanded roles beyond the clinic walls, and work towards changing health policies, procedures, and protocols to protect the health of pregnant women and their vulnerable, unborn children. NPs possess the knowledge base, collaborative skills, and abilities to work with local community agencies, and also on a national level, to design, apply, and evaluate the relevant information for pregnant smokers, based on the Transtheoretical Model. Research should then focus on evaluating whether these tailored interventions significantly promote forward movement, and eventually lead to smoking cessation.
REFERENCES


