EVALUATION OF A COMMUNITY-WIDE
PRETERM BIRTH PREVENTION PROGRAM

by

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A thesis submitted to the Department of Community Health and Epidemiology
in conformity with the requirements for the degree of Master of Science

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Abstract

Background: Unlike most causes of infant morbidity and mortality, there has been no significant reduction in the incidence of preterm birth in the past 25 years. Preterm birth remains the leading cause of neonatal morbidity and mortality, representing one of the most important perinatal health problems in Canada.

Objective: To evaluate the implementation and outcome of the community-wide preterm birth prevention program Reach, React, Respond.

Program Description: The intervention consists of educating caregivers about the need to teach women the signs and symptoms of preterm labour and the action women should take if they experience them. Caregivers were also provided with evidence based guidelines for the treatment of women in preterm labour with tocolytic and corticosteroid drugs.

Methods: A multi-phased study was conducted in Kingston, Ontario. This evaluation examined knowledge and practice change among caregivers (Phase I) and knowledge change among postpartum women (Phase II) using pre- and post-program implementation surveys. Pre- and post-program implementation chart reviews were conducted to determine the change in the use of antenatal steroids in infants born preterm (Phase III), and the effect of the program on the gestational age of infants born to mothers who experience preterm labour (Phase IV).

Results: Successful implementation of Reach, React, Respond through the academic detailing of caregivers was demonstrated by a significant increase in the number of caregivers who educated all pregnant women about the signs and symptoms of preterm labour (p < 0.05). Caregivers' education of pregnant women led to a very significant increase in women's knowledge about the signs and symptoms of preterm labour and what to do if experiencing these signs or symptoms (p < 0.001). There was no significant difference between the pre- and post-program implementation groups in the administration of tocolytic or corticosteroid drugs or the gestational age of babies born to women who experienced preterm labour.

Conclusions: Given the promising results from Phases I and II, it is imperative that this research be continued along with efforts to sustain the program in the community.
Acknowledgements

To properly acknowledge those who deserve recognition for their role in this project would require a manuscript as long again as my thesis. But in the allotted space, I'd like to say thank-you to many people who helped me with this project.

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I would like to thank Dr. Greg Davies, my clinical supervisor. His expertise and strong research and teaching skills have been very helpful.

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Thanks to the medical records research staff at Kingston General Hospital - in particular, Luci Bastos and Marikay Bailey.

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A very, very special thank-you to my best friend, Garth. Garth has been the most exceptional research assistant, spending hours with me photocopying, entering data, conducting analysis, solving my computer woes and proofreading. He has also been the most exceptional husband, father and friend.

And of course...my joy, Carolyn whose smiles make it all worthwhile.
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1.0 Background

The past 25 years has been a time of significant advances in perinatal medicine and in the understanding of reproductive processes. Although there has been progress in reducing the impact of most disease processes that contribute to infant morbidity and mortality, there has been no significant reduction in the incidence of preterm birth.\(^1\) Preterm birth remains the leading cause of neonatal mortality and morbidity, representing one of the most important perinatal health problems in Canada\(^2,3\).

In 1995, the rate of preterm birth was 9.2% in Ontario and 7.0% in the rest of Canada.\(^3\) In Kingston, Ontario it is estimated that at least 1 out of every 10 births is preterm.\(^4\) Preterm birth has become the single most common cause of poor outcome for infants; although early births constitute less than 10% of all live births, they contribute to more than 75% of prenatal morbidity and mortality.\(^3,5\) Among infants who survive preterm birth, there is an increased incidence of intraventricular hemorrhage, infection, neurodevelopment handicap, chronic respiratory problems and an array of other medical and developmental problems.\(^1,6-8\) Prolonged hospitalization of the preterm infant in neonatal intensive care units, and frequent rehospitalization and need for long term care make preterm birth an important social issue as well as a major health care expenditure.\(^9\) A conservative estimate of the lifetime cost associated with the care of infants born preterm with a birthweight of less than 2 500 grams averages more than $600 000.\(^6\) Since over 23 000\(^10\) such births occur in Canada each year, the cost to the health care system is over 13 billion dollars.

It is clear that preterm birth is a major contributor to infant mortality, chronic health problems and disability. There are major costs associated with preterm birth both to the family and to the health, education and social systems. Thus, it is important to develop and evaluate programs that are designed to reduce the rates of preterm birth in Canada.
2.0 Literature Review

2.1 Definition and Classification of Preterm Birth

Preterm birth is defined as any delivery that occurs before 37 weeks from the first day of the last menstrual period. The lower limit of gestational age at which the term preterm birth can be applied is not well defined. Pregnancies ending before 24 weeks gestational age are rarely considered viable; therefore preterm birth is often defined as delivery occurring between 24 and 37 weeks from the first day of the last menstrual period. 

Preterm birth can arise from maternal or fetal complications, premature rupture of membranes, and idiopathic preterm labour (Table 2.1). Approximately 20% of all preterm deliveries are indicated on the basis of medical or obstetric disorders in the mother or severe disease states in the fetus. In these cases, it is better for the infant to be delivered and placed in an appropriate neonatal care setting than for the pregnancy to continue.

<table>
<thead>
<tr>
<th>Table 2.1 Classification of the Etiology of Preterm Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of preterm births</td>
</tr>
<tr>
<td>Maternal or fetal complications</td>
</tr>
<tr>
<td>Premature rupture of membranes</td>
</tr>
<tr>
<td>Idiopathic preterm labour</td>
</tr>
</tbody>
</table>

Premature rupture of membranes (PROM) accounts for an additional 20% of preterm births. Women at increased risk for PROM include those of lower socioeconomic status, those with sexually transmitted diseases, multiparas with prior preterm deliveries, and women with preterm labour in the current gestation. Smokers
may also be at increased risk for PROM. However, in many cases, the ultimate cause of membrane rupture is not known.

Idiopathic preterm labour has unknown causes and accounts for about 60% of all preterm births. Idiopathic preterm labour refers to the spontaneous onset of contractions with progressive cervical dilation and effacement. Although most patients who experience idiopathic preterm labour do not fit any of the high-risk categories for preterm labour, risk factors for idiopathic preterm labour do exist (Table 2.2). Yawn estimates that approximately 20% of idiopathic preterm labour can be associated with known risk factors.

<table>
<thead>
<tr>
<th>Medical/Obstetrical</th>
<th>Lifestyle</th>
<th>Socioeconomic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous preterm labour and delivery</td>
<td>Smoking</td>
<td>Low maternal age</td>
</tr>
<tr>
<td>Two or more previous preterm births</td>
<td>Inadequate nutrition</td>
<td>High maternal age</td>
</tr>
<tr>
<td>Multiple gestation</td>
<td>Low pre-pregnancy weight</td>
<td>Low educational level</td>
</tr>
<tr>
<td>Hydramnios</td>
<td>High alcohol consumption</td>
<td>Poverty</td>
</tr>
<tr>
<td>Incompetent cervix</td>
<td>Narcotic addiction</td>
<td>Unmarried status</td>
</tr>
<tr>
<td>Uterine irritability</td>
<td>Environmental toxins</td>
<td></td>
</tr>
<tr>
<td>Two or more second trimester abortions</td>
<td>Strenuous work</td>
<td></td>
</tr>
<tr>
<td>Preterm labour in current pregnancy</td>
<td>Lack of social support</td>
<td></td>
</tr>
<tr>
<td>Diethylstilbestrol exposure</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.2 Preterm Birth Prevention Strategies

The lack of progress in reducing the incidence of preterm births is due to a myriad of factors, beginning with researchers' limited understanding of the basic etiology of preterm labour. Until a major scientific breakthrough unravels the mystery of parturition, the medical community is limited in their efforts to prevent preterm birth. Although a variety of prevention strategies have been employed to reduce the magnitude of the problem, most of these have met with limited success. The following literature review will examine various prevention strategies, including those strategies that involve a combination of prevention techniques.

2.2.1 Social interventions

The incidence of preterm birth is generally higher in lower socio-economic groups. The reasons for this are not known and may involve a variety of factors. Reduction of poverty and related factors such as poor nutrition, smoking and depression or other psychological distress may have an impact on reducing preterm labour. Similarly, social changes that reduce the numbers of pregnancies among women less than 18 and greater than 35 years of age could be expected to help limit the number of preterm births.

Many European countries have adopted social changes which have led to better birth outcomes. For example, in France, a 90% salary compensation was introduced in the mid 1970's, which allowed practitioners to prescribe two weeks of sick leave for pregnant women. This was combined with an antenatal education program that taught women to recognize and avoid activities that provoke uterine contractions.

4
proportion of preterm birth fell from 5.8% to 4.0% after the introduction of this program.\textsuperscript{18}

As well, some researchers report that interventions which provide social support during pregnancy are effective in reducing the incidence of preterm births.\textsuperscript{19} For example, a randomized controlled trial assigned 1554 women to either an intervention or control group; those in the intervention group received telephone calls from a registered nurse one or two times weekly from 24 weeks through 37 weeks gestation. Among a high risk subset of these women there was a significant difference in the rate of preterm birth [8.7\% in the intervention group versus 15.4\% in the controls (95\% CI 0.28 - 0.84; p = 0.004)].\textsuperscript{20} Other studies, however, have provided little evidence for the effectiveness of social support interventions in the prevention of preterm birth.\textsuperscript{21} There have been four randomized controlled trials in North America of antenatal social support in the home, all of which failed to demonstrate significant reductions in preterm birth, although they had very low statistical power.\textsuperscript{22} A meta-analysis of results from randomized trials of social support interventions outside the home, with a total of 2643 participants, found an odds ratio of 1.06 (95\% CI 0.82 - 1.36) for preterm birth.\textsuperscript{22} Thus, there is little evidence to support the effectiveness of social interventions in the prevention of preterm birth.

2.2.2 Antenatal care

Preterm birth is less likely to occur among women who seek prenatal care early or who have more prenatal visits than among those who seek care later or have fewer visits.\textsuperscript{23} However, a review of the literature\textsuperscript{24 - 27} suggests that making prenatal care available to more women or making more visits available to the same number of women
has generally not reduced preterm birth rates. Enhancing prenatal care by adding combinations of patient education, case management, home visiting, and nutrition counselling appeared to be effective in reducing preterm births in some randomized trials but not in others.28 - 31

2.2.3 Tocolytic agents and corticosteroids

The efficacy of tocolytic agents in delaying delivery for varying periods in women with documented preterm labour has been established.32 Tocolytic drugs are used to interrupt or stop uterine contractions (Table 2.3). A few studies of low risk women have demonstrated that the use of tocolytic drugs may lead to an average of two to four weeks prolongation of gestation among women who experience preterm labour.13, 32

The delay in delivery provided by tocolytic drugs has substantial benefit for the infant because it provides time for the administration of corticosteroid drugs (Table 2.3). Antenatal administration of corticosteroid drugs for as few as 12 - 24 hours before delivery increases the maturity of the infants' lungs and is associated with significant reductions in neonatal morbidity and mortality. Thus tocolytic agents combined with antenatal steroids is the treatment of choice for preterm labour.5, 23

<table>
<thead>
<tr>
<th>Tocolytics</th>
<th>Administration</th>
<th>Corticosteroids</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ritodrine</td>
<td>5 - 10 mg (IM) q 2-4 for 24 hours</td>
<td>Celestone (betamethasone)</td>
<td>2 doses of 12 mg (IM) 24 hours apart</td>
</tr>
<tr>
<td>Magnesium Sulphate</td>
<td>4 gm bolus (IM) then 2 gm/hour (IM) for 24 hours</td>
<td>Dexamethasone</td>
<td>4 doses of 6 mg (IM) 12 hours apart</td>
</tr>
<tr>
<td>Terbutaline</td>
<td>0.250 - 0.500 gm (IM) q 3 - 4 for 24 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indomethacin</td>
<td>100 mg rectal suppository then 25 mg (IM) q 1 hour for 24 hours</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In order for these drugs to be effective, treatment must occur early in labour since the drugs must be administered before significant cervical dilation or rupture of membranes. A national study on the effectiveness of tocolytics in postponing birth found that only 31% of preterm babies had received the recommended two doses of steroids 24 hours apart, largely because most women present to the hospital too late to benefit from tocolytics or steroid use. Early recognition of preterm labour has been emphasized as a primary tool to increase the use of these drugs in appropriate patients.

The education of caregivers who administer these drugs is also important in the appropriate treatment of women experiencing preterm labour. Indeed, a large, multi-centred, randomized controlled trial found a 33% increase in the appropriate administration of corticosteroids and tocolytic drugs among physicians who received intense and ongoing education regarding the appropriate administration of drugs as compared to physicians who did not receive this education.

2.2.4 Uterine activity monitoring

It has been shown that women who deliver early have increased uterine activity at an earlier time in gestation than women who deliver at term. Many researchers have confirmed an elevated baseline uterine activity for several weeks before the onset of preterm labour. Uterine monitoring is used to recognize preterm labour so that tocolytic and corticosteroid drugs can be appropriately administered in an attempt to prolong the pregnancy and decrease infant morbidity. Prevention programs with uterine activity monitoring require intense prenatal care and generally focus on high-risk women.
The value of uterine activity monitoring plus perinatal nursing support in the prevention of preterm birth among high risk women has been questioned by a few studies. In 1997, 2,422 high risk women were randomized to either daily contact with a nurse or daily contact with a nurse including home uterine monitoring. There was no significant difference in the incidence of preterm birth as a result of home uterine monitoring (13% in the daily-contact group and 14% in the home-monitoring group). However, in a large, prospective, randomized multi-centre study, patients were assigned to receive either daily uterine monitoring and nursing contact or a preterm birth prevention program including intensive education and more frequent prenatal visits. Among the monitored patients, there was a significant increase in the early detection of preterm labour and successful prolongation of pregnancy to term.

2.2.5 Risk assessment and enhanced prenatal care

In the early 1980's, many researchers focused preterm prevention efforts on programs that were a combination of risk assessment to identify patients more likely to have preterm birth, education of these high risk women about the signs and symptoms of preterm labour and more intensive prenatal care. The premise of these programs was that teaching high risk women to recognize the signs and symptoms of preterm labour and enhancing their prenatal care would lead to more women presenting to the hospital in time to receive the appropriate administration of tocolytic and corticosteroid drugs.

A number of risk scoring indices have been generated on the basis of various factors causally associated with preterm birth. The risk scoring approach was popularized by Creasy et al. who reported in 1980 that among a population of nearly 10,000 women,
64% of early deliveries could be predicted by a scoring system.\textsuperscript{41} This system has been widely applied to the US-based prevention programs although there have been few prospective evaluations of the reliability and validity of these scoring indices. However, studies evaluating the use of the indices combined with preterm birth prevention strategies have found that the overall results show low positive predictive values of approximately 15 - 30% and sensitivities of 25 - 30\%.\textsuperscript{42, 43}

A crucial component of these programs is enhanced prenatal care. High risk women receive intensive education by providers about the subtle signs and symptoms associated with preterm labour. Women are asked to palpate contractions each day. They are instructed to report any symptoms to the provider at weekly (rather than traditional, monthly) visits during the second and third trimester. In addition during the regular visits, these patients receive gentle cervicovaginal assessment to detect any change in the cervix since the previous examinations.\textsuperscript{13}

Results from these programs have been reported from different centers and many have shown a decrease in the preterm birth rate (Table 2.4). Most of the preterm birth prevention programs geared toward high risk women in the United States were based on the early efforts reported by Papiernik\textsuperscript{44} in 1985. Papiernik et al. reported a significant decline in the preterm birth rate in Haguenau, France where delivery at less than 32 weeks fell from 1.8% to 0.8% over a 12 year study period. This prevention program entailed the application of a risk-assessment system, the use of midwives for home visits, and an education component which uniquely included advice regarding the reduction of physical efforts by at-risk women with an accompanying work leave provision.
In the United States, Herron et al.\textsuperscript{45} also evaluated the effectiveness of such a program. High risk patients were instructed in self-detection of the early signs of preterm labour, and were followed weekly in a special clinic. This prospective study demonstrated a significant reduction in the rate of preterm delivery. In studies using historical controls, a decrease in the incidence of preterm births was also reported.\textsuperscript{9, 46}

However, results from randomized controlled trials have been more variable and many researchers have concluded that these types of programs are not likely to be effective at reducing the rate of early deliveries among high risk women.\textsuperscript{9, 31, 48-50} A randomized controlled trial at the Hospital of the University of Pennsylvania used risk assessment to identify women at high risk for preterm labour before 18 weeks gestation.\textsuperscript{48} The study population was composed of black, inner city women. In addition to weekly or biweekly pelvic examinations, the intervention included patient education on the signs of preterm labour and training to palpate daily for mild contractions. A 24-hour hotline was established to ensure patient access to care and cervical cerclage was performed as indicated. The results demonstrated increased awareness of symptoms of preterm labour on the part of the intervention group. However, no significant differences were observed between the high risk and control groups in the percentage of preterm deliveries.

Other randomized controlled trials\textsuperscript{9, 31, 49, 50} have failed to show significant results and indeed, a comprehensive meta-analysis of these studies found no significant benefit of preterm-birth education programs designed to prevent preterm births among high-risk women.\textsuperscript{51} The only significant effect of these types of programs was an increase in the frequency with which preterm labour was diagnosed.\textsuperscript{51}
### Table 2.4 Studies of Preterm Birth Prevention Programs Aimed at High Risk Women

<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papiernik et al.(^4^)</td>
<td>Historical</td>
<td>6,599</td>
<td>Decrease (p &lt; 0.001) 5.4% - 3.7%</td>
</tr>
<tr>
<td>Herron et al.(^4^)</td>
<td>Historical</td>
<td>1,422</td>
<td>Decrease (p &lt; 0.001) 7.0% - 3.8%</td>
</tr>
<tr>
<td>Kotte et al.(^4^)</td>
<td>Historical</td>
<td>9,296</td>
<td>Non-significant trend toward decrease</td>
</tr>
<tr>
<td>Mueller-Heuback et al.(^9)</td>
<td>Historical</td>
<td>4,595</td>
<td>Decrease (p &lt; 0.001) 13.7% - 9.3%</td>
</tr>
<tr>
<td>Main et al.(^4^)</td>
<td>Randomized trial</td>
<td>943</td>
<td>No significant change</td>
</tr>
<tr>
<td>Hobel et al.(^3^)</td>
<td>Randomized trial*</td>
<td>2,654</td>
<td>Decrease (p &lt; 0.05) 7.4%(E) vs. 9.1%(C)*</td>
</tr>
<tr>
<td>Goldenberg et al.(^9)</td>
<td>Randomized trial</td>
<td>1,000</td>
<td>No significant change</td>
</tr>
<tr>
<td>Heins et al.(^5^)</td>
<td>Randomized trial</td>
<td>2,420</td>
<td>No significant change</td>
</tr>
<tr>
<td>Mueller-Hueback et al.(^9)</td>
<td>Randomized trial</td>
<td>5,457</td>
<td>No significant change</td>
</tr>
</tbody>
</table>

* Eight prenatal clinics were randomized to be either experimental (E) or control (C) clinics.

### 2.2.6 Community-wide prevention programs

As mentioned in the previous section, the majority of preterm birth prevention programs limit their focus to high risk patients, a large percentage of whom deliver prematurely because of maternal complications of pregnancy or premature rupture of membranes. Since patients at lower risk are more likely to deliver prematurely because of idiopathic preterm labour, and because idiopathic preterm labour accounts for approximately 60% of preterm births, there may be greater benefit from preterm birth prevention programs in lower risk populations.\(^5\),\(^5^2\)

Therefore, a promising avenue to promote early recognition and treatment of preterm labour is a community-wide approach to intervention. This innovative approach
is primarily educational and focuses on increasing patient and caregiver awareness of preterm contractions and the importance of early intervention. According to Stewart and Nimrod, community-wide programs allow the community to focus on the underlying influences on individual health and behaviour, provide a mechanism for joint planning and enhance the effectiveness of the individual groups focused on the issue of preterm birth.

Research suggests that community-wide preterm birth prevention programs may be more effective at reducing the rates of preterm birth than programs that focus on high risk women. Programs aimed at high risk women may lead to a decrease in the rates of preterm birth among less than 20% of all women who experience preterm birth; community-wide programs, however, are geared toward the entire population who may potentially experience preterm labour. Therefore, community-wide programs may be more effective at decreasing rates of preterm birth in the community.

A few studies describe community-wide interventions that focus on education of pregnant women and health care professionals about the early detection and appropriate treatment of preterm labour. Meis et al. implemented a program in northwestern North Carolina which included: (1) risk assessment of all patients at the initial prenatal visit and again at 24 to 28 weeks; (2) education for all pregnant women about the signs and symptoms of preterm labour and what to do if experiencing these signs and symptoms; (3) education of all health care providers about the importance of immediate evaluation of all women who may be experiencing preterm labour; and (4) enhanced prenatal care for high risk women. There were 17,370 women enrolled in the project, which included 42.5% of all births in the region. The results of this study supported a reduction in low
birth weight (<2500 gm) and very low birth weight (<1500 gm) infants as a result of the intervention. Specifically, when study participants who received prenatal care from participating private practices were compared to patients at private practices who were not enrolled in the study, there was a significant decrease in the proportion of low birth weight infants (1.3% vs 0.88%; p = 0.012) and a very significant decrease in the proportion of very low birth weight infants (0.59% vs 0.21% p < 0.001). The authors conclude that the very significant reduction of low birth weight infants among patients seen in private clinics can be attributed to the prevention of idiopathic preterm labour.

In another attempt to prevent preterm birth among low risk women, Yawn and Yawn developed a program for use in small, rural communities. This program was primarily educational and focused on increasing patient awareness of the signs and symptoms of preterm labour. Over the study period, the rate of preterm birth decreased from 3.2% in the one-year control period to 1.3% in the two-year study period. The percentage of women who presented early enough to receive tocolysis increased from 51% to 98%, and those in preterm labour who delivered at term increased from 56% to 96%.

Anderson and Comerford Freda examined the effectiveness of patient education to reduce preterm deliveries among low risk patients in Bronx, New York. The study population consisted of 2326 patients, of whom 487 participated in a patient education program which consisted of a half hour combined videotape and nurse discussion session. The preterm delivery rate among patients who received the education was 9.5% compared with 11.5% among those who did not receive it. The difference in preterm delivery rate did not achieve statistical significance, but had low power to do so.
However, the babies born to women who received the patient education had a significantly higher birth weight (3255 ± 548 gm) than those of women who did not receive the education (3200 ± 599 gm; p = 0.03).

Overall, these studies of community-wide preterm birth prevention programs support a reduction in the rate of preterm births. However, there are limitations to these study results because the studies are either inadequately controlled or have low power.

Community-wide programs use a broad approach, combining several public health strategies and medical interventions into a collective treatment aimed at different aspects of the problem. A limited number of studies have examined two components of preterm birth prevention programs, namely the caregivers' practice regarding education of pregnant women and women's level of knowledge.

There is a lack of Canadian studies on the type of education health caregivers provide to pregnant women about preterm birth. However, in a recent descriptive study, Davies et al. found that most women in Ottawa, Ontario were not being educated by any health caregivers about the prevention of preterm birth. This study found that education materials for women about the prevention of preterm birth were available from less than 10% of family physicians, and only one third of family physicians routinely discussed the signs and symptoms of preterm labour with their patients before 20 weeks gestational age. This study demonstrated a need for multidisciplinary guidelines about the timing and type of information for women about risk reduction and early identification and treatment of preterm labour.
Studies on the independent contribution of the education of pregnant women have concluded that prenatal education about early warning signs of preterm labour is an important component of preterm birth prevention programs. The need to educate women about the prevention of preterm birth is highlighted by descriptive studies that examine women's knowledge and responses to preterm labour. For example, in Bronx, New York, half of the postpartum women surveyed did not know how many weeks constituted a normal gestation and one third did not know that babies born preterm could have health problems. More than 65% of 955 postpartum women surveyed in Ottawa, Ontario reported that they had received no information on preterm labour from their health caregiver and only 30% of the women could name two or more signs or symptoms of preterm labour. Thus, studies in the United States and Canada have yielded similar results; the level of knowledge of women about the signs and symptoms of preterm labour in the population needs to increase if early detection by women is to be improved. These studies also indicate that it is important to increase the perception among women of the universal risk of preterm labour since it is impossible to predict most cases.

Overall, a review of the literature indicates that there is little research about community-wide preterm birth prevention programs and their specific components. The research available suggests the level of knowledge about preterm birth is low and that there is a need for education of caregivers and pregnant women about the signs and symptoms of preterm labour and what to do if experiencing these symptoms. Furthermore, the limited research on community-wide prevention programs supports a decrease in the rates of preterm birth. The literature suggests that if all women can learn to recognize the signs and symptoms of preterm labour and present to the hospital early
enough to receive the appropriate administration of tocolytics and corticosteroids, there is a potential to increase the gestational age at birth of babies born to women who experience preterm labour and to decrease the morbidity associated with preterm birth.

### 2.3 Summary of Literature Review

Over the past decade, there has been little progress in decreasing the rates of preterm birth in North America despite multiple risk assessment and clinical prevention strategies. The literature review discussed prevention strategies such as increased antenatal care, increased social support, the use of tocolytics and corticosteroids, uterine activity monitoring and programs that focus on high-risk women. Despite intense implementation and evaluation, these programs have met with limited success in decreasing the rates of preterm birth.

Recently, researchers have focussed on community-wide preterm birth prevention programs as a potential strategy to decrease the rates of preterm birth by targeting all women who may experience preterm labour. Community-wide preterm birth prevention strategies are an evolving and innovative approach to the problem of preterm birth. The limited research which has been done in this area suggests, but does not demonstrate conclusively, that community-wide preterm birth prevention programs may be effective in reducing the rates of preterm birth.
3.0 Rationale

A promising avenue to promote the prevention of preterm birth is a community-wide approach to intervention. Such a program, *Reach, React, Respond* has been developed by the Perinatal Education Program of Eastern Ontario (PEPEO) and implemented in Kingston, Ontario in March 1998.

According to Stewart and Nimrod,\textsuperscript{53} an essential part of a community-wide program is a comprehensive community evaluation during planning, development and implementation phases. Research findings and epidemiologic analysis contribute to decisions about program development and implementation. Kingston was an ideal setting in which to implement and evaluate the effects of this community-wide intervention because it had not been previously contaminated by other such programs or pilot studies.

Since community-wide preterm birth prevention programs, such as *Reach, React, Respond* are relatively inexpensive and non-invasive and because of the high social and economic cost of preterm birth, even a small effect of a preterm birth educational program may have dramatic implications. However, there are few studies evaluating the effects of community-wide preterm birth prevention programs. Furthermore, the studies that have been conducted have been done in the United States and may not be generalizable to the Canadian health care setting. From a public health perspective, if this study finds that the program leads to change in knowledge and practices of women and their caregivers and that these changes lead to a decrease in preterm births, more effort would be justified to continue the implementation and funding of similar programs in other areas throughout Canada.
4.0 Description of Reach, React, Respond

The preterm birth prevention program *Reach, React, Respond* was developed by PEPEO with funding from Health Canada. The program has been implemented in Ottawa and Kingston, Ontario. In the Kingston region, implementation is a joint effort between the Kingston General Hospital (KGH) and the Kingston, Frontenac and Lennox & Addington (KFL&A) Health Unit.

The goal of the program is to ensure that all expecting mothers, their partners and all prenatal health care providers know the early signs and symptoms of preterm labour so they can respond appropriately. Specifically, the program aims to:

1) *increase the proportion of babies who reach 37 weeks gestation;*
2) *increase the proportion of babies who reach 32 weeks gestation; and*
3) *increase the proportion of babies born at less than 34 weeks who receive a complete course of antenatal steroids.***

This program uses a community-wide approach to intervention. The first step, *Reach*, promotes universal counselling of pregnant women and their partners about preterm labour and birth at the 18-20 week prenatal visit using a self-assessment questionnaire, an educational pamphlet called "Preterm Labour - It Might Happen to You" and a poster. The second step, *React*, is what the pregnant women and their partners are encouraged to do at the earliest sign of preterm labour - go to the hospital for assessment. The third step, *Respond*, is the part of the program designed for prenatal health care providers in private practices and at KGH. This step of the program provides clinicians with evidence-based guidelines for care including the use of corticosteroids and tocolytic drugs.
The implementation of *Reach, React, Respond* in Kingston occurred in March 1998. To *reach* women at 18-20 weeks gestational age, the program is dependent on the cooperation of caregivers to provide information. Therefore, implementation of the program consisted of visits by a public health nurse to prenatal caregivers in order to teach them about the program and emphasize the need to teach all women the signs and symptoms of preterm labour and the appropriate response. Each caregiver was provided with enough materials to be given to patients for about two years. Public Health Nurses and other community educators who teach Prenatal Classes to women at the gestational age 18 - 20 weeks also received in-service training and program materials. In-service sessions occurred for obstetricians at Fraser Armstrong and staff of the Fetal Assessment Unit, both at KGH, to present evidence based guidelines for the treatment of preterm labour.
5.0 Evaluation of Reach, React, Respond

This study is an evaluation of the Reach, React, Respond Preterm Birth Prevention Program. Figure 5.1 presents schematically the framework for the implementation and evaluation of the program. Each phase of the evaluation addresses a specific objective that relates to one of the steps of the program and last phase examines the overall outcome of interest.

PEPEO developed measures to evaluate the first three phases of the program although the student (principal) investigator designed and carried out the evaluation. These measures were used to evaluate knowledge and practice change among caregivers (Phase I), knowledge change among postpartum women (Phase II), and the change in the use of antenatal steroids in infants born preterm (Phase III). Phase IV was the evaluation of long term outcomes, that is, the effect of the program on gestational age of infants born of mothers who experience preterm labour. This phase examined whether or not the program was successful in meeting its first two aims (page 18), and was the independent contribution of the student investigator.

<table>
<thead>
<tr>
<th>Program Steps</th>
<th>Program Description</th>
<th>Evaluation Phases</th>
<th>Evaluation Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implement</td>
<td>Academic detailing of caregivers</td>
<td>Phase I&lt;br&gt;Survey of Caregivers</td>
<td>Describe change in caregivers' practice</td>
</tr>
<tr>
<td>Reach</td>
<td>Universal counselling of pregnant women re: signs and symptoms of preterm labour</td>
<td>Phase II&lt;br&gt;Survey of Postpartum Women</td>
<td>Describe change in women's knowledge</td>
</tr>
<tr>
<td>React</td>
<td>Presentation at hospital for assessment at earliest signs of preterm labour</td>
<td>Phase III&lt;br&gt;Chart Review of Drug Administration</td>
<td>Describe change in antenatal use of steroids and tocolytics</td>
</tr>
<tr>
<td>Respond</td>
<td>Appropriate administration of tocolytic and steroid drugs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcome</td>
<td>Increase in gestational age of babies born to women with preterm labour</td>
<td>Phase IV&lt;br&gt;Outcome Evaluation</td>
<td>Determine change in gestational age</td>
</tr>
</tbody>
</table>
5.1 Objectives of the Study

The four phases of the evaluation were conducted to address the following four objectives:

I. To describe the change in prenatal health care providers' routine practice in regards to educating women about preterm labour before and after program implementation.

II. To describe the change in women's knowledge about preterm labour before and after program implementation.

III. To describe the changes in the use of antenatal steroids among preterm babies before and after program implementation.

IV. To determine whether the Reach, React, Respond program results in increased gestational age at birth of infants born to women who experience preterm labour.
6.0 Phase I: Survey of Health Care Providers

6.1 Design

A pre- and post-program implementation (PI) survey of all physicians and midwives who provide prenatal care at 18 - 20 weeks gestational age in Kingston was conducted to describe the change in caregivers' routine practice in regards to educating women about preterm labour.

6.2 Study Population

The study population included all physicians and midwives who practice in the city of Kingston and surrounding area and who provide prenatal care to patients at 18 - 20 weeks gestational age. The list of physicians and midwives was compiled from the list of the College of Physicians and Surgeons of Ontario, the KFL&A physician newsletter mailing list, and the phone book. Before the implementation of the survey, all caregivers were contacted in order to determine if they practiced prenatal care at 18 - 20 weeks gestational age.

6.3 Measures and Methods of Data Collection

The Preterm Birth Prevention Group (a branch of PEPEO) designed the questionnaire (Appendix A) based on the experience of various clinicians and a review of the literature. The questionnaire items investigate: a) the availability of client education materials about preterm labour; b) the nature of caregivers' discussion of preterm labour with their patients; c) caregivers' practice treating women with signs and symptoms of preterm labour and d) demographic characteristics of the caregivers. The post-PI
questionnaire (Appendix B) also asked the caregivers specifically if they were aware of and used the *Reach, React, Respond* program materials. Content validity was assessed with a group of experts from nursing, obstetrics, family medicine and public health. Test-retest reliability was also checked by a group of health care providers and questions with less than 90% reliability were modified.

A mail survey was conducted before the program was implemented (February 1998) using a modified Dillman method. On February 7, 1998, pre-PI questionnaires were sent by mail or internal courier to caregivers who practice prenatal care at 18 – 20 weeks gestational age. A cover letter from Dr. Ian Gemmill (Medical Officer of Health, KFL&A Health Unit), Pam Carr (Manager, KFL&A Health Unit) and Dr. Greg Davies (Obstetrician, Department of Maternal Fetal Medicine, Kingston General Hospital) was sent with the questionnaire (Appendix C). The letter described the reason for the survey, gave instructions as to how to complete the questionnaire and assured confidentiality. All participants were asked to respond within a week. A reminder letter was sent to all caregivers on February 11, 1998. A replacement questionnaire and another letter were sent on February 18, 1998 to caregivers who had not yet responded. A final letter with a replacement questionnaire was sent to the caregivers who had not yet returned it on February 25, 1998.

A post-PI survey was conducted in February 1999 using the same administration method as the pre-PI survey.

A Public Health Nurse at the KFL&A Health Unit independently conducted a brief telephone survey in November 1998 in order to determine whether or not caregivers
received and used program materials, and if they found the materials useful. These data were available for this research.

6.4 Data Storage, Entry, and Cleaning

Questionnaires were labeled with unique identifiers and stored in a locked storage cabinet. The principal investigator was the only person with access to the questionnaires. The master list linking the names and unique identifiers was kept in a separate locked filing cabinet. Unique identifiers were used on all computer files and the principal investigator controlled access to the computer.

All responses to the questionnaire were coded and entered into a Microsoft Excel spreadsheet. Data from the surveys were manually checked against the spreadsheet data for discrepancies. An error rate was calculated by dividing the number of errors by the total number of data items entered. There was a low error rate of 0.5% and all errors were corrected.

6.5 Data Analysis

The first stage of analysis was to examine the data for accuracy, consistency and completeness. Response rates and missing data were reported for the responses of caregivers.

Demographic data were analyzed using a Microsoft Excel 97 spreadsheet to describe the sample and to ensure comparability of the caregivers who responded to both surveys with the caregivers who responded to only one of the surveys. A predefined statistical function in Microsoft Excel 97 was used to calculate chi-square p-values.
In order to address Objective I, a paired analysis of the data was conducted using only the sample of the study population who had returned both the pre- and post-PI questionnaires. Frequency distributions, cross-tabulations and group comparisons of the data from the surveys were performed. Figure 6.1 indicates the outcome variables of interest in Phase I. In the main analysis, McNemar's test for difference between samples was performed to test for differences between pre- and post-intervention responses for dichotomous categorical variables. If the variable under study had three or more categories, the Wilcoxon signed ranks test was performed. When there were no responses in a category, the category was not included in the analysis.

Caregivers used a five category Lickert scale (1 = strongly disagree and 5 = strongly agree) to describe to what extent they agreed or disagreed with the importance of discussing various symptoms of preterm labour with their patients (Appendix A, Question 7). The caregivers were questioned about eight different symptoms and the possible scores ranged from 8 to 40 with 40 being the ideal score. A similar scale was used to determine to what extent the caregivers agreed or disagreed with six types of advice for a woman who telephone the caregivers' office because she thinks that she is in preterm labour (Appendix A, Question 8). According to the values on the Lickert scale (one to five) each type of advice was given a score of one for a correct response, negative one for incorrect responses or zero for neither correct nor incorrect responses. Paired sample t-tests were used to analyze these data. Qualitative responses to an open-ended question in the pre-PI survey were grouped into themes and summarized.
6.6 Results

6.6.1 Response rates

There were 139 pre-PI surveys mailed to potential respondents in February 1998. Surveys of seven caregivers at a particular family practice were excluded from the study as the group practice refused to participate in the program or the study. Surveys of five respondents were returned because the professionals had relocated to another area. It was found that 20 respondents did not have prenatal patients. Therefore, 107 caregivers saw prenatal patients at 18 - 20 weeks and were eligible to participate in the survey. The response rate for the pre-PI survey was 83% (89/107).

There were 107 post program implementation surveys mailed to potential respondents in February 1999. The overall response rate was 73% (78/107) (Table 6.1).

<table>
<thead>
<tr>
<th>Survey</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 107</td>
</tr>
<tr>
<td></td>
<td>n (% )</td>
</tr>
<tr>
<td>Pre-PI</td>
<td>89 (83)</td>
</tr>
<tr>
<td>Post-PI</td>
<td>78 (73)</td>
</tr>
<tr>
<td>Telephone*</td>
<td>22 (21)</td>
</tr>
<tr>
<td>Any post-PI follow-up</td>
<td>100 (93)</td>
</tr>
<tr>
<td>Pre and post follow-up</td>
<td>66 (62)</td>
</tr>
</tbody>
</table>

*Non-respondents to post-PI survey
In order to evaluate caregiver use of the program materials after the program was implemented, caregivers were also telephoned. There was an 83% (89/107) response rate to the telephone survey. Twenty-two caregivers who did not respond to the post-PI mail survey did respond to the telephone survey. Therefore, 93% (100/107) of the eligible participants were contacted through either the telephone survey or the mail survey following the program implementation (Table 6.1).

6.6.2 Demographic characteristics of respondents

Responses were received from all categories of prenatal care providers (Table 6.2). The demographic data of caregivers who responded to both surveys was compared to caregivers who responded only to the pre-PI survey and caregivers who responded only to the post-PI survey. There were no significant differences with respect to gender (p = 0.94), number of years completed basic training (p = 0.88) and type of provider (p = 0.77).

Among the caregivers who participated in both surveys, there were 48% (32/66) males and 52% (34/66) females. The majority of caregivers were family doctors (83%, 55/66). There were 6 obstetricians and 5 midwives. Approximately half (45%, 25/55) of the family doctors had been practicing for more than 10 years. The majority of obstetricians had also been practicing for more than 10 years (66%, 4/6). Among the midwives, 60% (3/5) had been practicing for 6 - 10 years. All family doctors and obstetricians worked at the Kingston General Hospital, a teaching hospital with approximately 2 000 births each year. According to their own estimates of how many births these caregivers deliver each year, the sample in this study account for more than 93% (1 871/2 000) of the births in the Kingston General Hospital.
### Table 6.2 Demographic Characteristics of Caregivers Surveyed in Phase I

<table>
<thead>
<tr>
<th></th>
<th>Family Physician</th>
<th>Obstetrician</th>
<th>Midwife</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 76</td>
<td>n = 8</td>
<td>n = 5</td>
<td>n = 89</td>
</tr>
<tr>
<td>Gender</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Male</td>
<td>36 (47)</td>
<td>6 (75)</td>
<td>0 (0)</td>
<td>42 (47)</td>
</tr>
<tr>
<td>Female</td>
<td>40 (53)</td>
<td>2 (25)</td>
<td>5 (100)</td>
<td>47 (53)</td>
</tr>
<tr>
<td>Years completed basic programming</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>3 (4)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>3 (3)</td>
</tr>
<tr>
<td>1 – 5</td>
<td>11 (15)</td>
<td>3 (25)</td>
<td>2 (40)</td>
<td>16 (18)</td>
</tr>
<tr>
<td>6 – 10</td>
<td>23 (30)</td>
<td>0 (13)</td>
<td>3 (60)</td>
<td>26 (30)</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>39 (51)</td>
<td>5 (62)</td>
<td>0 (0)</td>
<td>44 (49)</td>
</tr>
<tr>
<td></td>
<td>n = 67</td>
<td>n = 6</td>
<td>n = 5</td>
<td>n = 78</td>
</tr>
<tr>
<td>Gender</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Male</td>
<td>34 (50)</td>
<td>5 (83)</td>
<td>0 (0)</td>
<td>39 (50)</td>
</tr>
<tr>
<td>Female</td>
<td>33 (50)</td>
<td>1 (17)</td>
<td>5 (100)</td>
<td>39 (50)</td>
</tr>
<tr>
<td>Years completed basic programming</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>2 (3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (3)</td>
</tr>
<tr>
<td>1 – 5</td>
<td>8 (12)</td>
<td>2 (34)</td>
<td>2 (40)</td>
<td>12 (16)</td>
</tr>
<tr>
<td>6 – 10</td>
<td>23 (35)</td>
<td>0 (0)</td>
<td>3 (60)</td>
<td>26 (33)</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>34 (50)</td>
<td>4 (66)</td>
<td>0 (0)</td>
<td>38 (48)</td>
</tr>
<tr>
<td></td>
<td>n = 55</td>
<td>n = 6</td>
<td>n = 5</td>
<td>n = 66</td>
</tr>
<tr>
<td>Gender</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Male</td>
<td>28 (51)</td>
<td>5 (83)</td>
<td>0 (0)</td>
<td>32 (48)</td>
</tr>
<tr>
<td>Female</td>
<td>27 (49)</td>
<td>1 (17)</td>
<td>5 (100)</td>
<td>34 (52)</td>
</tr>
<tr>
<td>Years completed basic programming</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>2 (4)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (3)</td>
</tr>
<tr>
<td>1 – 5</td>
<td>7 (13)</td>
<td>2 (34)</td>
<td>2 (40)</td>
<td>11 (16)</td>
</tr>
<tr>
<td>6 – 10</td>
<td>21 (38)</td>
<td>0 (0)</td>
<td>3 (60)</td>
<td>24 (37)</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>25 (45)</td>
<td>4 (66)</td>
<td>0 (0)</td>
<td>29 (44)</td>
</tr>
</tbody>
</table>

### 6.6.3 Caregivers' practices before program implementation

Before program implementation, education materials about the prevention of preterm birth were available for patients of 18% (16/89) of caregivers; 8 caregivers did not respond to this question. Only 11% (9/76) of family physicians had program materials; whereas, 38% (3/8) of the obstetricians and 80% (4/5) of midwives had materials. It was reported that 38% (33/89) of caregivers discussed the signs and
symptoms of preterm labour with all prenatal clients. Thirty-one percent (28/89) of caregivers discussed preterm labour with only those patients at high risk of preterm labour and 31% (28/89) did not discuss this issue with any patients (Table 6.3).

Among the 68% (61/89) of caregivers who discussed the signs and symptoms of preterm labour with patients, 36% (22/61) first discussed these before 20 weeks gestational age.

<table>
<thead>
<tr>
<th>Table 6.3 Caregiver Practice Before Program Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Patients education material available</td>
</tr>
<tr>
<td><strong>Family Physicians</strong></td>
</tr>
<tr>
<td>n = 76</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>No response</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discuss signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Physicians</strong></td>
</tr>
<tr>
<td>n = 76</td>
</tr>
<tr>
<td>All</td>
</tr>
<tr>
<td>High risk</td>
</tr>
<tr>
<td>Not usually done</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First discuss signs and symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family Physicians</strong></td>
</tr>
<tr>
<td>n = 49</td>
</tr>
<tr>
<td>&lt; 20 weeks g.a.</td>
</tr>
<tr>
<td>20–26 weeks g.a.</td>
</tr>
<tr>
<td>27–30 weeks g.a.</td>
</tr>
<tr>
<td>&gt; 30 weeks g.a.</td>
</tr>
</tbody>
</table>

Caregivers were asked to comment about preterm birth prevention in their practice. Comments on the questionnaire indicated that many caregivers were not aware of the frequency of idiopathic preterm birth. Many commented that they “only see patients to a maximum of 28 weeks and then refer to an obstetrician; therefore, they do not deal with the issue of preterm labour.” One caregiver did not think that it was necessary to discuss preterm labour with all clients: “...as it [preterm labour] is not all that common, I do not think discussing it early in pregnancy is useful.” Another caregiver who had been practicing for less than 1 year commented that “the SOGC [Society of Obstetricians and Gynecologists of Canada] guidelines... don’t recommend treatment or
counselling unless symptomatic.” A number of caregivers requested reliable information and patient materials.

6.6.4 Caregivers’ practices after program implementation

According to responses in the post-PI survey and the telephone survey (Table 6.4), client education materials about the prevention of preterm birth were available in the practices of 70% (70/100) of caregivers following the program implementation. The data from the post-PI survey indicated that 60% (42/78) of caregivers discussed the signs and symptoms of preterm labour with all prenatal clients. Twenty percent (14/78) of caregivers discussed preterm labour with only those patients at high risk for preterm labour and 20% (14/78) did not discuss this issue with any patients.

Among the 80% of caregivers who discussed the signs and symptoms of preterm labour with patients, 64% (36/56) first discussed this issue before 20 weeks gestational age.

<table>
<thead>
<tr>
<th>Table 6.4 Caregiver Practice After Program Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Telephone and Post-PI survey</strong></td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>Patient education material available</td>
</tr>
<tr>
<td>No education material available</td>
</tr>
<tr>
<td><strong>Post-PI survey only</strong></td>
</tr>
<tr>
<td>Discuss signs and symptoms</td>
</tr>
<tr>
<td>With all</td>
</tr>
<tr>
<td>With high risk</td>
</tr>
<tr>
<td>Not usually done</td>
</tr>
<tr>
<td>First discussed signs and symptoms</td>
</tr>
<tr>
<td>&lt; 20 weeks</td>
</tr>
<tr>
<td>20 – 26 weeks</td>
</tr>
<tr>
<td>27 – 30 weeks</td>
</tr>
<tr>
<td>&gt; 30 weeks</td>
</tr>
</tbody>
</table>

* 8 item non-response
6.6.5 Change in caregivers' practices

As indicated in Table 6.5, there was a significant difference in prenatal caregivers' practice following the program implementation. Among caregivers who responded to both the pre- and post-PI survey, there was a very significant difference in the number of caregivers who had patient education materials available for their patients ($p < 0.001$). There were also significantly more caregivers who discussed signs and symptoms of preterm labour with their prenatal patients ($p = 0.003$), and who discussed preterm labour before 20 weeks gestation ($p = 0.005$). When the responses were dichotomized to caregivers who discussed the signs and symptoms with all patients as the program had recommended and those who did not discuss signs and symptoms with all patients, there was a very significant difference with $p = 0.007$. Similarly, when caregivers who discussed preterm labour with their patients before 20 weeks gestational age were compared to those who discussed signs and symptoms at 20 weeks gestational age or more, there was a very significant difference with $p = 0.003$.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre</th>
<th>Post</th>
<th>Paired Analysis</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient education materials available</td>
<td>12 (18)</td>
<td>43 (65)</td>
<td></td>
<td>$&lt; 0.001$</td>
</tr>
<tr>
<td>No education materials available</td>
<td>54 (82)</td>
<td>23 (35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discuss signs and symptoms*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With all</td>
<td>23 (36)</td>
<td>38 (60)</td>
<td></td>
<td>0.003</td>
</tr>
<tr>
<td>With high risk</td>
<td>19 (29)</td>
<td>12 (19)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not usually</td>
<td>21 (32)</td>
<td>13 (21)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When first discussed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$&lt; 20$ weeks</td>
<td>14 (22)</td>
<td>33 (50)</td>
<td></td>
<td>0.005</td>
</tr>
<tr>
<td>20 to 26 weeks</td>
<td>19 (29)</td>
<td>15 (23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 to 30 weeks</td>
<td>12 (19)</td>
<td>5 (8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$&gt;31$ weeks</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not discussed</td>
<td>21 (30)</td>
<td>13 (19)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 3 item non-responses; $n=63$
There was no significant difference in the extent to which caregivers agreed or disagreed with the importance of discussing various symptoms of preterm labour before or after the program implementation ($p = 0.948$). In both the pre- and post-PI surveys, caregivers strongly agreed that most of the symptoms were very important to discuss (mean score = 30.4/40 for both groups). There was a significant difference in the extent to which caregivers agreed or disagreed with advice given to a woman who telephones the office because she thinks she is experiencing preterm labour ($p = 0.006$). Following the program implementation, 53% (30/57) of caregivers strongly agreed that the woman should be told to go to the hospital compared to 26% (15/57) before program implementation (Table 6.6).

**Table 6.6 Change in the Extent to which Caregivers Agree or Disagree with Symptoms to be Discussed and Advice to be Given to Women about Preterm Labour**

<table>
<thead>
<tr>
<th></th>
<th>Pre Mean (Std. Dev.)</th>
<th>Post Mean (Std. Dev.)</th>
<th>Paired sample p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what extent do caregivers think it is important to discuss various symptoms of preterm labour*</td>
<td>30.45 (6.28)</td>
<td>30.40 (5.65)</td>
<td>0.948</td>
</tr>
<tr>
<td>To what extent do caregivers think that various advice should be given†</td>
<td>2.49 (2.32)</td>
<td>3.47 (2.04)</td>
<td>0.006</td>
</tr>
</tbody>
</table>

*Twenty-six item non-responses; $n = 40$
†Nine item non-responses; $n = 57$
7.0 Phase II: Survey of Postpartum Women

7.1 Design

A pre- and post-program implementation (PI) survey was conducted among women during their postpartum stay at KGH to describe the change in women's knowledge about preterm labour.

7.2 Study Population

The study population included all women who had a live birth over a three week period in February 1998 (pre-PI) and all women who had a live birth over a four week period in February 1999 (post-PI).

7.3 Measures and Methods of Data Collection

The questionnaire (Appendix D) was designed by the Preterm Birth Prevention Group, based on a review of the literature and the experience of various clinicians. The questionnaire asked about: a) general knowledge about preterm labour; b) where women received their information; c) their experience with signs and symptoms of preterm labour and d) demographic information. The post-PI questionnaire was modified slightly to ask the women the names of the caregivers who provided their prenatal care. The questionnaire was assessed for test-retest reliability and questions that were not 90% reliable were modified or deleted. The same group of experts who assessed the questionnaire for caregivers assessed this questionnaire for content validity.

A trained interviewer visited the Kingston General Hospital every day before the implementation of the program in February 1998 and used a logbook of all obstetric
patients to identify the women who gave birth during the study period. All postpartum women were invited to participate in the study; the women who agreed were asked to sign a consent form (Appendix E) and were then interviewed. Similarly, a second trained interviewer visited the Kingston General Hospital daily after the program implementation in February 1999. Women were identified and interviewed in the same manner. It should be noted that two different interviewers conducted the pre- and post-PI surveys.

7.4 Data Storage, Entry, and Cleaning

All surveys were coded and stored in a locked storage cabinet. All signed consent forms were stored separately in a locked filing cabinet. The names of the study participants and the consent forms were not linked to the questionnaires. The principal investigator was the only person with access to the questionnaires and the consent forms. Numerical identifiers on the questionnaires were used on all computer files and the principal investigator controlled access to the computer.

All responses to the questionnaires were entered into a Filemaker Pro 3.0 database. Every tenth questionnaire was re-entered into the database program and cross checked against the original database for discrepancies. An acceptable error rate of 0.43% was found by dividing the number of errors by the total number of data items entered. All errors found were corrected.
7.5 Data Analysis

The first stage of analysis was to examine the data for accuracy, consistency and completeness. A response rate for the post-PI group was calculated and missing data were reported for the responses of both groups. It was not possible to report a response rate for the pre-PI group, because the total number of women approached for the initial survey was unknown. Demographic data were analyzed to describe the pre- and post-PI groups and to ensure their comparability.

Frequency distributions, cross-tabulations and group comparisons of the data from the questionnaires were used to address Objective II using the Filemaker Pro 3.0 database program. Figure 7.1 indicates the outcome variables of interest. Since all variables were categorical, chi-squared analysis or Fisher's exact tests (if one or more cells had an expected value of less than five or if the total value of all cells was less than 20) were used to analyze the data. Chi-square statistics and p-values were calculated using a specifically designed Microsoft Excel 97 spreadsheet and Fisher's exact tests were performed using EPI Info. For non-dichotomous variables, categories were collapsed if more than 20% of the cells had an expected value of less than five. Qualitative data for the questionnaire items where there was an "other" category were grouped into themes and summarized.

Figure 7.1 Outcomes for Phase II Analysis

| Whether or not the woman was taught the signs and symptoms of preterm labour |
| Who taught the woman the signs and symptoms of preterm labour |
| Knowledge of signs and symptoms of preterm labour |
| Knowledge of what to do if experiencing signs and symptoms of preterm labour |
7.6 Results

7.6.1 Response rates

The study population included women who had a live birth over a three week period in February 1998 (pre-PI) and women who had a live birth over a four week period in February 1999 (post-PI). The pre-PI survey had 102 participants; the response rate is unknown. There were 99 participants in the post-PI survey with a response rate of 97% (100/103). One woman who attempted to complete the survey was excluded from the study because of a language barrier.

7.6.2 Demographic characteristics of postpartum women

Demographic data are presented in Table 7.1 for the women in both groups who participated in the study. There were no significant differences between the women in the pre- and post-PI groups.

7.6.3 Knowledge of the signs and symptoms of preterm labour and birth

Only 45% (46/102) of women in the pre-PI group knew that "preterm" meant that the baby was born before 37 weeks gestation. In the post-PI group, 65% (63/99) knew the meaning of "preterm." As indicated in Table 7.2, 30% (30/99) of women in the post-PI group were able to name four or more signs of preterm labour compared to 12% (12/102) of women in the pre-PI group.
Of the pre-PI group, 43% (44/102) were worried about experiencing preterm labour and birth, while in the post-PI group 22% (22/99) were worried about preterm labour and birth. Reasons for worrying about preterm labour and birth varied and are presented in Table 7.3. Only 2% (1/44) of the pre-PI group and 18% (4/22) of the post-PI group commented that preterm labour could potentially happen to anyone.

Table 7.1 Demographic Characteristics of Postpartum Women Surveyed in Phase II

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Pre n = 102</th>
<th>Post n = 99</th>
<th>Chi-square p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>Type of Birth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>89 (86)</td>
<td>93 (94)</td>
<td>0.113</td>
</tr>
<tr>
<td>Preterm</td>
<td>13 (14)</td>
<td>6 (6)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 19</td>
<td>12 (12)</td>
<td>9 (9)</td>
<td>0.460</td>
</tr>
<tr>
<td>20-29</td>
<td>53 (52)</td>
<td>61 (62)</td>
<td></td>
</tr>
<tr>
<td>30-34</td>
<td>30 (29)</td>
<td>21 (21)</td>
<td></td>
</tr>
<tr>
<td>35+</td>
<td>7 (7)</td>
<td>8 (8)</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primipara</td>
<td>52 (51)</td>
<td>41 (41)</td>
<td>0.174</td>
</tr>
<tr>
<td>Multipara</td>
<td>50 (49)</td>
<td>58 (59)</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>12 (12)</td>
<td>13 (13)</td>
<td>0.101</td>
</tr>
<tr>
<td>Married</td>
<td>73 (71)</td>
<td>58 (59)</td>
<td></td>
</tr>
<tr>
<td>Common-law</td>
<td>17 (17)</td>
<td>25 (25)</td>
<td></td>
</tr>
<tr>
<td>Separated/Divorced</td>
<td>0 (0)</td>
<td>3 (3)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; high school</td>
<td>16 (16)</td>
<td>11 (11)</td>
<td>0.204</td>
</tr>
<tr>
<td>high school</td>
<td>22 (22)</td>
<td>18 (18)</td>
<td></td>
</tr>
<tr>
<td>some post secondary</td>
<td>17 (17)</td>
<td>10 (10)</td>
<td></td>
</tr>
<tr>
<td>post secondary</td>
<td>47 (45)</td>
<td>60 (61)</td>
<td></td>
</tr>
</tbody>
</table>

37
Table 7.2 Women’s Knowledge of Signs and Symptoms of Preterm Labour Before and After Program Implementation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Pre n = 102</th>
<th>Post n = 99</th>
<th>Chi-square p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>Preterm labour occurs before</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 weeks g.a.</td>
<td>37 (36)</td>
<td>14 (14)</td>
<td>0.003</td>
</tr>
<tr>
<td>37 weeks g.a.</td>
<td>46 (45)</td>
<td>63 (64)</td>
<td></td>
</tr>
<tr>
<td>28 weeks g.a.</td>
<td>5 (5)</td>
<td>8 (8)</td>
<td></td>
</tr>
<tr>
<td>unsure</td>
<td>14 (14)</td>
<td>14 (14)</td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 or more symptoms</td>
<td>12 (12)</td>
<td>30 (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Less than 4 symptoms</td>
<td>90 (88)</td>
<td>69 (70)</td>
<td></td>
</tr>
<tr>
<td>Worried about preterm labour</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>44 (43)</td>
<td>22 (22)</td>
<td>0.002</td>
</tr>
<tr>
<td>No</td>
<td>58 (57)</td>
<td>77 (78)</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.3 Women’s Reported Reasons for Feeling At Risk for having a Preterm Birth

<table>
<thead>
<tr>
<th>Reason</th>
<th>Pre n = 44</th>
<th>Post n = 22</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Medical complications before or during pregnancy</td>
<td>5 (12)</td>
<td>9 (41)</td>
</tr>
<tr>
<td>Tests indicating that there could be a problem</td>
<td>10 (23)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Prior preterm infant</td>
<td>7 (16)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Age or lifestyle factors</td>
<td>6 (14)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Family history of preterm birth</td>
<td>3 (7)</td>
<td>3 (14)</td>
</tr>
<tr>
<td>Multiple gestation</td>
<td>1 (2)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>Other (in mother’s own words)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tendency to over-react (worrier)</td>
<td>5 (12)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Physical discomfort</td>
<td>5 (12)</td>
<td>2 (9)</td>
</tr>
<tr>
<td>Unsure</td>
<td>1 (2)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Preterm labour could potentially happen to anyone</td>
<td>1 (2)</td>
<td>4 (18)</td>
</tr>
</tbody>
</table>

7.6.4 Discussion of preterm labour during prenatal care

Most women started prenatal care at less than 13 weeks gestation (89%, 91/102 of the pre-PI group and 93%, 92/99 of the post-PI group). There was a significant difference between type of caregiver in the pre- and post-PI groups. Table 7.4 illustrates that women in the pre-PI group were more likely to visit an obstetrician for prenatal care than a family doctor or than a family doctor and an obstetrician.
Table 7.4 Types of Prenatal Care of Women Surveyed in Phase II

<table>
<thead>
<tr>
<th>Type of Caregiver</th>
<th>Pre n = 102 n (%)</th>
<th>Post n = 99 n (%)</th>
<th>Chi-square p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Doctor</td>
<td>38 (38)</td>
<td>49 (50)</td>
<td>0.019</td>
</tr>
<tr>
<td>Obstetrician</td>
<td>20 (20)</td>
<td>6 (6)</td>
<td></td>
</tr>
<tr>
<td>Midwife</td>
<td>3 (3)</td>
<td>1 (1)</td>
<td></td>
</tr>
<tr>
<td>Doctor &amp; Obstetrician</td>
<td>41 (40)</td>
<td>43 (43)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gestational age at first prenatal appointment</th>
<th>Pre n = 102 n (%)</th>
<th>Post n = 99 n (%)</th>
<th>Chi-square p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;13 weeks</td>
<td>91 (89)</td>
<td>92 (93)</td>
<td>0.510</td>
</tr>
<tr>
<td>14 - 17 weeks</td>
<td>9 (9)</td>
<td>4 (4)</td>
<td></td>
</tr>
<tr>
<td>18 - 21 weeks</td>
<td>2 (2)</td>
<td>2 (2)</td>
<td></td>
</tr>
<tr>
<td>22 + weeks</td>
<td>0 (0)</td>
<td>1 (1)</td>
<td></td>
</tr>
</tbody>
</table>

Significantly more women in the post-PI group (44%, 42/96) reported that their caregiver discussed the signs and symptoms of preterm labour than the pre-PI group (28%, 28/99). There were three women in both groups who could not recall if their caregiver had discussed this issue. Among the women who were taught the signs and symptoms of preterm labour, 45% (10/22) of the pre-PI women and 79% (30/38) of the post-PI women were taught this information before 22 weeks gestation (p = 0.009). Six women in the pre-PI group and 4 women in the post-PI group who were taught the signs and symptoms of preterm labour did not answer this question and were not included in the analysis. Among the two groups of women who were taught the signs and symptoms, there were no differences in who gave the women the information, whether the women were told what to do if experiencing signs and symptoms of preterm labour and whether the information met the patients needs. Table 7.5 summarizes the nature of the caregivers’ discussion of the signs and symptoms of preterm labour.
### Table 7.5 Caregivers' Discussion of Preterm Labour Before and After Program Implementation

<table>
<thead>
<tr>
<th></th>
<th>Pre n = 99*</th>
<th>Post n = 96*</th>
<th>Chi-square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caregiver taught patient signs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and symptoms of preterm labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>28 (28)</td>
<td>42 (44)</td>
<td>0.024</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>71 (72)</td>
<td>54 (56)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients who were taught signs</td>
<td>n = 28</td>
<td>n = 42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and symptoms of preterm labour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When caregiver taught</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 13 weeks</td>
<td>2 (7)</td>
<td>21 (50)</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>14 - 17 weeks</td>
<td>3 (11)</td>
<td>7 (17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 - 21 weeks</td>
<td>5 (18)</td>
<td>2 (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 - 25 weeks</td>
<td>3 (11)</td>
<td>5 (11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>more than 25 weeks</td>
<td>9 (32)</td>
<td>3 (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>can't recall (not in analysis)</td>
<td>6 (21)</td>
<td>4 (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Who gave information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own Provider</td>
<td>28 (100)</td>
<td>40 (95)</td>
<td>0.357†</td>
<td></td>
</tr>
<tr>
<td>Nurse/Receptionist</td>
<td>0 (0)</td>
<td>2 (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient given literature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15 (54)</td>
<td>28 (67)</td>
<td>0.215</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>13 (46)</td>
<td>14 (33)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient told what to do if</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>experiencing signs and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>symptoms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>27 (96)</td>
<td>35 (83)</td>
<td>0.135</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1 (4)</td>
<td>7 (17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information met patients needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24 (86)</td>
<td>39 (93)</td>
<td>0.329</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>4 (14)</td>
<td>3 (7)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 3 respondents do not recall if caregiver discussed preterm labour: not included in analysis
† Fischer's exact p-value

#### 7.6.5 Discussion of preterm birth during prenatal classes

There was no significant difference between the two groups (p = 0.54) in the number of women who participated in prenatal classes. Among the 32% (33/102) of pre-PI women and 35% (35/99) of post-PI group who attended prenatal classes, there was no significant difference in the number of women who recalled instruction about the signs and symptoms of preterm labour and what to do if it occurred. There was also no
significant difference between the two groups as to whether or not they received written information and if the information met the women's needs (Table 7.6).

| Table 7.6 Discussion of Preterm Labour in Prenatal Classes Before and After Program Implementation |
|-------------------------------------------------|----------|----------|----------------|
| Attended Classes                                | Pre      | Post     | Chi-square    |
|                                                 | n = 102  | n = 99   | p-value       |
| Yes                                             | 33 (32)  | 35 (35)  | 0.549         |
| No                                              | 69 (68)  | 64 (65)  |              |
| Among women who attended prenatal classes        | n = 33   | n = 35   |              |
| Learn signs & symptoms of preterm labour         |          |          |              |
| Yes                                             | 27 (82)  | 32 (91)  | 0.373         |
| No                                              | 6 (18)   | 3 (9)    |              |
| "Can't Recall"                                  | 1 (3)    | 0 (0)    |              |
| Received written information                     |          |          |              |
| Yes                                             | 26 (79)  | 29 (83)  | 0.944         |
| No                                              | 5 (15)   | 6 (17)   |              |
| "Can't Recall"                                  | 1 (3)    | 0 (0)    |              |
| Told what to do if experiencing signs and symptoms|        |          |              |
| Yes                                             | 25 (76)  | 32 (91)  | 0.127         |
| No                                              | 7 (21)   | 3 (9)    |              |
| "Can't Recall"                                  | 1 (3)    | 0 (0)    |              |
| Information met needs                           |          |          |              |
| Yes                                             | 23 (70)  | 31 (89)  | 0.120         |
| No                                              | 9 (27)   | 4 (11)   |              |
| "Can't Recall"                                  | 1 (3)    | 0 (0)    |              |

7.6.6 Experiences with signs and symptoms of preterm labour

As reported in Table 7.1, among the pre-PI group, 86% (89/102) of the births were term and 14% (13/102) of the births were preterm. In the post-PI group, 94% (93/99) of the births were term and 6% (6/99) of the births were preterm. Among the term births, 24% (21/89) of the pre-PI group and 19% (18/93) of the post-PI group reported that they experienced signs and symptoms of preterm labour. There was no significant difference between the pre-PI group and the post-PI group in terms of the woman's
actions when she experienced the signs and symptoms of preterm labour (Table 7.7).

Among the pre-PI group 71% (24/34) contacted a health caregiver immediately. Similar results were found among the post-PI women where 75% (18/24) of women reported contacting a caregiver right away.

Approximately half of the women who contacted a caregiver immediately (12/24 in the pre-PI group and 11/18 in the post-PI group) contacted their caregivers' office. The remaining women went straight to the hospital. Among the women who contacted their caregivers' office, all women spoke with the caregiver, were told to go to the caregivers' office or were told to go to the hospital. All of the women who did not contact their caregiver immediately (29%, 10/34 in the pre-PI group and 25%, 6/24 in the post-PI group) called their caregivers within forty-eight hours (Table 7.7).

<table>
<thead>
<tr>
<th>Women's action</th>
<th>Pre n=34</th>
<th>Post n=24</th>
<th>Chi square p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacted caregiver immediately</td>
<td>24 (71)</td>
<td>18 (75)</td>
<td>0.711</td>
</tr>
<tr>
<td>Did not contact immediately</td>
<td>10 (29)</td>
<td>6 (25)</td>
<td></td>
</tr>
</tbody>
</table>

Among the women who contacted caregiver immediately:

<table>
<thead>
<tr>
<th>Women's action</th>
<th>Pre n=24</th>
<th>Post n=18</th>
<th>Chi square p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacted caregivers' office</td>
<td>12 (50)</td>
<td>11 (61)</td>
<td>0.624</td>
</tr>
<tr>
<td>Presented to hospital</td>
<td>12 (50)</td>
<td>7 (39)</td>
<td></td>
</tr>
</tbody>
</table>
8.0 Phase III: Chart Review of Steroid Use

8.1 Design

A pre- and post-program implementation (PI) chart review was conducted to describe the use of antenatal steroids and tocolytics for preterm births.

8.2 Study Population

The study population consisted of women with diagnosed preterm labour between the 24th and 37th week of pregnancy who were admitted to KGH over two six-month periods.

Group 1 consisted of all women who were admitted to the hospital for preterm labour before the program was implemented (November 1997 - April 1998). Group 2 consisted of all women who were admitted to the hospital for preterm labour after the program was implemented (November 1998 - April 1999). Both groups included all women who experienced preterm labour, even if the baby was born at term (>37 weeks). For inclusion in the study, patient charts were reviewed to verify that a diagnosis of preterm labour met the following criteria:

1. Labour between 24 and 37 weeks gestational age;
2. Documented uterine contractions;
3. Intact membranes and at least one of the following:
   a) Documented cervical change; or
   b) Cervical effacement of 80%; or
   c) Cervical dilation of at least 2 cm.
All maternal transfers from outside the KGH catchment area were excluded since treatment often began at the hospital of origin. Women who had preterm deliveries that were indicated because of medical or obstetrical disorders in the mother or severe disease states in the fetus were also excluded from the study. Exclusion criteria are listed in Figure 8.1.

<table>
<thead>
<tr>
<th>Figure 8.1 Exclusion Criteria for Phase III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal transfers</td>
</tr>
<tr>
<td>Preterm deliveries due to:</td>
</tr>
<tr>
<td>Any induced or elected delivery</td>
</tr>
<tr>
<td>Premature rupture of membranes</td>
</tr>
<tr>
<td>Placental abruption</td>
</tr>
<tr>
<td>Incompetent cervix (with cervical cerclage)</td>
</tr>
<tr>
<td>Anomalies of the fetus</td>
</tr>
</tbody>
</table>

8.3 Measures and Methods of Data Collection

An emergency intake form is filled out for all women who come to the hospital with symptoms of labour. All the emergency intake forms are stored in a logbook at Connell 5, KGH. An admission intake form is filled out for women who are diagnosed to be in labour. This form is then kept in the patient's inpatient hospital chart. Therefore, cross-referencing the emergency admission forms with the patients' inpatient hospital charts allowed the identification of eligible women.

In order to verify that all eligible study participants were included in the study, a list of all patients whose discharge diagnosis was preterm labour or delivery was generated from the Medical Records Database. This list provided the chart numbers of all patients who had preterm labour or delivery and was compared with the list generated from the emergency admission forms to ensure that all eligible participants were included in the study.
A chart review form was used to extract data from the patient's chart (Appendix F). It had been previously used in a 1995 study in the Ottawa-Carleton region and was modified slightly to be applicable to Kingston. It was used to collect information on the antenatal use of steroids, tocolytics and their timing. The data collector was trained in data abstraction and an obstetrician was consulted to clarify any unclear information in the patients' charts. The Society of Obstetricians and Gynecologists of Canada have developed guidelines that were used to determine the appropriate administration of drugs.

8.4 Data Storage, Entry and Cleaning

The chart review forms were identified by the patients' hospital chart number and stored in a locked storage cabinet. The principal investigator was the only person with access to the forms. The hospital chart numbers were used as the identifier on all computer files and the principal investigator controlled access to the computer.

All data on the chart review forms were entered into the SPSS Rel. 9.0.0 statistical software program and frequency distributions and descriptive statistics were generated to check for out-of-range values. Data from 10% of the forms were re-entered into SPSS and cross checked against the original data set for discrepancies. An acceptable error rate of less than 0.1% was found by dividing the number of errors by the total number of data items entered. All errors found were corrected.

8.5 Data Analysis

The first stage of analysis was to examine the data for accuracy, consistency and completeness. The comparability of the two groups was determined by examining...
demographic characteristics. All variables except age were categorical. Chi-square analyses were conducted on categorical variables. Fisher's exact test was used to analyze multiple gestation since this variable had an expected cell value of less than 5. A t-test was performed to compare the mean age between the two groups.

Frequency distributions, cross-tabulations and group comparisons of the data from the chart review were used to address Objective III. Chi-squared analysis was used to test for differences. The appropriate administration of tocolytics was defined as a dichotomous variable (yes/no). The appropriate administration of corticosteroids was defined as a trichotomous variable, represented by the number of doses administered (no drugs administered, one dose or two doses). The appropriate administration of drugs was examined among the total study population and among only women who experienced preterm labour at less than 34 weeks gestational age.
8.6 Results

8.6.1 Sample size

Between November 1, 1997 and April 30, 1998 (pre-PI) there were 119 women who had preterm birth at the Kingston General Hospital (11% of all births). In the same time period, 37 women were admitted to Kingston General Hospital with signs or symptoms of preterm labour and were discharged before the birth of the baby. By the criteria listed in Figure 8.1, 38 of these women were eligible for this phase of the study.

Between November 1, 1998 and April 30, 1999 (post-PI) there were 104 women who had preterm birth at the Kingston General Hospital (10% of all births). In the same time period, there were 36 women admitted to Kingston General Hospital with signs or symptoms of preterm labour who were discharged before the birth of the baby. There were 40 women eligible for this phase of the study.

8.6.2 Demographic characteristics

Demographic data are presented in Table 8.1 for the women whose charts were reviewed in both groups. There were no significant differences between the women in the pre- and post-PI groups for the variables marital status, smoking status, parity, whether or not the present gestation was a multiple gestation or age. All multiple gestations in the study were twins. There was a significant difference between the groups in the number of primigravida women. Women in the post-PI chart review were more likely to be in their first pregnancy (p = 0.008).
Table 8.1 Demographic Characteristics of Postpartum Women in Phases III and IV

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Pre</th>
<th>Post</th>
<th>Chi-square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 38</td>
<td>n = 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>26 (68)</td>
<td>18 (45)</td>
<td>0.208</td>
<td></td>
</tr>
<tr>
<td>Common Law</td>
<td>3 (8)</td>
<td>4 (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separated/Divorced</td>
<td>1 (3)</td>
<td>2 (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>8 (21)</td>
<td>16 (40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking Status</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8 (21)</td>
<td>10 (25)</td>
<td>0.679</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>30 (79)</td>
<td>30 (75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravidity 1</td>
<td>9 (24)</td>
<td>21 (52)</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>Gravidity 2</td>
<td>15 (39)</td>
<td>8 (20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravidity 3</td>
<td>5 (13)</td>
<td>1 (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravidity 4</td>
<td>6 (16)</td>
<td>2 (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravidity &gt;=5</td>
<td>3 (8)</td>
<td>8 (20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity 0</td>
<td>11 (29)</td>
<td>22 (54)</td>
<td>0.064</td>
<td></td>
</tr>
<tr>
<td>Parity 1</td>
<td>15 (39)</td>
<td>9 (23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parity &gt;=2</td>
<td>12 (32)</td>
<td>9 (23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple Gestation</td>
<td>Yes</td>
<td>2 (5)</td>
<td>0.087</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31 (82)</td>
<td>38 (95)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean Age (standard deviation) 28.63 (5.45) 25.90 (6.90) 0.056*
* Independent samples t-test

8.6.3 Summary of use of tocolytics and corticosteroids

The chart review indicated that among the entire study population, there was no significant difference between the pre- and post-PI groups in terms of the appropriate administration of corticosteroids (p = 0.264) or tocolytics (p = 0.401). There was also no significant difference between the pre- and post- PI groups (p = 0.595 and p = 0.323) among the women who experienced preterm labour at less than 34 weeks gestational age. Table 8.2 summarizes the results.
Table 8.2 Administration of Drugs Before and After Program Implementation

<table>
<thead>
<tr>
<th>Administration of Drugs</th>
<th>Pre</th>
<th>Post</th>
<th>Chi square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gestational Age &lt; 37 Weeks</strong></td>
<td>n = 38</td>
<td>n = 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tocolytics</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2 (5)</td>
<td>5 (13)</td>
<td>0.264</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>36 (95)</td>
<td>35 (87)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corticosteroids</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No dose</td>
<td>30 (79)</td>
<td>30 (75)</td>
<td>0.401</td>
<td></td>
</tr>
<tr>
<td>One dose</td>
<td>1 (3)</td>
<td>4 (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two doses</td>
<td>6 (18)</td>
<td>6 (15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gestational Age &lt; 34 Weeks</strong></td>
<td>n = 18</td>
<td>n = 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tocolytics</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1 (6)</td>
<td>3 (19)</td>
<td>0.595</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>17 (94)</td>
<td>13 (81)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corticosteroids</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No dose</td>
<td>10 (56)</td>
<td>10 (62)</td>
<td>0.323</td>
<td></td>
</tr>
<tr>
<td>One dose</td>
<td>1 (6)</td>
<td>2 (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two doses</td>
<td>7 (38)</td>
<td>4 (25)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.0 Phase IV: Outcome Evaluation

9.1 Study Design

A pre and post study design using an historical comparison group was conducted to determine whether the *Reach, React, Respond* program resulted in increased gestational age at birth of infants born to women who experience preterm labour.

9.2 Study Population

The same study population used in Phase III (Section 8.2) was used to conduct the analysis in Phase IV. Women who were eligible for Phase III were also eligible for Phase IV providing the gestational age of the baby could be determined.

9.3 Measures and Methods of Data Collection

A trained researcher examined the eligible patients' charts and extracted relevant information on a chart review form (Appendix F). Data were collected from the women's charts for potential confounders\(^\text{30, 57, 64}\) (Figure 9.1), as well as to determine the accuracy of the diagnosis of preterm labour. An obstetrician was consulted if information in the patient's hospital chart was unclear.

**Figure 9.1 Variables Considered as Potential Confounders in the Analysis of Gestational Age**

<table>
<thead>
<tr>
<th>Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Marital status</td>
</tr>
<tr>
<td>Obstetrical Index (GTPAL)*</td>
</tr>
<tr>
<td>Smoking Status</td>
</tr>
<tr>
<td>Multiple Gestation</td>
</tr>
<tr>
<td>Gestational age at first prenatal visit</td>
</tr>
</tbody>
</table>

*Gravidity; Number of previous: Term deliveries, Preterm deliveries, Abortions (spontaneous and therapeutic) & Living children
The outcome of interest, gestational age, was also collected from the patients' charts. Gestational age was determined for infants by calculation from the last menstrual period (LMP). Corrections with ultrasound scanning were used whenever they were available and if they were performed before 20 weeks. For those patients with no ultrasound before 20 weeks, gestational age was considered correct if there was agreement (+/- 10 days) between reported LMP and a late ultrasound measurement. If the gestational age could not be accurately determined, the woman was excluded from the study.

9.4 Data Storage, Entry and Cleaning

The chart review forms were identified by the patients' hospital chart number and stored in a locked storage cabinet. The principal investigator was the only person with access to the forms. The hospital chart number was used as the identifier for all computer files and the principal investigator controlled access to the computer.

All data on the chart review forms were entered into the SPSS statistical software program and frequency distributions and descriptive statistics were generated to check for out-of-range values. Data from 10% of the forms were re-entered into SPSS and cross checked against the original data set for discrepancies. An error rate of less than 0.1% was found by dividing the number of errors by the total number of data items entered. All errors found were corrected.
9.5 Data Analysis

All analyses were conducted using the SPSS Rel. 9.0.0\textsuperscript{63} statistical software program. The data from Phase IV was summarized in contingency tables in order to determine if the distribution of potential confounders differed significantly between the groups. All analyses were conducted initially using the entire study population and subsequently, using only women who experienced preterm labour before 34 weeks gestational age.

In a first look at the effect of the intervention on gestational age of the infants, the gestational age of infants born after preterm labour prior to program implementation was compared to those born after implementation.

The main analysis of Objective IV was done using multiple regression with gestational age at birth as the dependent variable, and exposure to the program as the independent variable. All potential confounders for which data were collected were included in the regression (Table 9.1). Marital status, multiple gestation, smoking status, gravidity and the use of tocolytic drugs were coded as categorical variables; the age of the mother was entered as a continuous variable. A model was also constructed using the above variables and replacing gravidity with previous pregnancy losses. Previous pregnancy losses were calculated by subtracting the number of living children plus one from gravidity. The model also controlled for the gestational age at which labour began. The model was reduced through backward elimination of non-significant variables based on a selection criteria of $P > .10$ to remove.
Table 9.1 Categories of Potential Confounders included in the Multiple Regression Model

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital Status</td>
<td>Single</td>
</tr>
<tr>
<td></td>
<td>Married/Common Law</td>
</tr>
<tr>
<td>Multiple Gestation</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Smoking Status</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Gravidity</td>
<td>First Pregnancy</td>
</tr>
<tr>
<td></td>
<td>Subsequent pregnancy</td>
</tr>
<tr>
<td>Previous Pregnancy Losses</td>
<td>&gt;=1</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Tocolytics</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Women in the first category for each variable are at higher risk for preterm delivery

9.6 Results

9.6.1 Sample size

The same study population in Phase III was used for the analysis of Phase IV. Therefore, there were 38 women eligible for the pre-PI chart review and 40 women eligible for the post-PI chart review. Among the pre-PI women, one was excluded from the analysis because the gestational age of the baby could not be accurately determined. Among the post-PI women, 3 were excluded because of inaccurate dating of gestational age and one was excluded because there was no record of the baby's birth.

Originally, the study was designed to exclude women who were not potentially exposed to the program in order to provide a less contaminated estimate of the outcome. However, after examining the data, it was determined that since more than 93% (34/37) of the pre-PI women and 97% (35/36) post-PI women had family physicians who were exposed to the program, this secondary analysis would not provide more information.
9.6.2 Demographic characteristics and outcome variables

The demographic characteristics of the total study population (including the 5 women who have been excluded from the analysis) were examined in Phase III. As previously mentioned in Section 8.6.2, there were no significant differences between the groups for any of the variables collected with the exception of gravidity. More women in the post-PI chart review were in their first pregnancy.

The mean gestational age at birth, gestational age at which labour began and difference between the gestational age at labour and birth of the pre- and post- PI groups are presented in Table 9.2. The variables are examined among the total study population who experienced preterm labour and among the women who experienced preterm labour at less than 34 weeks gestational age.

| Table 9.2 Description of Outcome Variables for Exposed and Unexposed Women |
|-----------------------------|-----------------------------|-----------------|-----------------------------|
| **Group (n)**              | **Gestational age of labour (weeks)** | **Gestational age at birth (weeks)** | **Difference (weeks)** |
|                            |    Mean    | Standard Deviation |    Mean    | Standard Deviation |    Mean    | Standard Deviation |
| Gestational age < 37 weeks |            |                  |            |                  |            |                  |
| Pre - PI (37)             | 33.57     | 2.65              | 34.95     | 3.00              | 1.38       | 2.70              |
| Post - PI (36)            | 33.57     | 3.03              | 35.56     | 3.32              | 1.89       | 3.08              |
| Gestational age < 34 weeks |            |                  |            |                  |            |                  |
| Pre - PI (18)             | 31.61     | 2.59              | 34.11     | 4.07              | 2.50       | 3.43              |
| Post - PI (16)            | 31.50     | 3.48              | 35.31     | 4.83              | 3.75       | 3.61              |
9.6.4 Multiple regression model

When a backward elimination procedure was used to check for confounding, all of the potential confounders except marital status were dropped from the model since they had no significant confounding effect and were not significant predictors of the outcome. Interaction was not assessed since the variables that had been considered \( a \) \textit{priori} as potential interaction terms were not significantly associated with the gestational age at birth.

The final model with the entire study population consisted of exposure to the program (\( p = 0.16 \)), marital status (\( p = 0.023 \)) and the gestational age at which labour began (\( p < 0.001 \)). Exposure to the program was not a significant predictor of the dependent variable, gestational age at birth (Table 9.3). Similarly, Table 9.3 indicates that when women who experience preterm labour at less than 34 weeks gestational age were considered, exposure to the program did not significantly affect the gestational age at the birth of the baby (\( p = 0.262 \)).

Table 9.3 Multiple Regression Model to Determine if Exposure to the Program Leads to an Increase in the Gestational Age at Birth of Babies Born to Women who Experience Preterm Labour

<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Standard Error</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{Gestational Age &lt; 37 Weeks}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>16.324</td>
<td>3.790</td>
<td></td>
</tr>
<tr>
<td>Exposure to program</td>
<td>8.91</td>
<td>0.633</td>
<td>0.164</td>
</tr>
<tr>
<td>Marital status</td>
<td>-1.612</td>
<td>0.693</td>
<td>0.023</td>
</tr>
<tr>
<td>Gestational age at labour</td>
<td>0.565</td>
<td>0.112</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>\textit{Gestational Age &lt; 34 Weeks}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>9.421</td>
<td>6.77</td>
<td></td>
</tr>
<tr>
<td>Exposure to program</td>
<td>1.369</td>
<td>1.197</td>
<td>0.262</td>
</tr>
<tr>
<td>Marital status</td>
<td>-2.251</td>
<td>-1.660</td>
<td>0.017</td>
</tr>
<tr>
<td>Gestational age at labour</td>
<td>0.801</td>
<td>0.209</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Dependent Variable: gestational age at birth
10.0 Discussion

This study evaluated the community-wide preterm birth prevention program Reach, React, Respond which was implemented in an attempt to increase patient and caregiver knowledge of preterm labour and consequently to decrease the rates of preterm birth in the community. Given the promising outcomes of community-wide preterm birth prevention programs, the lack of studies evaluating the effects of these programs in international and Canadian settings, and the importance of evaluating all programs, it was crucial to examine the effects of the program. The evaluation examined each of the steps of the program and the overall outcome of interest.

The steps of the program, and thus of the evaluation, build upon each other. Successful implementation of the program would result in caregivers' learning about the signs and symptoms of preterm labour, receiving program materials and teaching their patients about preterm labour. Consequently, women learn about preterm labour from their caregivers and in their prenatal classes, and are able to respond appropriately in the event of experiencing preterm labour. An increase in caregiver knowledge about the appropriate administration of tocolytic drugs and corticosteroids means that women who present early to the hospital with preterm labour are treated appropriately and thus there is a possibility to delay births of women who experience preterm labour and the morbidity associated with preterm birth.

The study objectives corresponded with the steps of the program (Figure 5.1). This chapter summarizes the study findings by study objective and discusses the limitations and strengths of this evaluation. Finally, the implications of the findings with respect to further program implementation and future evaluation and research are outlined.
10.1 Objective I

To describe the change in prenatal health care providers' routine practice in regards to educating women about preterm labour before and after program implementation.

The premise of community-wide preterm birth prevention programs is that educating all pregnant women about the signs and symptoms of preterm labour is a potentially inexpensive way to increase the percentage of women who present to the hospital in early preterm labour. According to pilot studies conducted in Ottawa, Ontario, there is a need to improve the education of pregnant women about the signs and symptoms of preterm labour. Findings from the pre-program implementation survey found similar results in Kingston, Ontario with only 18% of caregivers having patient education material available and only one third of caregivers discussing the signs and symptoms of preterm labour with all pregnant women.

Following the implementation of the program, there was a significant change in caregivers' practice of educating women. Among the caregivers surveyed following the program implementation, almost 50% more caregivers reported having patient education materials available (p < 0.001). Furthermore, twice as many caregivers reported discussing signs and symptoms of preterm labour with their patients (p = 0.021). As well, 60% of caregivers who discussed the signs and symptoms did so before 20 weeks gestational age (p = 0.024).

These results demonstrate that the program was successfully implemented through academic detailing in Kingston. This is in agreement with a descriptive study by Yawn (1991), who determined that a better understanding of the goals and components of preterm birth prevention programs by caregivers may facilitate the use of such
programs. Further support for academic detailing of caregivers within the community is described by Cameron and Naylor. They evaluated an educational intervention designed to increase the use of the "Ottawa Ankle Rules," a widely publicized set of clinical guidelines shown to reduce the use of radiography for diagnosis of acute ankle injury. The authors concluded that local implementation strategies including academic detailing are required to promote consistent adherence to programs and guidelines.

Although caregivers play a key role in most preterm prevention programs, few researchers have examined caregivers' practice regarding teaching patients about preterm birth. The studies of preterm birth prevention programs universally assume compliance by the caregivers in educating women. The need to evaluate the effectiveness of caregivers as a mode to educate women can be demonstrated by unpublished, preliminary results in a study of a preterm birth prevention program in Ottawa, Ontario. In this study, fewer than 30% of caregivers agreed to receive program materials or academic detailing. The failure of this step of the program to be implemented will greatly limit the ability of the program to achieve its overall goal of reducing the rates of preterm birth.

Hueston, a prominent researcher in the field of preterm birth prevention, states that the success of community-wide preterm birth prevention programs depends not only on the education of patients, but also on the education of caregivers. Comerford Freda reiterates the importance of caregivers in community-wide prevention programs. As "gatekeepers" in the community, caregivers are an effective and important way to teach women about the signs and symptoms of preterm birth.
The results from this research demonstrate that academic detailing of caregivers and distribution of patient education materials by a public health nurse was an effective way to implement the program *Reach, React, Respond* in Kingston, Ontario.

### 10.2 Objective II

*To describe the change in women's knowledge about preterm labour before and after program implementation.*

Previous studies about women's knowledge of preterm labour support the need for patient education. In a survey of 465 Quebec women, one third of the women did not recognize the signs and symptoms of premature rupture of membranes and preterm labour. Likewise, researchers in Bronx, New York found that one third of women did not know that neonates born preterm could have health problems. Similarly, the present evaluation found that before the implementation of the program, less than half of the women surveyed were aware that preterm birth meant that the baby was born before 37 weeks gestation and less than 12% of women surveyed could identify four or more symptoms of preterm labour.

Following the implementation of the program, there were very significant changes in women's knowledge of signs and symptoms of preterm labour. More than 63% knew that preterm birth meant birth before 37 weeks gestation (p = 0.003) and more than 30% of women could identify four or more symptoms of preterm labour (p < 0.001). Women were asked if they "ever considered that their baby might be born before 37 weeks." Before program implementation, 43% of women worried that their baby might be born preterm. Only 2% of these women felt that they were at risk for preterm labour because it
could potentially happen to anyone. Among the women surveyed after program implementation, only 22% of women were worried about their baby being born preterm. There was an increase in the number of women who mentioned that they were concerned about preterm labour because it could happen to anyone. The significant decrease in the number of women concerned about preterm birth demonstrates that although the program leads to an increase in knowledge about preterm birth, it does not lead to an increase in the woman's anxiety about preterm birth.

Approximately 90% of women in both groups surveyed began prenatal care at less than 13 weeks gestation. There was a significant difference between the groups surveyed before and after program implementation in terms of the type of caregiver who provided prenatal care. Women in the pre-program implementation survey were more likely to report visiting only an obstetrician for prenatal care. Likely, this difference can be attributed to interviewer bias. The post-program implementation interviewer prompted women who reported visiting an obstetrician to determine if they had seen their family physician for the initial prenatal care, resulting in more women responding that they had seen both an obstetrician and a family doctor. This prompting did not occur during the pre-program implementation survey. The results from the post-program implementation survey are similar to the proportions of women visiting obstetricians in other communities in Ontario. If the differences in the type of caregivers were not due to interviewer bias, the results of Phase II would be biased toward the null (no difference between groups). This bias toward the null would result because in the pre program implementation survey a much higher proportion of obstetricians than family doctors reported teaching women about preterm labour.
Almost twice as many women reported that their caregivers discussed the signs and symptoms of preterm labour following the program implementation ($p = 0.024$). Among the women who were taught the signs and symptoms of preterm labour before program implementation, only 35% reported that their caregiver discussed this information before 22 weeks gestation. Following program implementation, 72% of women taught about preterm labour reported being taught before 21 weeks gestation.

Sixty seven percent of the women taught about preterm labour reported that they received the pamphlet entitled "Preterm Birth - It Might Happen to You" and most of the women (83%) were told what to do if experiencing the signs and symptoms of preterm labour.

In the post program implementation survey, women were asked to name their caregiver(s). Only two of the women surveyed had caregivers who were not eligible to receive program materials, since they practiced outside of the Kingston area. Therefore, 98% of the population surveyed were potentially exposed to the program through their caregivers. The women's responses to the surveys are a method of validating caregivers' responses to their questionnaires. Although there was a large increase in the number of women who reported being taught the signs and symptoms of preterm labour, there was a much larger increase in the number of caregivers who indicated that they used program materials and taught women about the signs and symptoms of preterm labour. It is unknown if this discrepancy is due to recall bias by the women, misreported information by the caregivers, women who were "missed" by their caregivers or a combination of these factors.

Women also learned about the signs and symptoms of preterm labour in prenatal classes. Among the women who attended prenatal classes, 80% of women surveyed
before the program implementation and 90% of women surveyed after the program implementation reported learning about the signs and symptoms of preterm labour in their prenatal classes. However, only about one third of women surveyed had taken prenatal classes during the pregnancy under question. There were no significant differences between the groups as to the number of women who attended prenatal classes and as to the number of women who recalled the teacher talking about the signs and symptoms of preterm labour and what to do if it occurred. Furthermore, there were no significant differences between the number of women who received "written information" about preterm labour in their classes.

In a lecture on the prevention of preterm birth, Yawn indicated that education programs need to adhere to the basic principles of adult education; the information must be presented in a form that is sensitive to the patient's culture, reading level and learning style. Repetition, reinforcement and constant evaluation, according to Yawn, are crucial components of these programs. Furthermore, Comerford Freda et al. has stated that before a teaching program is established, caregivers should have an understanding of the patient populations' basic knowledge of the subject, so that the most critical areas of the topic can be emphasized. The results of this study indicate that the methods of teaching women about preterm labour and the program materials met these basic principles of education.

Similar to evaluations of the caregivers' change in practice regarding preterm labour, there has been limited research that specifically examines the change in women's knowledge as a result of community-wide education programs. However, in every preterm birth prevention program the pregnant woman is the most important member of
the health care team. She must recognize the warning signs and symptoms of preterm labour, know that they are not normal and have a plan of action when the warning signs occur. Studies by Newman et al. measured the effectiveness of educational programs and found that women were able to recognize only 30% of their contractions. However, in the research by Yawn and Yawn, education increased the percentage of women presenting early enough in preterm labour to be good candidates for tocolytic treatment from 51% to 98%. Unfortunately, changes in woman's knowledge and the usefulness of that knowledge in bringing women to the hospital has not been assessed in previous research.

Overall, this research has demonstrated that the program Reach, React, Respond was an effective method of increasing women's knowledge about the signs and symptoms of preterm labour and what to do if experiencing preterm labour.
10.3 Objective III

To describe the changes in the use of antenatal steroids among preterm babies before and after program implementation.

The effectiveness of the program Reach, React, Respond is dependent on the early administration of tocolytics to women experiencing preterm labour in order to prolong the pregnancy. The successful use of any tocolytic agent must depend on the early diagnosis of preterm labour because if the cervix is more than four centimeters dilated or the membranes are ruptured, tocolysis is rarely effective and the incidence of infection increases. The hypothesis for preterm birth prevention programs is that early detection of labour leads to presentation of patients at an earlier stage of labour, when tocolysis is more effective. Unfortunately, as with other components of these programs, the use of tocolysis has not been well evaluated in the context of a preterm birth prevention program.

In the present study, the use of tocolytics and corticosteroids was examined among the population of women who presented to KGH in preterm labour and who were from the Kingston area. Among the women who experienced preterm labour in the time period before and after the program implementation, less than 8% received either tocolytics or corticosteroids. There was no significant difference between the two groups for the administration of either corticosteroids or tocolytics. Given that such a small proportion of women received antenatal drugs, the power of this study may have been too low to allow a significant difference between the two groups to be detected. Regardless, very few women received tocolytic drugs.
The selection of appropriate candidates for tocolysis is not based only on the presence of preterm labour, but also on the overall condition of the mother and the baby. Although this study reviewed the charts to determine if the woman was in diagnosed preterm labour based on clinical guidelines, the woman's chart was not explicitly reviewed for contraindications for tocolytic therapy. However, the criteria for eligibility implicitly removed most women who were not eligible for tocolysis. The small number of women who received the drugs is lower than results obtained in the Canadian preterm labour trial\textsuperscript{24} where 31\% of women received tocolytics.

The results likely demonstrate that the program either did not have an influence on caregiver practices in the hospital in treating preterm labour or that the women who presented were too far advanced in labour to benefit from the treatment.

10.4 Objective IV

*To determine whether the Reach, React, Respond program results in increased gestational age at birth of infants born to women who experience preterm labour.*

This study found no significant difference in the gestational age of babies born to women who experienced preterm labour before or after the implementation of the program. Given that the program demonstrated very significant increase in caregiver and patient knowledge about preterm labour, this is likely due to the lack of significant change in the proportion of women who received tocolytic drugs.

In the absence of controlled clinical trials, and given the conflicting results of studies evaluating preterm birth prevention programs,\textsuperscript{41-50} it is important to delay
conclusions about the proposed benefits of this program. Although this study has not shown an increase in the gestational age of babies born to women who experienced preterm labour, as mentioned, each of the components of the program are dependent on the others. Therefore, since there was no significant change in the administration of tocolytic drugs, it is not surprising that there are no differences in the outcome of interest. Further program evaluation appears to be necessary to determine why adherence to evidence based guidelines appears to be low.

Preterm birth prevention programs have achieved variable results and have met with a mixed acceptance by the medical community. Nevertheless, it seems when women are enrolled in such programs, there is usually a prolongation of pregnancy because of the early diagnosis of preterm labour, as compared to patients receiving traditional care in the same area. 9, 30, 44-46, 54, 55
10.5 Study Limitations and Strengths

There are some limitations of this study that should be kept in mind in the interpretation of the results. Evaluating community-wide prevention programs is challenging for a number of reasons. First, positive effects of community initiatives are often not shown for many years and may be difficult to track. Therefore, evaluations need to remain in place for sufficient duration to determine the size and sustainability of changes in the community. Acceptance of the null hypothesis (no difference between groups in terms of gestational age of birth among women who experienced preterm labour) may be an indicator that the program has not been implemented for a sufficient length of time to be evaluated. Due to financial and time constraints, this evaluation examined the effects of the program for only one year following the program implementation.

Secondly, although determining the relationship between a program's activities (i.e. education of caregivers and women) and its effects (i.e. a reduction in the rates of preterm birth) is a common research goal, this is especially difficult when evaluating community-wide programs. The interventions target different groups and are implemented by different agents. For example, women can learn about the signs and symptoms of preterm labour from their family doctor, obstetrician, prenatal classes, or at an ultrasound scanning. Consequently, clearly identifying the program effects is difficult.

Finally, when evaluating community-wide programs, it is impossible to know for sure that changes in outcome measures can be attributed to the program; there may be other interventions in the community that cause a change in any of the variables of
interest. Program effects are difficult to disentangle from effects of other efforts, influences and trends.

There are limitations that apply specifically to each of the phases of the evaluation. In both phases I and II, there is a concern about the external validity of the study. Caregivers in Kingston were more responsive to receiving program materials and program information than caregivers in pilot studies in Ottawa. There may be a systematic difference in the population of caregivers in Kingston that does not apply to other communities. Although there was a high response rate for the post-program implementation survey of women, it was not possible to report a response rate for the pre-program implementation survey. Furthermore, the demographics of the women surveyed were not compared with women in the general population who gave birth in order to determine if the sample surveyed was representative of that population. Hospital data describing the demographics of the total population of postpartum women were not accessible.

Other potential problems with Phase II result from not being able to examine the inter-rater reliability of the two interviewers. As well, since not all women included in the main analysis have the opportunity to be exposed to the program, these results will likely tend to be biased toward the null hypothesis.

The results in phases III and IV may not be generalizable to different populations given that KGH is a teaching hospital and a tertiary care centre. Obstetricians at KGH may be more likely to be involved in teaching or research than in other populations. As well, there is a neonatal intensive care unit available for babies born prematurely. All these factors may limit the generalizability of the evaluation of practices in the hospital.
In both phases III and IV, every attempt was made to determine if the woman was indeed experiencing preterm labour by looking for certain clinical determinants in her chart. Given the difficulty and subjectivity of diagnosing preterm labour, there may be misclassification of women in the study. One study found an error rate of 30% to 40% in the diagnosis of preterm labour. An error rate this high for any disease obviously hinders an analysis of any intervention. In the present study, any misdiagnosis of preterm labour would likely be non-differential.

Furthermore, a limitation that applies specifically to Phase IV is the use of a proxy measure of gestational age. Gestational age was determined by the woman's estimate of her last menstrual period and, where possible, the results of an ultrasound scanning before 20 weeks gestational age. Any error should be similar between groups resulting in non-differential misclassification and a general tendency to bias towards the null. Ideally, both groups would be controlled for other potential confounders of interest (i.e. socioeconomic status measures, such as income). However, this information is not available from the hospital charts.

The strength of this evaluation design is that it examines all of the main components of the program in an attempt to examine the effects of each step of the program.

The high response rates in Phases I and II increases the generalizability of the study results. The internal validity of the study results is strengthened by the use of repeat surveys among the same caregivers to control for potential confounders (Phase I) and the fact that pre- and post-program implementation groups come from the same population base (Phase II, III and IV).
Furthermore, Kingston was an ideal setting in which to implement and evaluate the program *Reach, React, Respond*. The city had not been previously contaminated by pilot studies and was geographically accessible for program implementation. The relative homogenous cultural make up of the community was well suited to the program design for preliminary evaluations.

This evaluation addresses the goals of the *Reach, React, Respond* program. The project makes use of available data and an inexpensive means of data collection, in a relatively short time frame in order to provide valuable information to program planners and public health administrators.

### 10.6 Implications for Program Implementation

The known risk factors for preterm birth are often grouped into three categories: lifestyle, socioeconomic and medical and obstetric (Table 2.2). However, these risk factors are known to account for fewer than half of all preterm births. Preterm birth prevention programs face the major challenge of incorporating known factors about preterm birth with the complex social and economic factors that influence the pregnant woman's actions. Therefore, programs to promote preterm birth prevention must be flexible to incorporate new and innovative strategies.

Community-wide preterm birth prevention strategies, with on-going evaluation and flexibility to incorporate the latest research provide an excellent vehicle to attempt to influence the rates of preterm birth. According to Stewart and Nimrod, "a community-wide approach acknowledges the difference that the whole community can make on the health of its members." Indeed, many "Heart Health" programs use a community-wide
approach. The goal of these programs is to implement a comprehensive heart health program using community-wide strategies. Comprehensive means that interventions are implemented through various community channels, target many groups, use a mix of education and policy approaches, and address various risk behaviours. Evaluation of these programs has demonstrated that the community-wide programs can influence the health of its members.

This evaluation agrees with past research findings that community-wide programs are a promising avenue to prevent preterm births. However, the continued success of the program to influence caregiver and women's knowledge depends on the development of successful community partnerships. In Kingston, there needs to be ongoing collaboration among the Health Unit, the Kingston General Hospital and caregivers in the community to achieve a common goal of decreasing the rates of preterm birth.

In order to reinforce the program's goals in the community, caregivers need continued access to program materials (pamphlets, posters etc.) and the latest information on treatment. Program planners need to consider that many women who are at risk for preterm birth may not receive early (or any) prenatal care. Thus, program materials could be made available from other sources, such as drug stores and social assistance programs. Furthermore, cultural differences and language barriers should be considered in further program implementation.

This evaluation was unable to find a significant difference in the treatment of preterm labour at the Kingston General Hospital before and after the intervention. There are a variety of possible reasons for this lack of change, many of which need to be addressed with ongoing program implementation and evaluation. The program is
designed to increase the number of women who present to the hospital with signs and symptoms of preterm labour. However, this program does not address the difficulty that caregivers and researchers have in diagnosing preterm labour. Research suggests that the diagnosis of preterm labour should involve consideration of cervical change in addition to contractions. Cervical ultrasonography has shown promise as a method to diagnosis preterm labour, as have various biomarkers. Specifically, there has been encouraging research which found that there was a positive predictive value of 83% of preterm delivery if fetal fibronectin was positive when patients presented with preterm uterine contractions.

It is also reasonable to speculate that the program failed to reach caregivers with the evidence based guidelines for treatment of preterm birth. Research has shown that traditional methods of publishing practice recommendations to introduce or change treatment within a hospital setting do not effect change among caregivers. Better results have been shown with more intense, "active focussed dissemination efforts" that are based on clinical guidelines. Therefore, there is a need for guidelines to help caregivers determine if indeed the mother is in preterm labour and is eligible for tocolysis along with guidelines for the correct use of tocolytic and corticosteroid drugs.

If the Health Unit is going to continue to coordinate this dissemination of information, there needs to be continued funding and skilled human resources. Program planners need to update materials, program goals and program guidelines to represent the most up-to-date research in the field. Furthermore, successful implementation of this program will depend on on-going evaluation of the program activities.
10.7 Future Research and Evaluation

It is important that future research continues to focus on the broad picture of decreasing preterm births. Research in such areas as categorizing the various types of preterm birth, solving the puzzle of the etiology of preterm birth, examining various drugs to treat preterm labour, and searching for possible biochemical markers and other factors to diagnose preterm labour are relevant to community-wide preterm birth prevention programs. However, despite the importance of these ongoing research topics, they are beyond the scope of this paper.

There are a variety of future research topics that are directly relevant to this research project and should ideally be incorporated into future evaluation designs of this program. Firstly, the results of this study indicate that the program was ineffective in achieving its overall aim of decreasing the rates of preterm birth. This does not mean that the program was ineffective. Indeed, there were very significant results in the Implementation and Reach components of the program - specifically, an increase in women and caregivers' knowledge about preterm labour and what to do when it occurs.

However, the lack of significant results in the overall outcome of interest may be attributed to either the React (presentation at the hospital of the earliest signs of preterm labour) or the Respond (appropriate administration of tocolytic and corticosteroid drugs) components of the program which were evaluated in Phase III. The failure of either of these components leads to no change in the use of tocolytic drugs and corticosteroids as was found in this study. Therefore, the question to be answered in future evaluations is why there is a lack of change in this outcome. The following are some examples of possible reasons that positive effects of this program are lost:
- Women may know about the signs and symptoms of preterm labour, but fail to recognize them when they appear.

- Women may recognize the signs and symptoms of preterm labour, but fail to respond immediately.

- Women may recognize the signs of preterm labour and present to the hospital earlier in labour, but caregivers either may not recognize the women in early labour for whom tocolytics are appropriate or may not appropriately administer the drugs.

- Caregivers may be aware of the recommendations to use tocolytics drugs, but may not have confidence in these recommendations.

- Caregivers may not be aware of the recommendations for the use of tocolytic and corticosteroid drugs for the treatment of preterm birth.

If future evaluations can determine the reason(s) for the failure of the program at this step, more decisions can be made about further program implementation. The decisions may vary from expending more resources to enhance specific aspects of the program to determining that the overall program is not effective at decreasing the rates of preterm birth.

Some important research topics to determine why the React and Respond components of the program failed include determining if increasing women's knowledge about the signs and symptoms of preterm birth leads to a change in their responses to the symptoms and an increase in the proportion of women eligible for tocolysis. Related to this topic is future research about the etiology of premature rupture of membranes. This category of preterm birth has previously been grouped separately from the category of
idiopathic preterm labour. Some researchers believe that rupture of membranes for some women may simply be the result of unrecognized preterm labour.\textsuperscript{74}

Furthermore, future evaluations should examine whether the low rates of administration of corticosteroids and tocolytics are a result of women presenting to the hospital too late or of caregivers' decisions not to treat. Given the low rates of the use of drugs to treat preterm labour in Kingston General Hospital, one component of future evaluations should incorporate a focus group including doctors, nurses, or pharmacists in order to determine current attitudes and beliefs about the administration of tocolytic or steroid drugs. This focus group would provide program planners with information about the barriers that need to be overcome to implement "active dissemination" among caregivers at the hospital.

Finally, future research needs to extend Phase IV of this evaluation to answer the question of whether or not the program has an impact on the rates of preterm birth in the community. This future evaluation of the program outcomes should be ongoing because it requires a large sample size and sufficient time for the program effects to be demonstrated. Kingston is an ideal setting in which to implement the program and given the promising results from Phases I and II, it is imperative that this research be continued along with efforts to sustain the program in the community.
11.0 Conclusions

1. Caregivers were very responsive to academic detailing from public health nurses. The program successfully led to an increase in caregivers who discussed preterm labour with all their patients before 20 weeks gestation.

2. The program led to an increase in women who reported discussing preterm labour with their caregivers. It also led to an increase in women's knowledge of the signs and symptoms of preterm labour, knowledge of what to do if experiencing these symptoms and the number of women who received written information about preterm birth.

3. There was no change in the use of tocolytic drugs or corticosteroid drugs after the implementation of the program. Further investigation of the reasons for low levels of adherence to these guidelines is a research priority.

4. There was no change in the gestational age of babies born to women who experienced preterm labour as a result of the program.

Among researchers in the field of preterm birth, there is much frustration over the inability to decrease the rates of preterm birth despite the implementation of many intervention strategies. Nevertheless, increasing knowledge about etiologic factors, the role of education, biophysical markers and pharmacologic agents could influence the rates of preterm birth in the future. Many researchers have commented on the promising potential for community-wide programs such as Reach, React, Respond.

Overall figures for mortality and costs are relevant to public health program planners and caregivers. However, what matters to an individual mother is whether her
baby will live and whether her baby will be healthy. It is the sum of these individual successes and failures that makes up the national statistics. Researchers' understanding of preterm labour is growing and with it is the hope of making a positive impact on these personal crises and national statistics. The results from the present study should encourage researchers to go forward with more effort and vigor, searching out new and innovative ways to overcome this difficult problem.
12.0 References


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APPENDIX A
SURVEY OF CAREGIVERS
(Pre-Program Implementation)
Prenatal Health Caregivers' Practices Related to Preterm Labour/Birth

Code # ____________________________

Please check the box that corresponds to your answer.

1. Do you have patient education materials about preterm birth prevention in your office?
   □ Yes
   □ No (skip to # 5)
   □ Not sure (skip to # 5)

2. Where are the materials located?
   □ Waiting room/lounge
   □ Examination room
   □ Stored in desk or filing cabinet
   □ Other: ____________________________________________________________

3. Do women ask questions about this material?
   □ Yes
   □ No

4. To whom do you usually give literature regarding preterm labour and birth?
   □ all prenatal clients
   □ only those at high risk of preterm labour
   □ not usually done (skip to # 8)

5. With whom do you discuss the signs and symptoms of preterm labour?
   □ all prenatal clients
   □ only those at high risk of preterm labour
   □ not usually done (skip to # 8)

6. When do you first discuss the signs and symptoms of preterm labour?
   □ before 20 weeks gestation
   □ 20 - 26 weeks gestation
   □ 27 - 30 weeks gestation
   □ 31+ weeks gestation
7. To what extent do you agree or disagree that it is important to discuss each of the following as symptoms of preterm labour: (please circle your response for each).

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Strongly disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menstrual -like cramps</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Low-dull backache</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Pelvic Pressure</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Abdominal cramping wit or without vaginal discharge</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Increase or change in vaginal discharge (mucousy, light, watery, bloody)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Fluid leaking from the vagina (ruptured membranes)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Uterine contractions less than 10 minutes apart for more than 1 hour</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>General feeling that &quot;something is not right&quot;</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

8. A primigravida at 24 weeks gestation telephones you stating she thinks she is in preterm labour. She describes having contractions every 10 - 15 minutes for the last hour. To what extent do you agree or disagree that she should be given the following advice:

<table>
<thead>
<tr>
<th>Advice</th>
<th>Strongly disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drink 2 - 3 large glasses of water and rest on your left side for one hour</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Go to the hospital</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>After a second hour of regular contractions go to the hospital for assessment</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Take a warm bath and relax</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Don’t worry, it’s probably nothing</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Have a glass of wine and relax</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Other: (specify)</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
9. Do you prescribe intravenous drugs to halt preterm contractions/labour (tocolytic drugs)?
   □ Yes
   □ No (skip to #11)
   □ Not applicable to my practice

10. What are the lowest and highest gestational ages at which you would recommend stopping uterine contractions with intravenous tocolytic drugs?

   lower limit (weeks): 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
   upper limit (weeks): 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

11. Do you prescribe corticosteroids to the mother in the antenatal period when preterm birth is a possibility to help improve fetal lung maturity?
   □ Yes
   □ No
   □ No applicable to my practice (skip to # 15)

12. What are the lowest and highest gestational ages at which you would recommend maternal administration of steroids?

   lower limit (weeks): 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
   upper limit (weeks): 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

13. Do you routinely test pregnant women for bacterial vaginosis during pregnancy?
   □ Yes
   □ No

14. Whom do you usually test for bacterial vaginosis during pregnancy?
   □ all pregnant women
   □ women at high risk

15. The results from a vaginal swab are returned to your office. A 20 week primigravida patient tests positive for bacterial vaginosis. Which of the following best describes your thoughts?
   □ I would not be concerned, this is a normal finding in pregnancy
   □ I need to recheck this at the next visit
   □ I need to talk with this woman and prescribe treatment
   □ I need more information about the management of bacterial vaginosis in pregnancy
16. The report on a 24 week primigravida that you sent for ultrasound comes back and says that the cervical length is 20 mm. Which of the following best describes your thoughts?

☐ I would not be concerned, it is within normal values
☐ I am concerned because this woman may be at risk for preterm labour
☐ I need more information about cervical length

17. During regular office hours, what is the usual protocol when your nurse/receptionist receives a call from a woman who thinks she has the signs or symptoms of preterm labour?

☐ Nurse or receptionist handles the call using their judgement
☐ Nurse or receptionist consults immediately with physicians prior to giving information
☐ Physician handles the call immediately
☐ Physician returns the call at the end of office hours
☐ Other: (specify)

18. Please answer the following questions about yourself:

a) ☐ Female ☐ Male

b) Professional specialty:

☐ family physician
☐ obstetrician/ gynecologist
☐ midwife

c) How long ago did you complete your residency?

☐ < 1 years
☐ 1 - 5 years
☐ 6 - 10 years
☐ > 10 years

d) Is the hospital where your practice is associated primarily:

☐ non-teaching
☐ teaching

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e) During 1997, approximately how many births were performed in the hospital where your practice is associated?

☐ < 500
☐ 501 - 1000
☐ 1001 - 3000
☐ > 3000

f) During 1997, approximately how many births in total did you attend?

☐ not applicable
☐ applicable # __________________________

Thank you for taking the time to complete this questionnaire. We welcome any other ideas or thought you have concerning this topic.

Comments:
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Please return the survey in the envelope included.
APPENDIX B
SURVEY OF CAREGIVERS
(Post-Program Implementation)
Prenatal Health Caregivers' Practices Related to Preterm Labour/Birth

Code # __________________________

Please check the box that corresponds to your answer.

1. How did you learn about the Preterm Birth Prevention Program Reach, React, Respond?
   - □ A public health nurse visited my office
   - □ A public health nurse contacted me by phone
   - □ A public health nurse contacted my staff
   - □ I have not heard of the program (skip to #5)

2. Do you use the Reach, React, Respond patient education materials (booklet, client questionnaire)?
   - □ Yes
   - □ No (skip to #5)
   - □ Did not receive materials (skip to #5)

3. Where are the materials located?
   - □ Waiting room/lounge
   - □ Examination room
   - □ Stored in desk or filing cabinet
   - □ Other: __________________________

4. To whom do you usually give literature regarding preterm labour and birth?
   - □ all prenatal clients
   - □ only those at high risk of preterm labour
   - □ not usually done (skip to #7)

5. With whom do you discuss the signs and symptoms of preterm labour?
   - □ all prenatal clients
   - □ only those at high risk of preterm labour
   - □ not usually done (skip to #7)

6. When do you first discuss the signs and symptoms of preterm labour?
   - □ before 20 weeks gestation
   - □ 20 - 26 weeks gestation
   - □ 27 - 30 weeks gestation
   - □ 31+ weeks gestation
7. To what extent do you agree or disagree that it is important to discuss each of the following as symptoms of preterm labour: (please circle your response for each)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Strongly disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menstrual - like cramps</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Low-dull backache</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Pelvic Pressure</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Abdominal cramping with or without vaginal discharge</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Increase or change in vaginal discharge (mucousy, light, watery, bloody)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Fluid leaking from the vagina (ruptured membranes)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Uterine contractions less than 10 minutes apart for more than 1 hour</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>General feeling that &quot;something is not right&quot;</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

8. A primigravida at 24 weeks gestation telephones you stating she thinks she is in preterm labour. She describes having contractions every 10 - 15 minutes for the last hour. To what extent do you agree or disagree that she should be given the following advice:

<table>
<thead>
<tr>
<th>Advice</th>
<th>Strongly disagree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drink 2 - 3 large glasses of water and rest on your left side for one hour</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Go to the hospital</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>After a second hour of regular contractions go to the hospital for assessment</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Take a warm bath and relax</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Don't worry, it's probably nothing</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Have a glass of wine and relax</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Other: (specify)</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
9. Do you prescribe intravenous drugs to halt preterm contractions/labour (tocolytic drugs)?
   - Yes
   - No (skip to #11)
   - Not applicable to my practice

10. What are the lowest and highest gestational ages at which you would recommend stopping uterine contractions with intravenous tocolytic drugs?
    
    lower limit (weeks): 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
    upper limit (weeks): 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

11. Do you prescribe corticosteroids to the mother in the antenatal period when preterm birth is a possibility to help improve fetal lung maturity?
    - Yes
    - No
    - No applicable to my practice (skip to #15)

12. What are the lowest and highest gestational ages at which you would recommend maternal administration of steroids?
    
    lower limit (weeks): 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
    upper limit (weeks): 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

13. Do you routinely test pregnant women for bacterial vaginosis during pregnancy?
    - Yes
    - No

14. Whom do you usually test for bacterial vaginosis during pregnancy?
    - all pregnant women
    - women at high risk

15. The results from a vaginal swab are returned to your office. A 20 week primigravida patient tests positive for bacterial vaginosis. Which of the following best describes your thoughts?
    - I would not be concerned, this is a normal finding in pregnancy
    - I need to recheck this at the next visit
    - I need to talk with this woman and prescribe treatment
    - I need more information about the management of bacterial vaginosis in pregnancy
16. The report on a 24 week primigravida that you sent for ultrasound comes back and says that the cervical length is 20 mm. Which of the following best describes your thoughts?

- [ ] I would not be concerned, it is within normal values
- [ ] I am concerned because this woman may be at risk for preterm labour
- [ ] I need more information about cervical length

16. During regular office hours, what is the usual protocol when your nurse/receptionist receives a call from a woman who thinks she has the signs or symptoms of preterm labour?

- [ ] Nurse or receptionist handles the call using their judgement
- [ ] Nurse or receptionist consults immediately with physicians prior to giving information
- [ ] Physician handles the call immediately
- [ ] Physician returns the call at the end of office hours
- [ ] Other: (specify) ______________________________________________________________

Thank you for taking the time to complete this questionnaire. We welcome any other ideas or thought you have concerning this topic.

Comments:

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

Please return the survey in the envelope included.
QUESTIONNAIRE
(Women's Knowledge of Preterm Birth)

Hospital Chart #: ______________________

Did this woman have a: _______ preterm birth
_________ term birth

R = Read the answers to the woman and let her choose
NR = Do NOT read the answers, let the woman answer spontaneously

We will start with a few general questions that we ask all women about preterm birth:

1. If a woman has her baby "preterm," that means that she delivers before: (R)
   
   ____ 40 weeks
   ____ 37 weeks
   ____ 28 weeks
   ____ Not sure

2. Did you ever consider that your baby might be born too soon, that is before 37 weeks? (NR)
   
   ____ Yes
   ____ No
   ____ Never thought about it

3. Why did you think you might be at risk for having a preterm baby? (check as many as apply or specify) (NR)
   
   ____ My last baby was born preterm
   ____ I was carrying twins, triplets etc.
   ____ I had a family history of preterm births
   ____ Tests (lab or diagnostic) indicated that there could be a problem
   ____ I or my baby had medical complications before or during pregnancy
   ____ My age or lifestyle put me at higher risk (work situation, smoking, alcohol, stress, over or underweight, lack of exercise)
   ____ Other (specify using the mother's own words)
4. Can you tell me what you think are the warning signs of preterm labour (check as many as the woman states (NR))?  

____ Menstrual - like cramps  
____ Low dull backache  
____ Pelvic pressure (heavy feeling, pushing into vagina)  
____ Abdominal cramping with or without vaginal discharge  
____ Bleeding from vagina  
____ Increase or change in vaginal discharge (mucousy, light, watery, bloody)  
____ Fluid leaking from the vagina (rupture of membranes)  
____ Uterine contractions (may be painless)  
____ General feeling that something is not right  
____ I don't know/ I can't remember  
____ Other (specify using the woman's exact words)  

5. Can you tell me how you learned about the signs and symptoms of preterm labour (check as many as apply) (R):  

____ Pamphlet, book, article, etc.  
____ Prenatal visits to caregiver  
____ Prenatal classes  
____ Family/friends had experience and I learned from them  
____ Heard/saw something about it on T.V or on the radio  
____ Picked up information in the doctor's office/ drugstore/pharmacy  
____ Experience this pregnancy  
____ Other (specify)  

6. Who provide your prenatal health care? (check as many as apply) (NR)  

____ Family physician  
____ Obstetrician only  
____ Midwife only  
____ Family physician and obstetrician  
____ Nurse practitioner  
____ Other: (specify)  
____ No prenatal care (skip to # 17)

Post PI survey only: What was your caregivers' name? ____________________________
7. How many weeks pregnant were you when you first saw someone for prenatal care? (NR)
   ____ 4 - 6 weeks (about 1 month)
   ____ 7 - 9 weeks (about 2 months)
   ____ 10 - 13 weeks (about 4 months)
   ____ 14 - 17 weeks (about 4 months)
   ____ 18 - 21 weeks (about 5 months)
   ____ more than 22 weeks (about 6 months) - specify ___ weeks or ___ months
   ____ can't recall

8. Did your health caregiver or anyone in the office discuss with you or give you information about preterm labour during your pregnancy?
   ____ Yes  ____ No (skip to #17)  ____ Can't recall (skip to #17)

9. How far along in your pregnancy were you when the topic of preterm labour was first discussed? (NR)
   ____ 7 - 9 weeks (about 2 months)
   ____ 10 - 13 weeks (about 4 months)
   ____ 14 - 17 weeks (about 4 months)
   ____ 18 - 21 weeks (about 5 months)
   ____ 22 - 25 weeks (about 6 months)
   ____ more than 25 weeks - specify ___ weeks or ___ months
   ____ can't recall

10. Which member of the office staff gave you the information on preterm labour (check as many as apply) (NR):
    ____ My own health caregiver
    ____ A nurse in the office
    ____ A receptionist
    ____ Other (specify): ____________________________

11. Did this person or these people: (R each one)
    a. Discuss the signs and symptoms of preterm labour?
       ____ Yes  ____ No
    b. Give you a booklet, pamphlet or sheet of paper on preterm labour to read?
       ____ Yes  ____ No
    c. Show you how to feel your abdomen for contractions
       ____ Yes  ____ No
    d. Tell you what to do if you had any of the signs and symptoms of preterm labour?
       ____ Yes  ____ No
    e. Do anything else: (specify) ________________________________________

12. Was your partner and/or support person given this information as well?
    ____ Yes  ____ No  ____ Can't recall
13. Did this information meet your needs?
   _____ Yes    _____ No

   (Complete only if there was an "YES" in answer #11)

14. Can you remember what you read or were advised to do if you experienced any of the signs and symptoms of preterm labour? (Check as many as apply) (NR)

   _____ Rest for a while on your side
   _____ Time the contractions for a while
   _____ Call the health caregiver
   _____ Call the hospital or labour and delivery department for advice
   _____ Change your activity level for a while
   _____ Modify your work activities
   _____ Drink 2 or 3 glasses of water
   _____ Have a glass of wine and try to relax
   _____ Other (specify)

15. Did your health caregiver ever review the information that was initially given to you about preterm labour?
   _____ Yes    _____ No    _____ Can't recall (Skip to #17)

16. The information was brought up or reviewed again: (Check all that apply) (R)

   _____ At another visit
   _____ At every visit
   _____ Only after I asked a question about the material

17. Did you attend prenatal classes during your pregnancy?
   _____ Yes    _____ No (skip to question #23 if term)
                    (skip to question #24 if preterm)

18. How far along in your pregnancy were you when you started your prenatal classes? (NR)

   _____ 7 - 9 weeks (about 2 months)
   _____ 10 - 13 weeks (about 4 months)
   _____ 14 - 17 weeks (about 4 months)
   _____ 18 - 21 weeks (about 5 months)
   _____ 22 - 25 weeks (about 6 months)
   _____ 26 - 29 weeks (about 7 months)
   _____ more than 29 weeks - specify ___ weeks or ___ months
   _____ can't recall

19. Did the prenatal teacher review the signs and symptoms of preterm labour?
   _____ Yes    _____ No    _____ Can't recall    _____ Didn't finish the classes
20. Did the prenatal teacher tell you what to do if you had any of the signs and symptoms of preterm labour?
   _____ Yes  _____ No

21. Did you receive any written information (pamphlet, information sheet) on preterm labour form the prenatal teacher?
   _____ Yes  _____ No (skip to #23 if term)
   (skip to #24 if preterm)

22. Did the information meet your needs?
   _____ Yes  _____ No

And now some questions about your experience with the signs and symptoms of preterm labour.

If preterm, skip to # 24
(Only term women answer #23)

23. At any point during your pregnancy, did you feel like you might be experiencing preterm labour or preterm ROM?
   _____ Yes (skip to # 25)  _____ No (skip to # 34)

(Only preterm women answer question #24)

24. Did you have: (R)
   _____ spontaneous preterm labour or ROM
   _____ an induction of labour for a medical or pregnancy problem (skip to #34)
   _____ a pre-booked caesarian section (skip to #34)

25. How many week/months along in your pregnancy were you when you first felt like you might be in preterm labour or have preterm ROM?
   _____ Weeks  or  _____ Months

Lets talk about the most recent time these signs and symptoms happened prior to the birth of this baby.

26A. At the time you were experiencing these signs and symptoms, did you contact a health care professional about them? (R)
   _____ Yes, immediately (skip to # 29)
   _____ Yes, but not right away (skip to # 27)
   _____ No (complete #26 B and then skip to # 34)
26B. Was there a particular reason by you chose not to call a health care professional? (NR)

_____ I didn't really think that anything would come of the symptoms
_____ I was unsure about what was happening
_____ My partner/support person said it was probably nothing
_____ I didn't want to bother my health caregiver
_____ I didn't think a few hours would make a difference
_____ I was going to visit my health caregiver soon anyway
_____ My symptoms resolved on their own
_____ Other (specify)

27. About how long did you wait before you contacted your health caregiver or went to the hospital? (NR)

_____ hours or _____ minutes

28. Could you finish this statement, "I waited a while before calling my health caregiver or going to the hospital because…" (check as many as apply) (NR)

_____ I didn't really think that anything would come of the symptoms
_____ I was unsure about what was happening
_____ My partner/support person said it was probably nothing
_____ I didn't want to bother my health caregiver
_____ I didn't think a few hours would make a difference
_____ I was going to visit my health caregiver soon anyway
_____ My symptoms resolved on their own
_____ Other (specify)

29. When you realized that you needed to get professional help for the signs and symptoms you were experiencing, what did you do first? (R)

_____ Called the hospital/ labour and delivery department (answer # 30)
_____ Called my health caregiver's office (skip to # 31)
_____ Went directly to hospital or labour and delivery department (skip to # 23)

30. What response did you get when you decided to call the hospital or the hospital's labour and delivery department? (NR)

_____ I was told to come in a be assessed (skip to #32)
_____ I was told to call my own health caregiver (skip to #31)
_____ Other (specify) ______________________________________(skip to #32)
31. What happened when you called your health caregiver's office to explain your signs and symptoms? (check as many as apply) (NR)

   _____ No one answered the phone
   _____ I only got the answering machine
   _____ I couldn't get through so I went to the hospital
   _____ I was put through to the health caregiver within a few minutes
   _____ I spoke with the receptionist and was called back within one hour
   _____ I was called back after one hour
   _____ I was told to come in to office to be seen
   _____ I was told to go directly to the hospital labour and delivery department
   _____ I didn't get called back and I went to the hospital
   _____ I was told it wasn't preterm labour and given other advice
   _____ Other (specify) __________________________________________

32. Were you admitted to the hospital for observation or treatment of preterm labour or preterm ROM?

   _____ Yes   _____ No

33. Do you feel that your concerns about your signs and symptoms were taken seriously by the professionals?

   _____ Yes   _____ No

   Comments: _______________________________________________________
   ________________________________________________________________
   ________________________________________________________________

To complete the questionnaire, we need some information about you. Let me remind you that all the information you give us remains confidential.

34. Can you tell us a little about your pregnancy history. Including this pregnancy, how many: (R)

   _____ pregnancies have you had (including those that did not end in birth)

   _____ pregnancies you had that went to 37 weeks or more
   Were any of these twins, triplets, etc.
       _____ Yes   _____ No

   _____ pregnancies you have had that went more than 20 weeks but less than 37 weeks
   Were any of these twins, triplets or more?
     _____ Yes   _____ No
35. Was this pregnancy you just finished a: (R)

   _____ single
   _____ multiple (specify, twins triplets etc.)

36. How old are you? ____________ years

37. Which of the following best describes your present marital status? (mark one) (R)

   _____ single
   _____ married
   _____ common law
   _____ separated
   _____ divorced
   _____ widowed

38. What was the last level of school that you completed? (NR)

   _____ didn't complete highschool
   _____ grade 12: Graduated: _____ Yes _____ No
   _____ grade 13: Graduated: _____ Yes _____ No
   _____ some community college or CGEP
   _____ community college or CGEP graduate
   _____ some university
   _____ university graduate
   _____ post graduate degree

Thank you for taking the time to complete this survey. Your information will be very useful to us.

Please record who was present when the interview was taking place.

   _____ Woman only
   _____ Woman plus partner/support person
APPENDIX E
CONSENT FORM FOR
POSTPARTUM WOMEN
Dear Mother,

You are being invited to participate in a research project to find out more about preterm labour and birth.

**Purpose**

We will be interviewing a group of women who have given birth to find out about their pregnancy, labour and birth experiences. This project is being carried out by the Preterm Birth Prevention Program and the six hospitals in Ottawa-Careton and Kingston who have obstetrics departments.

If you agree to participate in this study a research assistant will spend about 10 to 15 minutes with you and ask you some questions about your pregnancy, labour and birth experience and whether or not you experienced any signs and symptoms of preterm labour.

**Risk and Benefits**

There are no direct risks of being involved in this study. If you do not wish to participate or wish to stop the interview at any point, it will not affect your care in the hospital in any way. If answering any of the questions causes you distress or discomfort, you may end the interview and the research assistant will be happy to answer your questions and/or refer you to a nurse or other support person in the hospital.

Following the completion of the survey of postpartum women, a new Preterm Birth Prevention Program will be implemented. The doctors, nurses, and midwives who care for women during their pregnancy, labour and birth will participate in the prevention program. This survey will help us to determine whether the program has been helpful to women and their babies.

**Confidentiality**

All information gathered in the study will be confidential. No names will appear on any data. Only the research assistant and project coordinator will have access to the data. It will be kept in a locked filing cabinet and the data will be destroyed by mechanical shredding once the analysis has been completed. If results of this study are published,
only information from the group will appear. If you would like more information about the study, please feel free to contact me or Ann Mitchell (PEPEO Coordinator at KGH, 549-6000, ext. 4960) at any time.

Consent

You will receive a copy of this letter for your records. If you agree to participate, please complete and sign the bottom portion of this page and return it to the research assistant. We expect that the information you give us will help us implement a community-wide preterm birth prevention program. We would appreciate your help with this project. Thank you for considering this request.

Sincerely,

Helen Scott
Principle Investigator,
Department of Community Health
and Epidemiology, Queen's University
(613) 549-1232

CONSENT FORM - PRETERM BIRTH STUDY

I have read the consent form and understand that I will be asked to answer questions about my pregnancy, labour, and birth. I understand that if I do not wish to participate or if I wish to stop the interview at any point, it will not affect my care in the hospital in any way. All information will remain confidential and no names will appear on any data.

I agree to participate in the Preterm Birth Study

Name: (Please Print)

Address:

Postal Code:

Signature:
APPENDIX F
CHART REVIEW FORM
SECTION I: DEMOGRAPHIC INFORMATION

Patient's Name: ________________________________

CR #: ________________________________

Address: ________________________________

Family Doctor/ Midwife: ________________________________

Date of First prenatal Visit: ________________________________

Name of Obstetrician: ________________________________

Date of first visit with Obstetrician: ________________________________

Mother's Date of Birth: ________________________________

(Before birth of baby):G_____T_____P_____A_____L_____

Marital Status: Single
    Married
    Common Law
    Separated
    Divorced
    Widowed

Smoking: Y/N

Did the patient have an ultrasound at KGH? Y____N_____ DATE _____________
SECTION II: ADMISSION INFORMATION

Date of admission to hospital ______________________
Time of admission to hospital ______________________

If more than once, use two forms.

1. Was this woman transferred from another hospital? Y____ N_____

2. Gestational Age at admission to the hospital? __________(weeks)
   (Check): Reported by: LMP _______
   Ultrasound ______ Gestational age at ultrasound____(weeks)
   Dubowitz Scale __________
   Unknown ________________

3. Was this pregnancy a multiple gestation? Y____(Circle): Twins/ Triplets No____

4. Was this woman admitted specifically for signs or symptoms of preterm labour or preterm ROM?
   Yes ____ (Complete #5) No____(Skip to 6)

5. Were there any other indications for admission of this patient other than the signs and symptoms of preterm labour or preterm ROM (see physician progress notes)?
   Yes ____ No _____(Skip to section II)
   Examples:
   Premature rupture of membranes
   Placental Abruptia
   Incompetent Cervix (with cervical cerclage)
   Anomalies of the fetus
   Specify: ________________________________________________________________
   ________________________________________________________________

6. What was indicated on the physician's progress note as the reason for admission of this patient?
   _____ Need for elective delivery (specify)
   _____ induction of labour (specify reason)_______________________________
   _____ cesarean birth (specify reason) _________________________________
   Skip to 15 unless this woman went into spontaneous labour before the induction or section was done.
   _____ Medical or pregnancy problem(specify)_______________________________
   _____ Fetal Problem (Specify): _________________________________________
SECTION III: LABOUR ONSET INFORMATION

Date of Labour onset: ______________________
Time of Labour onset: ______________________

1. Does the patient meet the following criteria (check):

_____ Labour occurs between 24 and 37 weeks gestational age;  
_____ Documented uterine contractions;  
_____ Intact membranes  
_____ and at least one of the following:  
   a) Documented cervical change; or  
   b) Cervical effacement of 80%; or  
   c) Cervical dilation 2 cm.

2. What was the cervical dilatation at the initial assessment for signs/symptoms of labour:

   _____ cm  
   _____ not assessed  
   _____ not recorded

3. What was the cervical effacement at the initial assessment for signs/symptoms of labour:

   _____ %  
   _____ not assessed  
   _____ not recorded

4. Did the woman have orders for and receive any of the following treatments prior to the birth of the baby?

<table>
<thead>
<tr>
<th>Treatment</th>
<th>No</th>
<th>Yes</th>
<th>Date (d/m/y)</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steroid Administration</td>
<td></td>
<td></td>
<td>Dose 1</td>
<td>Dose 1</td>
</tr>
<tr>
<td>Tocolytic Therapy with ritodrine</td>
<td></td>
<td></td>
<td>Dose 2</td>
<td>Dose 2</td>
</tr>
<tr>
<td>Tocolytic therapy with MgSO4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Was the patient discharged because the labour stopped? Y____ N____

6. Date of babies birth _____________

7. Time of birth: ________________
   Baby #2 ________________
   Baby #3 ________________
8. This woman underwent a
   ____ vaginal birth
   ____ vaginal birth w/ vacuum
   ____ vaginal birth w/ forceps
   ____ cesarean birth (specify)
       ____ normal/elective  indication: __________________________
       ____ urgent          indication: __________________________

9. Sex of baby _____________________

10. Gestational age of baby at birth _______________________
     reported by: LMP ________
         Ultrasound ________ (g.a. at ultrasound)
         Dubowitz Scale ________