The Effects of Action Learning on Nurses' Use of a Fetal Health Surveillance Guideline with Low-Risk Labouring Women

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Abstract

Strategies for implementing evidence in clinical practice are often applied with an aim to change provider behaviour and improve patient outcomes. In Canada, many health professionals in birthing units use continuous electronic fetal monitoring rather than intermittent auscultation, despite the fact that continuous electronic fetal monitoring is associated with increased caesarean section and obstetrical intervention rates without benefit to the fetus. Based on a synthesis of credible research, there are national and international guidelines recommending intermittent auscultation for low-risk labouring women. The purpose of this study was to evaluate two interventions, interactive education and Action Learning, that aimed to increase nurses' use of intermittent auscultation in low-risk labouring women as per the Society of Obstetricians and Gynecologists of Canada Fetal Health Surveillance Clinical Practice Guideline (Liston & Crane, 2002). Guided by Roger's (2003) theory of diffusion of innovation and the promoting action on research implementation in health services (PARiHS) framework (Kitson et al., 2008), I conducted a two-phase study. In the first phase, I used a pre-post design with staff nurses (N = 93) to evaluate the effectiveness of an educational intervention. In the second phase, I used a randomized controlled trial design to evaluate the effectiveness of the Action Learning strategy with staff nurses (N = 62) and randomized the nurses to either Action Learning or Usual Care. During labour, 270 consecutively admitted women who met the low-risk inclusion criteria received their care from either an Action Learning or a Usual Care nurse.

Neither the interactive education intervention nor the Action Learning intervention had a significant effect on the nurses' use of guideline appropriate care,

during episodes of care for low-risk labouring women. Various types of data were explored to determine their influence on the nurses' guideline adherence. The data included the nurses' attitudes, events from the labour and practice environment, and maternal satisfaction/perception of labour. The nurses' attitudes towards intermittent auscultation, despite low adherence to the guideline and a lack of practice change, were generally positive. Two labour events, epidural analgesia and narcotic analgesic most influenced the nurses' use of guideline appropriate care ($p = .00$, and $p = .01$ respectively). Policy, equipment, social networks among the various healthcare providers in the labour area, and entrenched practices were issues in the practice environment that the nurses identified as contributing to their use of intermittent auscultation. In the postpartum period, regardless of their study nurse's group, women reported no statistically significant difference in satisfaction with their birth experience and the satisfaction scores were positive overall.

Study results provide evidence that practice change is influenced by a combination of factors from the labour experience and the practice environment. In order to be effective, implementation strategies need to take into account that (a) clinical practice settings are complex, (b) all clinicians are stakeholders in the implementation process, and (c) suggested evidence-based changes to entrenched clinical practices are likely to be difficult. Future investigation of ways to influence intermittent auscultation practice needs to consider expanding interventions beyond individually-focused interventions to include organizational factors such as team support and other aspects in the context of the birthing unit.

RÉSUMÉ

Les stratégies de mise en œuvre des données probantes dans la pratique clinique sont souvent appliquées dans le but de modifier le comportement des fournisseurs de soins et d'améliorer les résultats des patients. Au Canada, de nombreux professionnels de la santé travaillant dans des unités d'accouchement surveillent constamment le rythme cardiaque du fœtus plutôt que de manière intermittente, en dépit du fait que la surveillance cardiaque constante du fœtus est associée à un taux accru de césariennes et d'interventions obstétriques sans avantage pour le fœtus. Sur la base d'une synthèse des recherches crédibles, et des directives nationales et internationales, recommandent l'auscultation intermittente pour les femmes en travail à faible risque. L'objectif de cette étude était d'évaluer deux types d'intervention : la formation interactive et l'apprentissage actif, destinées à augmenter l'usage de l'auscultation intermittente par le personnel infirmier pour les femmes en travail à faible risque, conformément à la directive de pratique clinique pour la surveillance de la santé du fœtus, directive fournie par la Société des obstétriciens et gynécologues du Canada (Liston & Crane, 2002). En m'appuyant sur la théorie de la diffusion des innovations de Rogers (2003) et sur le modèle PARiHS – promoting action on research implementation in health services (Kitson et al., 2008), j'ai mené une étude en deux phases. Dans la première phase, j'ai utilisé un modèle avant-après avec des infirmières soignantes (N = 93) pour évaluer l'efficacité d'une intervention éducative. Dans la seconde phase, j'ai utilisé une méthodologie d'essai comparatif aléatoire pour évaluer l'efficacité de la stratégie d'apprentissage actif auprès d'infirmières soignantes (N = 62) et j'ai assigné de manière aléatoire les infirmières au groupe bénéficiant de l'apprentissage actif ou au groupe

dispensant les soins habituels. Durant le travail, 270 femmes admises consécutivement et répondant au critère de faible risque, ont reçu les soins d'une infirmière ayant suivi un apprentissage actif ou d'une infirmière dispensant les soins habituels.

Ni l'intervention éducative interactive ni la stratégie d'apprentissage actif n'ont eu d'effet significatif sur l'usage de l'auscultation intermittente par le personnel infirmier, conformément à la directive, lors des soins prodigués aux femmes en travail à faible risque. Divers types de données ont été explorés pour déterminer leur influence sur l'observation de cette directive par le personnel infirmier. Ces données comprenaient les attitudes du personnel infirmier, les interventions dans le cadre et la pratique de l'accouchement et la satisfaction/perception de la mère concernant le travail. Les attitudes du personnel infirmier à l'égard de l'auscultation intermittente, en dépit de la faible observation de la directive et du manque d'évolution de la pratique, étaient généralement positives. Les deux interventions qui ont le plus influencé l'usage de l'auscultation intermittente par le personnel infirmier étaient l'épidurale continue et l'analgésie narcotique ($p = 0,00$, et $p = 0,01$ respectivement). Les politiques, l'équipement, les réseaux sociaux entre les divers fournisseurs de soins dans l'unité d'accouchement et les pratiques fortement enracinées étaient les éléments du cadre de pratique qui, selon le personnel infirmier, influençaient l'usage de l'auscultation intermittente. Après l'accouchement, quel que soit le groupe d'étude dont elles faisaient partie, les femmes n'ont signalé aucune différence de satisfaction statistiquement significative à l'égard de leur expérience d'accouchement et les scores de satisfaction étaient dans l'ensemble positifs.

Les résultats de cette étude démontrent que l'évolution de la pratique est influencée par une combinaison de facteurs liés à l'expérience d'accouchement et au cadre de pratique. Pour être efficaces, les stratégies de mise en œuvre doivent tenir compte des facteurs suivants : (a) les cadres de pratique clinique sont complexes, (b) tous les cliniciens sont engagés dans le processus de mise en œuvre et (c) les modifications aux pratiques cliniques fortement enracinées, même si elles sont basées sur des données probantes, risquent d'être difficiles à mettre en œuvre. Les recherches futures sur les moyens d'augmenter la pratique de l'auscultation intermittente devront envisager d'aller au-delà des interventions ciblées sur les individus pour tenir compte de facteurs organisationnels comme l'appui de l'équipe et d'autres aspects du contexte des unités d'accouchement.

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Definition of Terms

The following terms are considered operational definitions for the purpose of this dissertation.

Action Learning Set

A group of colleagues (nurses) who get together in an environment of high challenge to work on an issue or issues (McGill & Brockbank, 2004). Through high challenge, group members share, reflect, and support each other in an environment where they "challenge the assumptions and perspective that a presenter may hold and have taken for granted" (McGill & Brockbank, 2004, p. 23) and generate actions (what the nurses will do when they return to practice for bringing about change).

Episode of Care

The period from admission to the Birth Unit through to delivery in which the Society of Obstetricians and Gynecologists of Canada fetal health surveillance intermittent auscultation practice guideline to low-risk labouring women applies (Liston & Crane, 2002).

Portion of an Episode of Care

The Society of Obstetricians and Gynecologists of Canada fetal health surveillance intermittent auscultation practice guideline (Liston & Crane, 2002) was further subdivided into eight portions of an episode of care. These portions are (a) admission to epidural, (b) post-epidural to delivery, (c) admission to non-reassuring fetal heart, and (d) post non-reassuring fetal heart to epidural, (e) post non-reassuring fetal heart to delivery, (f) admission to thick meconium, (g) admission to augmentation, and (h) post-epidural to augmentation.

Low-Risk

Included women at 37 to 41 weeks' gestational age, with a singleton vertex presentation fetus, and not experiencing any of the following on admission to the Birth Unit: temperature ≧37.5 C, cervical dilation >7 cm, low-lying placenta, planned induction, planned cesarean delivery, non-reassuring initial fetal heart assessment, meconium (thick), severe pregnancy induced hypertension (requiring magnesium sulfate), and/or gestational diabetes mellitus requiring medication. Low-risk status was met on admission to the Birth Unit. This status did not have to be maintained during labour.

Non-Reassuring Fetal Heart

The presence of one or more of the following: fetal heart rate baseline <110 or >160, deceleration, and/or changing fetal heart rate (Liston & Crane, 2002).

Intermittent Auscultation

Listening to fetal heart rate every 15-30 minutes, following a contraction, during the active phase of labour (Liston & Crane, 2002). The infant's heart rate can be heard using a hand-held Doppler, a fetal stethoscope, or by the intermittent use of the external transducer of the electronic fetal monitor.

Knowledge Translation

"A dynamic and iterative process that includes synthesis, dissemination, exchange and ethically sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system" (CIHR, 2008). "This process takes place within a complex system of interactions between researchers and knowledge users which may vary in intensity,

complexity and level of engagement depending on the nature of the research and the findings as well as the needs of the particular knowledge user" (CIHR, 2008). For the purposes of this trial, Knowledge Translation is the dissemination, exchange, and application of fetal health surveillance intermittent auscultation knowledge by Birth Unit nurses during an episode of care for low-risk women.

Table of Contents

List of Appendices

List of Tables

List of Figures

CHAPTER 1

Introduction

Over the past 40 years, there has been considerable growth in research-based evidence. Despite this growth, concerns exist about the limited application of this type of evidence in practice (Landry, Amara, & Lamari, 2001; Larsen, 1980; Loomis, 1985). A significant percentage of people are not receiving evidence-based health care (Cochrane et al., 2007; Grol & Grimshaw, 2003; Thompson, Estabrooks, Scott-Findlay, Moore, & Wallin, 2007) and in any illness or health condition, the appropriate evidence does often not support the selected intervention. This lack of support or application of the available research evidence leads to a lack of consistency, inappropriate variation in care for individuals, and negative health outcomes (Asch et al., 2006; Cochrane et al., 2007). For example, American adults receive about half of recommended health care services (McGlynn et al., 2003). Researchers have stated that this situation is said to be related to poor knowledge translation (Kent, Hutchinson, & Fineout-Overholt, 2009).

After decades of attempts to increase research-based practice with insufficient impact in many areas, a new field of investigation, often referred to as knowledge translation, has emerged. Knowledge translation is a "dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system" (Canadian Institute of Health Research, 2009). The ultimate goal of knowledge translation is usually a change in behaviour (MacDermaid & Graham, 2009; Schryer-Roy, 2005). To date, implementation strategies designed to improve knowledge translation, improve professional practice and

improve the delivery of effective health services, have had varying degrees of success (Ballini et al., 2010). Numerous factors have influenced this success. These factors include the type of strategy chosen for implementing the evidence (Kitson et al., 2008). It has been suggested that the choice of implementation strategies should be based upon the evidence being recommended for use and the clinical setting in which the intervention is being implemented (Kitson et al., 2008). To date, the research literature pertaining to implementation strategies aimed at changing provider behaviour have been dominated primarily by one discipline, physicians (Stetler, 2003). Implementation strategy studies that pertain to nursing are fewer in number and, because nurses play a significant role in health care delivery, this gap in knowledge must be addressed.

Evidence, more specifically research-based evidence, can be translated in many ways. Traditionally, it was felt that the publication of scientific articles in peer-reviewed journals constituted knowledge translation. Given the vast number of articles one would have to review in order to stay current on a particular topic, various forms of synthesizing the evidence have been developed (Guyatt, Meade, Jaeschke, Cook, & Haynes, 2000). One example of synthesized evidence targeted for transfer into clinical practice is the clinical practice guideline (CPG). Clinical practice guidelines, a means to support implementing evidence into clinical practice (Turner, Misso, Harris, & Green, 2008), provide a guide to best practice. They aim to improve the quality of patient care and of patient outcomes, promote efficient use of resources, and decrease the variation in practice (Kryworuchko, Stacey, Bai, & Graham, 2009; Prior, Guerin, & Grimmer-Somers, 2008). They provide a link between an appraisal of scientific research and clinical practice (Turner et al., 2008). Despite this link, Thompson et al. (2007) reported

that there were inconsistent outcomes when attempting to put research-based recommendations, such as those published in CPGs, into nursing practice. Currently, there is a pressing need to develop (Turner et al., 2008) and identify (Prior et al., 2008) effective methods of implementing CPGs.

One example of a CPG is the guideline for Fetal Health Surveillance in Labour (Liston & Crane, 2002; hereafter referred to as the guideline). Electronic fetal monitoring is a surveillance approach that was introduced into obstetrical clinical practice during the 1960s to assess fetal well-being and hypoxia during labour. The Society of Obstetricians and Gynecologists of Canada developed a guideline based on the evidence from a systematic review of 11 randomized controlled trials (RCTs) and the expert panel's clinical experience. The guideline recommends the use of intermittent auscultation for women experiencing a low-risk labour. Despite evidence that continuous external fetal monitoring is associated with an increase in both caesarean section rates and operative vaginal deliveries, most health professionals continuously rather than intermittently monitor the fetal heart during a low-risk woman's labour (Chalmers, Dzakpasu, Heaman, & Kaczorowski, 2008; Enkin, Glouberman, Groff, Jadad, & Stern, 2006).

The identification of effective approaches to implementation of a fetal health surveillance guideline has proven to be challenging (Davies et al., 2002). Although researchers have attempted to bring about change in provider fetal health surveillance behaviour, the results have been mixed with some change noted (Davies et al., 2002). There is still a gap between the recommended evidence-based approach to fetal health surveillance and the everyday practice of nurses. The purpose of this study was to

evaluate two knowledge translation strategies, an interactive education session and Action Learning, to determine which intervention, if either, was more effective in supporting nurses to follow the guideline thereby increasing their use of intermittent auscultation in low-risk labouring women. The research was guided by Rogers' (2003) theory of diffusion of innovation and the promoting action on research implementation in health services (PARiHS) framework (Kitson et al. 2008). Rogers' theory guided my understanding of how innovations spread and the various patterns and stages of innovation uptake. The PARiHS framework supported a focus on the factors influencing the use of evidence, the guideline, and drew my attention to the relationships between these factors, to the two implementation strategies, and to the desired outcome of successful implementation.

CHAPTER 2

Literature Review

The field of Knowledge Translation has evolved out of a number of foundational sources. Two of the more prominent sources include the work of Everett Rogers (1962, 2003) and the work of the Evidence-Based Medicine Working Group (1992). First published in 1962, Rogers' *Diffusion of Innovations* offered a general model of the diffusion of ideas, that is, how ideas spread (Rogers, 2003). He defined diffusion as the process by which an innovation, an idea perceived as "new" by an individual, is communicated over time and among members of a social system (2003). Rogers argued that change is impacted by different regulatory, financial, operational, and conceptual influences (2003). Rogers' theory of the diffusion of innovations is helpful when assessing the process of adoption of specific clinical behaviour (Sanson-Fisher, 2004).

The classical diffusion model, the basic paradigm for diffusion research, came from the hybrid corn study (Ryan & Gross, 1943). The rate of adoption of the innovation in this study followed an S-shaped curve. Initially there were relatively few adopters, called innovators. Early adopters, the opinion leaders of the system, followed the innovators. The rate of adoption usually increased exponentially after the early adopters began using the innovation. Both leaders and time influenced the adoption of the innovation. When individuals obtained information from a "known" source, they were more likely to adopt the idea.

Further work using Rogers' theory has identified several stages of adoption in implementing an innovation: (a) agenda-setting, (b) matching, (c) redefining, (d) structuring, and (e) interconnecting. Adopters, using these stages, design a flexible

approach that is suited to the innovation (Rice & Rogers, 1980). This approach requires a fit between the organization and its environment. As a social process, diffusion of an innovation occurs when individuals talk with one another about experiences with the innovation (Rogers, 2003). As active participants, local adopters give meaning to the new form of the innovation as they apply it to the local context.

Rogers' work involving attributes of the innovation and information exchange has led to a further understanding about the uptake of evidence (2003). That understanding led Rogers to describe five attributes of the innovation that predicted the rate of adoption (2003). These attributes are (a) relative advantage, how much the innovation is thought to be better than previous practice; (b) compatibility, how much the innovation aligns with the existing values, past experiences, and needs of potential adopters; (c) complexity, how hard it is to both understand and use the innovation; (d) trialability, how much the adopter can try out the innovation before having to implement; and (e) observability, that is, if others can see the outcome of adopting the innovation (2003). In addition to the effect of these attributes, Rogers also understood that the rate of adoption can vary from one social system to another and perhaps, from one innovation to another (2003).

In a report that incorporated findings from individual reviews, a systematic review (Grimshaw, Eccles, Walker, & Thomas, 2002), and a case study, Grol and Grimshaw (2003) identified the challenge of keeping pace with advances in healthcare. Their interest in healthcare and the process of diffusion of innovation has been focused on building research evidence and theory related to guideline implementation. Burgers, Cluzeau, Hanna, Hunt, and Grol, (2003), Foy et al. (2002), and Grol et al. (1998),

identified characteristics of guidelines, comparable to Rogers' attributes (1995) that might affect compliance in practice. The characteristics included (a) a specific health problem (compliance is better for acute versus chronic care issues), (b) the quality of evidence (the strength of the findings), (c) compatibility with existing values, (d) complexity of decision making (less complexity leads to better uptake), (e) fewer new skills needed, and (f) a clear description of the desired performance. Collectively, these researchers believed that the attributes of an innovation (Rogers, 1995; 2003) or a CPG (Grol & Grimshaw, 2003) contributed to the successful uptake of guidelines in clinical practice.

Information exchange or communication also influences uptake of an innovation. The foundational research of the diffusion of innovations theory, the hybrid corn study (Ryan & Gross, 1943), revealed how neighboring farmers influenced each other to adopt an innovation. This information-exchange was at the heart of the diffusion (Rogers, 2004). Consistent with the theory, others have argued that strategies, such as reflection on action, that enable health care providers to share their concerns and issues while supporting and challenging one another to learn, will serve to enhance information exchange (McGill & Brockbank, 2004; Schon, 1983). Swanson-Fisher (2004) contended that professional resemblance between the person introducing the innovation and the recipient enhanced the effectiveness of information-exchange.

In the foundational research model, based on the hybrid corn study, the innovation originated from an expert source and the adopter was a passive accepter (Rogers, 2003). Over time, Rogers became aware of other models of diffusion of innovations where ideas spread among peer networks in a horizontal fashion (2003). In these decentralized

diffusion systems, adopters made many decisions and sometimes were the change agents themselves. Members of these systems made decisions about how they should manage the diffusion system. The decision-making of the members was a fundamental assumption of the decentralized system. The members' capacity to manage the diffusion system was most effective when they had sufficient technical expertise and were highly educated.

Rogers reported that findings about a decentralized diffusion system revealed a gap in our knowledge (2003). This gap addressed two points. First, he identified that there was a lack of research regarding this type of adopter-controlled decentralized system. Secondly, Rogers reported that success of diffusion in such a system was linked to the change agents within the system (2003) as opposed to being diffused to the users from a centralized expert source. In a decentralized diffusion system, the users felt a sense of control because they participated in the decision-making. In this system, key decisions were based on the local needs.

The other foundation of Knowledge Translation research was the work of the Evidence-Based Medicine Working Group (1992). The origins of the evidence-based movement can be traced back to the early 20th century (Estabrooks, 1999a; Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Despite its century-old origins, the catalyst for the notion that interventions and services "should be evaluated and selected on the basis of the most reliable evidence available for their effectiveness and cost effectiveness" (Ashcroft & ter Meulen, 2004, p. 119) was identified in Archie Cochrane's 1972 book 'Effectiveness and efficiency: Random reflections on health services'. He proposed a rational practice of medicine in which RCTs, if available, were deemed

superior to all other forms of research evidence. It has been argued that the Working Group was of the opinion that the RCT ought to be used as the basis for the selection of practice interventions (Ashcroft & ter Meulen, 2004). Perhaps this notion stems from one of the five linked ideas regarding the roots of evidence-based medicine that were published in 1995. "Identifying the best available evidence means using epidemiological and biostatistical ways of thinking" (Davidoff, Haynes, Sackett, & Smith, 1995).

In 1992, in an effort to advance the scientific basis of clinical practice and focus on the role of evidence-based medicine in medical education, the Evidence-Based Medicine Working Group published an article that has become the manifesto of evidence-based medicine (Evidence-Based Medicine Working Group). At that time, the goal of evidence-based medicine was to improve, through studies of causation and interventions, the effectiveness of health care practice and outcomes (Gupta, 2003). Evidence-based medicine, as a foundation for education and practice, offered a new approach: retrieving and critically analyzing predominantly experimental studies to determine the best results and applying them to clinical practice (Montori & Guyatt, 2008). This early form of evidence-based medicine or evidence-based practice represented an empiricist mode of thinking that privileged research evidence. Truth or knowledge, therefore, was regarded as emanating from statistical analysis of the available data. Other types of knowledge were not considered to be evidence. Research was considered the only form of evidence. Some practitioners and scholars continue to understand evidence-based practice in this way and regard the results of RCTs as their principal referent for decision-making: the RCT results are considered the gold standard. The RCT as gold standard developed its reputation through its use in evaluating questions

about therapy (Sackett et al., 1996), such as, the effectiveness of drugs and surgical procedures (Lindsay, 2004).

In recent years, RCT designs have evolved and some designs now include approaches to testing complex interventions. Complex interventions contain several interacting components (Craig et al., 2008a). Other characteristics include

> Number and difficulty of behaviours required by those delivering or receiving the intervention, number of groups or organizational levels targeted by the intervention, number and variability of outcomes, and degrees of flexibility or tailoring of the intervention permitted (Craig et al., 2008a, pp. 979).

Complex interventions generally do not involve drugs or surgical interventions. Their ingredients are varied and are sometimes difficult to define and to control (Lindsay, 2004; Oakley, Strange, Bonell, Allen, & Stephenson, 2006; Spillane, Byrne, Leathem, O'Malley, & Cupples, 2007).

Early models of the implementation of these original conceptions of evidence described a linear process and supported a rational-linear view of implementation (Haines & Jones, 1994). In order to change practice, emphasis was directed to simple activities, such as disseminating the results of studies through various forms of oral and written communication and monitoring any subsequent changes in practice (Harvey, 2005; Rycroft-Malone, 2006). The overarching assumption was that a clinician's behaviour would change upon receipt of the evidence. Once given the knowledge and/or skills, healthcare professionals were expected to use them. Research evidence was given priority. The best external evidence was sought to answer clinical questions (Sackett et al., 1996).

The Evidence-Based Medicine Working Group in 1996 revised its definition of evidence-based medicine. They asserted that the use of clinical expertise in evidence-based medicine was reflected in "thoughtful identification and compassionate use of individual patient's predicaments, rights, and preferences in making clinical decision about their care" (Sackett et al., 1996, p. 71). This addition to the definition of evidence-based medicine introduced a second principle (Guyatt et al., 2000). The practice of evidence-based medicine was to include the values and preferences of the patient (Montori & Guyatt, 2008). This second principle, together with the first principle of critically appraising and summarizing the research evidence, formed the definition of evidence-based medicine. Although not cited explicitly in these two principles, the addition of clinical expertise and patient values had previously been and was supported by other authors and nursing groups (Ciliska, 2006; Kitson et al., 2008; Miles, Louglin, & Polychronis, 2008; Rycroft-Malone et al., 2004; Sigma Theta Tau International, 2005). The definition of evidence-based practice used for this research incorporates research evidence, clinical expertise, and patient preference.

Following the publication of the rational-linear views, researchers have moved towards more context-specific, multifaceted approaches of translating evidence into practice (Harvey, 2005; Rycroft-Malone, 2006) and incorporated the change in definition of evidence-based practice proposed by Sackett et al. (1996) in their perspectives. For these researchers, uptake or the adoption of evidence in clinical practice has been more successful when the implementation strategies take more than the research evidence itself into consideration. Several researchers have recognized that implementation of evidence required whole system changes (Kitson, 2009; Rajab, Villamaria, & Rohack, 2009; Titler,

2010) that implicated both the individual and the organization. For example, researchers need to consider including culture (Rajab et al., 2009; Titler, 2010) and key stakeholders (Kitson, 2009). Recent studies on knowledge translation considered these various sources of evidence, those beyond research evidence, and employed a variety of implementation strategies. The current theories and frameworks, including Rogers' diffusion of innovation theory (2003) and the PARiHS framework (Kitson et al., 2008), have recognized that the nature and number of the factors that contribute to knowledge translation vary according to the models or frameworks.

Moving Research Findings into Practice

A number of implementation models or frameworks have been developed for use in healthcare and in other settings. Each has been designed to focus on the implementation of evidence and to explain or describe how change occurs. For example, Rogers' diffusion theory is a classic model of change intended to describe how change occurs. A planned change model, however, is used to provide direction for change (Graham et al., 2007). Graham and Logan (2004) stated that planned change models identify a set of concepts that explain the way that planned change occurs, with an objective to alter social systems.

Graham et al. (2007) undertook a focused literature search that yielded 78 articles for data abstraction. Of these articles, they identified 31 models or frameworks published between 1983 and 2006 that met the criteria of being a planned action theory, model, or framework. Of these model or framework articles, 15 were interdisciplinary, two were from medicine, nine were from nursing, and the remaining were primarily from allied

health professionals. Each of these models or frameworks was developed to guide practice, research, or theory (Graham et al., 2007).

Implementation Models/Frameworks

Several authors have described their models as planned action or as models that explain the implementation of evidence into clinical practice. Those used most frequently in nursing include (a) the Stetler model of research utilization (Stetler, 1994; 2001), (b) the Ottawa model of research utilization (Graham & Logan, 2004; Logan & Graham, 1998), and (c) the Iowa model of evidence-based practice to promote quality care (Titler et al., 1994; Titler et al., 2001). A framework frequently cited in nursing is the PARiHS framework (Kitson, Harvey, & McCormack, 1998; Kitson, 2009; Rycroft-Malone, 2004).

There are a variety of similarities and differences between these models. For example, one of the differences is in the way that they describe the individual or group processes for implementing research as a basis for clinical decisions. The individual or group processes can range from finding the evidence to applying the evidence. The three models take into consideration either the individual nurse (Stetler, 1994; 2001; Titler et al., 1994; Titler et al., 2001) or the application of research from interdisciplinary perspectives including systematic assessment, monitoring, and evaluation (Graham & Logan, 2004; Logan & Graham, 1998). Each of these models has the goal of using research in practice.

When originally published, both the Stetler and Iowa model were linear in their application and evidence was considered to be solely research evidence (Titler et al., 2001). Both of these models have been revised to include new feedback loops and

actions steps or phases. The Iowa model is intended to be used with an existing committee structure where group process has already been established; in the absence of an existing committee a new team must be formed (Titler et al., 2001). Evidence is intended to be implemented at the point of care delivery. The primary focus of the Stetler model is use of research findings (Stetler, 2001). It is grounded in critical thinking and is practitioner oriented. To use the Stetler model, users must have a certain level of competency (Stetler, 2001), or support from those with the required competencies. Consideration of the adopter is not explicit in either the Stetler or the Iowa model. The Ottawa model, however, considers the setting and the adopter. Both the Ottawa model and the Iowa model address barriers to using evidence. The element of facilitation is not emphasized in any of these three models. The Ottawa model, however, does identify in their first step that a facilitator of change must be identified. The model provides direction regarding the issues to be addressed and the activities the change agent undertakes (Graham & Logan, 2004).

The PARiHS framework identifies three elements that require attention for the successful transfer of evidence into clinical practice. It focuses on the interplay of relationships of these elements within the phenomenon of the implementation of evidence. Within this framework, a facilitative approach is proposed to guide the implementation strategy. This facilitative approach is determined based upon the evidence and the context (Kitson et al., 2008). The PARiHS authors moved away from other authors' descriptions of rational linear views of a step-by-step translation process and proposed that a more reflective approach would include multifaceted facilitation strategies for implementation. They advocated that these strategies should be chosen

based on assessment of several aspects of the context and the evidence in the particular situation. These elements represented components of the system where the practice change was planned. It was the collective assessment of the context and the evidence that supported a whole system change. In this system change, both the individual and the organization were implicated. Simultaneous consideration of the elements, rather than a step-by-step approach, supported a reflective approach to change in an environment where health care providers were dealing with the daily pressures of patient care. For these reasons, (a) the delineation of the elements, (b) a reflective approach to change, and (c) a systems approach to change, I choose the PARiHS framework as a heuristic to guide the implementation strategy for the transfer of evidence into clinical practice.

PARiHS. Researchers who were working with nurses in practice settings (Kitson et al., 1998) developed the PARiHS framework. The goal was to help the nurses improve the quality of care within their care settings (Kitson et al., 1998) by changing practitioner behaviour to improve patient outcomes (McCormack, 1995). The authors proposed that the implementation of quality research was likely to improve patient care (Kitson et al., 1998). Initially they presented three central elements, evidence, context, and facilitation (Kitson et al., 1998) that they proposed would influence whether a practice based on research evidence would be successfully implemented. They have since refined their perspective on those elements through a series of concept analyses (Harvey et al., 2002; McCormack et al., 2002; Rycroft-Malone, 2004) and further research (Rycroft-Malone et al., 2004; Kitson et al., 2008). The framework has been used in a number of research studies. For example, in a recent study Brown and McCormack (2005) explored how the

three central concepts or elements aligned and contributed to improving postoperative pain management practices.

In their initial writings, Kitson and colleagues proposed a formula in which successful implementation (SI) of evidence-based practice is a function (f) of the relationships among the nature of the evidence (E), the context (C) of the proposed change, and facilitation (F) (1998). The formula is depicted as SI = f (E, C, F). They held that both context and evidence should be used to guide the facilitation approach required for successful implementation (Kitson et al., 1998; Kitson et al., 2008). They proposed that when evidence is strong and the context is strong, the situation is ideal for change. Change would ultimately occur by using a facilitative implementation strategy that aligns with the respective strength of the context and of the evidence. Facilitative support can foster changes in behaviour and working patterns; it is, therefore, a key variable in intervention research. Since its inception, the PARiHS framework has gone through three stages of refinement (Kitson et al., 2008). Development and concept analysis was the first phase (1998 – 2002). Both face and construct validity were achieved during this time. As well, it was proposed at this time that it was the interrelationship of the three key elements that led to successful implementation of new ideas. In the second phase (2001-2003), researchers used case studies to determine the factors practitioners identified that enabled transferring evidence into practice. In the final phase (2003-present), developed after this study was conceived, the authors of the framework have gone on to expand their work and to evaluate the framework. For example, they have proposed using a diagnostic and evaluative tool to more precisely measure the strength of evidence and context. McCormack, McCarthy, Wright, Slater,

and Coffey (2009) recently developed and tested the Context Assessment Index. They found this tool to have practical utility as a means to measure the strength of the context in which the practitioners work.

In this third phase, the framework's most recent iteration, Kitson and colleagues (2008) suggested a two-stage process to guide the implementation of evidence into clinical practice. The first stage is diagnostic and evaluative, where the elements and sub-elements of evidence and context are measured. In the second stage, a facilitative method is chosen based upon the data from the evaluative stage. They proposed that a facilitator and the team choose an evidence-based facilitative approach that supports a program of change. This program of change must meet the individual clinician's and the team's learning needs. Once the two-stage process is completed, the facilitator coaches and mentors the team throughout the change. Kitson et al. (2008) proposed a variety of facilitative strategies to mentor a team through change. They argued, however, that in order to move forward the assessment of readiness from a contextual perspective is warranted.

I will next describe the three elements that are central to the framework and attend to two points concerning the elements. First, all three of the key elements of the PARiHS framework include sub-elements. Secondly, the definitions of all three elements have been revised since the original publication about the framework in 1998.

Evidence. In the original definition of evidence in 1998 (Kitson et al.), there were three sub-elements: research, clinical experience, and patient preference. Each sub-element was evaluated on a continuum of low to high. The greatest success for the implementation of evidence was thought to occur when the sub-elements were rated as

being towards the high end of the continuum. In 2004, the PARiHS group undertook a concept analysis of the element evidence and argued for a broader evidence base that included four different types of evidence: research, clinical experience, patient experience, and information from the local context (Rycroft-Malone, Harvey, Seers, Kitson, McCormack, & Titchen). They proposed that evidence should be "knowledge derived from a variety of sources that has been subjected to testing and has found to be credible" (Higgs & Jones, 2000, p. 311). For example, an RCT may not be the only type of evidence valued by the individuals and the team. The group also reported a social aspect of evidence whereby different groups may value sources of evidence in different ways. Finally, refinements were made to the indicators of each of the sub-elements.

In 2008, the PARiHS authors proposed maintaining the four evidence sub-elements from 2004; however, the scale on the continuum was changed from a scale of low/high to a scale of weak/strong. Each of the sub-elements was evaluated on this scale. In order for evidence to be evaluated as strong, (a) research had to be judged as relevant, (b) clinical experience had to be reflected upon by the individual and team members, (c) the patient had to be part of the decision-making process, and (d) the local data had to be taken into consideration (Kitson et al., 2008; Rycroft-Malone, 2007). These four sub-elements comprised the sources of knowledge for evidence. No matter what the source of knowledge for the evidence, they proposed that those participating in the implementation of evidence needed to find the evidence credible. Care providers, those participating in the implementation, should also examine the evidence prior to implementation. The evidence can include sources of knowledge that are disseminated in

a tangible form and/or are acquired in an informal manner. Regardless of the sources of knowledge, they proposed that such evidence had to be subjected to validation.

Context. In the 1998 version of the PARiHS framework, context, 'the setting in which practice takes place' was defined to include the sub-elements, culture, leadership, and measurement. The 2002 concept analysis by McCormack et al. presented a refinement of the context sub-element, *measurement*. They argued that the broader term evaluation was more representative, permitting diversity in the measurement of effectiveness of the change process. The introduction of the concept of evaluation, as a sub-element of context, enabled a multi-method approach to assessing effectiveness, whereas the term measurement was associated with a scientific notion. They proposed that the term evaluation suggested the inclusion of a variety of types of evidence (McCormack et al., 2002). At this time, the continuum was changed from low/high to weak/strong. The authors stated that they made this change for the purposes of clarity. In their most recent publication, authors of the PARiHS framework suggested that context, the setting where the implementation of the proposed change is to take place, was comprised of the prevailing culture, the attributes of leadership, and the extent and types of ongoing monitoring of practice processes and outcomes in the particular context (Kitson et al., 2008). Consideration of context permits an assessment of the readiness of the context for successful implementation.

Various sub-elements of context have been found to contribute to the use of evidence in practice. For example, the strength of the unit culture can be determined based upon certain characteristics. These characteristics can include being able to define the culture in terms of prevailing values and beliefs, and the consistency of the

individual's role or experience. Identification of characteristics such as these can help to determine the factors that enable or inhibit the implementation of evidence into practice.

Pepler et al. (2005) explored whether and how nursing practices were built on research. In order to obtain data from a variety of sources and perspectives, nurses in this study completed questionnaires, were interviewed, and were observed. Unit culture was the principle factor emerging from these data and helped to explain the observed patterns of research use. Taking the sub-element of context to a broader perspective, Scott-Findlay and Golden-Biddle (2005) also proposed that organizational culture contributed to shaping behaviours, and these behaviours shaped research use. Both Pepler et al. (2005) and Scott-Findlay and Golden-Biddle (2005) identified the complexity of context within a nursing unit. The more recent research of Cummings, Estabrooks, Midodzi, Wallin, and Hayduk (2007) also identified culture as a key component, described its complexity, and added more evidence about the importance of contextual factors. These researchers identified significantly more research use in contexts that reported positive culture, positive leadership, and positive evaluation. Within the PARiHS framework, strong leadership includes transformational leadership, role clarity, effective teamwork, and an enabling/empowering approach to teaching/learning/managing (McCormack et al., 2002). Additional factors that can help to determine the strength of the context and thus enable the implementation of evidence in practice include assessment for the presence of effective (a) performance feedback on individuals, use of multiple methods for clinical performance and experience, (b) team and systems interactions or effective organizational structures, and (c) use of multiple sources of information on performance.

Facilitation. Over the 12-year history of the framework, perhaps the most significant change in the definition of sub-elements has been in relation to facilitation. In 1998 the sub-elements of facilitation were defined as characteristics, roles, and styles. In a later publication on a concept analysis of facilitation (Harvey et al., 2002), the sub-elements were refined to include purpose of the facilitation, and the role, and skills and attributes of the facilitator (Rycroft-Malone, 2004). These authors described facilitation as "the process of enabling (making easier) the implementation of evidence into practice" (Harvey et al., 2002, p. 579). The facilitation sub-elements remain unchanged in the 2008 version (Kitson et al.).

Harvey et al. (2002) identified several characteristics that distinguished the role and the actions of facilitators from those of other participants in the healthcare change process. These characteristics include (a) the facilitator is appointed, (b) the facilitator may be internal or external, and (c) the facilitator requires a broad range of skills and attributes to effectively fulfill the role. These skills and attributes would affect choices of approach that range from a task oriented, doing for others to a holistic, enabling approach. The role of the facilitator has been described as including assessing the situation and the individual, determining the readiness of the team and the workplace, supporting the implementation strategies, and coaching and mentoring the team. The authors of the PARiHS framework (Kitson et al., 2008) described the likelihood of successful research implementation as being dependent on appropriate facilitation. They proposed that the particular facilitative approach should be chosen based upon the contextual characteristics in play and the evidence to be implemented. As described by Kitson et al. (2008), this diagnostic and evaluative preparation sets the stage for the

facilitation efforts, and should influence decisions about the appropriate facilitative strategy aimed towards the goal of change. Thus, facilitation "requires flexibility and has more to do with the ability to combine a range of different techniques than rigidly prescribing a discrete intervention" (Kitson et al., 2008, facilitation as an intervention, para 1). What remains consistent throughout the history of the PARiHS framework is that the authors report that there continues to be variation in the interpretation of facilitation and in the types of facilitator roles. They argue that in their framework, the concept of facilitation requires more testing, modeling, and theoretical work. Continued research with the PARiHS framework will aid in the determination of the most appropriate role of the facilitator to conduct an appropriate facilitative implementation strategy. Research that would strengthen this framework includes incorporating a facilitator with an internal role and using an implementation strategy that takes into consideration the needs of the participants.

Sources of Knowledge pertaining to Evidence and Context

Researchers have examined various factors believed to influence the use of evidence in nursing clinical practice (Carlson & Plonczynski, 2008; Closs & Cheater, 1994; Estabrooks, Floyd, Scott-Findlay, O'Leary, & Gusta, 2003; Funk, Champagne, Wiese, & Tornquist, 1991; Funk, Tornquist, & Champagne, 1995; Hutchinson & Johnston, 2004; Kajermo et al., 2010; Thiel & Ghosh, 2008). The factors examined in this study align with the elements of the PARiHS framework, evidence, context, and facilitation, and have included nurses' willingness to change, attitudes, understanding of the research itself, and the time to both learn and change practice and the level and strength of administrative support.

Evidence. Varied descriptions and definitions of evidence (Scott-Findlay & Pollock, 2004; Mitchell, 1999; Rycroft-Malone, 2006; Upshur, 2000) are attributed to differences between health professions, philosophical stands, and to contextual differences. Butcher (1998) avowed, "the nature of what can count as evidence in the justification of a decision or judgment is varied as the types of possible judgments themselves" (p. 263). Scott-Findlay and Pollock (2004) argued that evidence should be understood as solely research findings. However, as described earlier, Kitson et al. (2008) stated that evidence included sources of knowledge, such as research, clinical expertise, patient preferences, and clinical experiences.

Rycroft-Malone and her colleagues (2004) argued that practitioners, including nurses, use a variety of knowledge sources upon which to make decisions. They hold that nurses' melding of these sources of information supports the use of both propositional and non-propositional knowledge in clinical decision-making. For many health care providers, more specifically nurses, the use of evidence in clinical decision-making aligns with the opinion of Kitson et al. (2008), that is the bringing together of the external, scientific and the internal, intuitive (Rycroft-Malone et al., 2004). Various authors' interpretations of the nature of evidence, have led to the struggle and differing opinions over what 'evidence' ought to apply in clinical practice.

Some interpretations of evidence include the elements of research, a clinician's own experience, the attitudes, knowledge, and preferences of patients, and the prevailing culture of the local context (Rycroft-Malone, 2004). The landmark paper of the Evidence-Based Medicine Working Group in 1992 regarded the first fundamental principle of evidence-based medicine as the process of classifying and choosing evidence

according to a hierarchy of evidence. It was their belief that a clinician's job was to uncover the best external evidence. While the RCT and meta-analyses were deemed the gold standard in the hierarchy of evidence, it was also recognized that certain clinical questions could not be answered by an RCT. This definition set a precedent. Upshur, VanDenKerof, and Goel (2001) have argued against the definition of levels of evidence and saw this hierarchical interpretation of research evidence as grounded in a positivistic, reductionist epistemology, with other sources of knowledge being granted less value. While this hierarchical approach to evidence and evidence-based practice began in medicine, it was also adopted by nursing. That is not to say, however, that all adopted this approach. Despite the acceptance of research evidence by health care providers, nursing has also given consideration to the discipline-specific knowledge and the diverse epistemologies that guide the discipline (Dobratz, 2010; Parse, 2008).

Some researchers have supported a more diverse definition of evidence in order to explain the complexities of nursing practice (Estabrooks, 1999a; Kitson et al., 1998; Rycroft-Malone et al., 2004; Tarlier, 2005). For some, this diversity moves away from the hierarchical view of evidence (Rycroft-Malone, 2008). The diverse approach to evidence is more reflective of, or true to, the realities, context complexities, and the specific knowledge of the nursing discipline (Rycroft-Malone et al., 2004; Tarlier, 2005). This approach includes knowledge from research evidence, clinical expertise, patient preferences, and local information in the definition of evidence and also considers the health care setting (Rycroft-Malone, 2008). In accord with the stance that these four different types of evidence characterize knowledge (Rycroft-Malone et al., 2004), I will

next consider the different kinds of knowledge and the decision-making about what should count as knowledge.

Knowledge. The nature and grounds of knowledge, or epistemology, can be understood from many perspectives. As a result, it is challenging to find a single agreed upon definition (Mantzoukas & Jasper, 2008). Kerr (1981) argued that one's general conception of knowledge and one's theory of action ultimately influence how knowledge will be used. These differences in knowledge matter epistemologically. Moreover, she stated that conceptions of knowledge utilization are inconsistent among social institutions and from one individual's practice to another's. I will address conceptions of knowledge by first introducing propositional and non-propositional knowledge (Eraut 1985; 2000), and then by integrating them with the classical fundamental patterns of knowing in nursing (Carper, 1978).

For the purposes of this argument, the knowledge in question is practice knowledge. Nurses use two types of knowledge in their decision-making, propositional and non-propositional (Rycroft-Malone et al., 2004). Propositional knowledge stems from research and other forms of scholarship. Eraut (2000) refers to it as codified or public knowledge. This knowledge is given status, for example, when it is included in education courses. Conversely, non-propositional knowledge arises mainly from historically or conventionally based routines in clinical practice. I argue that together, these two types of knowledge encompass Carper's classical descriptions of the patterns by which nurses learn to know or build knowledge, and then use that knowledge in their practice (1978).

In Carper's approach, four patterns of knowing were described and deconstructed: empirics, esthetics, personal knowledge, and ethics. The first pattern, empirics, represents the science of nursing. In order to describe, explain, and predict a certain phenomena, knowledge is systematically organized into general laws and theories. The representativeness, clarity, and logic of the theories, as well as the outcomes of scientific research shape this first pattern. Esthetics, or the art of nursing, requires a broad distinction of perception between the abstracted particulars and the abstracted universals. Through this distinction, the art of nursing has the element of creativity within the practice context. Personal knowledge, the third pattern of knowing, is both difficult to reach and complex to teach. Personal knowing cannot be described or experienced, but simply actualized. It allows for the expression of "the uniqueness of the individual encountered as a person, as a self" (p. 19) and addresses the holistic nature of the nurse/patient therapeutic relationship. The fourth and final pattern of knowing is ethics. This is the moral component of knowing, focusing on what we should do, moral obligations, and codes of conduct. Collectively, the patterns of knowing combine the influences of evidence from scientific facts, the human and practice context, and the expected professional approaches and accountabilities.

Processes of knowing are influenced by nurses' sets of beliefs, as well as different spaces and times (Mantzoukas, 2007). It is the integration of these various sources of knowing, similar to the four different types of evidence described by PARiHS (Rycroft-Malone et al., 2004), that influence practice within a given nursing unit. Therefore, the overall gestalt of knowledge, influenced by critical reflection (Mantzoukas & Watkinson, 2007), constitutes the evidence base available for use in clinical practice. This evidence

base, according to the PARiHS authors stems from, as previously described, the four different types of evidence, research, clinical experience, patients, and local context and environment (Rycroft-Malone et al., 2004).

Implementing evidence in clinical practice. Within the studies exploring the effect of strategies used to transfer evidence into clinical practice, there is an equally wide range of 'types of evidence' available to implement and to assist with implementation. As described in relation to the PARiHS framework, there are elements that influence the implementation of this evidence. The focus for the type of evidence to be implemented in this study is a particular type of evidence published in a clinical practice guideline related to fetal health surveillance. This fetal health surveillance guideline was based on evidence from research and from clinical experience. In this research, my focus was on application of the guideline for labouring women who were low-risk on admission to the birth unit (Liston & Crane, 2002). The study nurse's adherence to the guideline was measured during the entire episode of care. That is, the nurse was considered to have adhered to the guideline when the fetal health surveillance care she provided was exactly as the guideline recommendation stated for that clinical situation, from admission to delivery. In addition to the guideline, the study nurses also considered evidence from their clinical experience and evidence from their knowledge about the patient experience to influence guideline implementation. In this study, I assessed the nurses' attitudes towards intermittent auscultation as a proxy for their clinical experience, and the patients' reported perceptions of their birth experience as the proxy for knowledge about patient experience. In this section, I will review the

guideline, the knowledge about clinical experience, and the knowledge about patient experience.

Knowledge from research evidence: Clinical practice guidelines. The use of CPGs is aimed at providing recommendations for clinical practice that are supported by evidence. In many CPGs, this evidence is comprised of both the best available research evidence and clinical expertise. CPGs can provide a number of benefits. Developed systematically and usually evaluated at a high level of methodological strength by either professional or government organizations, CPGs are designed to help in the decision-making process of practitioners and patients in specific clinical situations (Field & Lohr, 1992; Rogers, 2003). When implemented, CPGs can improve both process and outcome measures of care (Barosi, 2006; Grimshaw et al., 2004; Grol, Wensing, & Eccles, 2005; Kryworuchko et al., 2009) and include a possible reduction in practice variation (Kryworuchko et al., 2009). The effectiveness of a CPG depends upon the successful uptake and transfer into clinical practice (Hakkennes & Dodd, 2008). As previously stated, the CPG for implementation in this study concerns fetal health surveillance.

Fetal health surveillance. Fetal health surveillance by the monitoring of a fetus's heartbeat during labour is an obstetric intervention that has been used since the early 1800s (Freeman, Garite, & Nageotte, 2003). It is perhaps the most common assessment procedure employed during the birth experience (Chalmers et al., 2008). Originally developed as a screening test for intrapartum asphyxia, it is currently and routinely performed with either intermittent auscultation or continuous electronic fetal monitoring throughout labour. Unlike intermittent auscultation, continuous electronic fetal monitoring is a procedure where the labouring woman remains in a bed, physically

connected to the electronic fetal monitoring machine, for all or part of her labour experience. The Society of Obstetricians and Gynecologists of Canada developed a CPG in 2002 to provide evidence-based guidance for fetal health surveillance (Liston & Crane, 2002). This guideline was comprised of 16 recommendations related to the standards of fetal health surveillance in labour. Of these, five recommendations were related to the standards of either intermittent auscultation or continuous intrapartum electronic fetal monitoring. More recently, the authors revised this guideline (Liston, Sawchuck, & Young, 2007). Change in the guideline resulted in a recommendation of intermittent auscultation as the *recommended* method of fetal health surveillance for healthy women in active labour (Liston et al., 2007). In 2002, this intermittent auscultation recommendation was the *preferred* method of fetal health surveillance for women experiencing healthy pregnancies in active labour (Liston & Crane). The 2002 guideline did not have a specific recommendation for fetal health surveillance in epidural analgesia use during labour. In 2007, a recommendation was added to the guideline regarding the use of intermittent auscultation when epidural analgesia was used during labour. This recommendation stated that intermittent auscultation may be used when there is epidural analgesia as long as there is a protocol in place for frequent intermittent auscultation assessment.

The strength of the Society of Obstetricians and Gynecologists of Canada guideline is that it is built on outcomes of fetal health surveillance research. The guideline was developed based on a review of RCTs from 1995 to 2002. Both Medline and the Cochrane Database were searched for new studies. Using the criteria and classification system of the Canadian Task Force on the Periodic Health Examination, the

guideline authors rated their recommendations based upon the level of evidence of these RCTs (Liston & Crane, 2002). The guideline authors rated their intermittent auscultation during labour recommendation as I-A (Liston & Crane, 2002).

Guideline development. A systematic review of 11 RCTs (Haverkamp et al.,1979; Haverkamp, Thompson, McFee, & Cetrulo, 1976; Kelso et al., 1978; Killien & Shy, 1989; Luthy et al., 1987; MacDonald, Grant, Sheridan-Pereira, Boylan, & Chalmers, 1985; Neldam et al., 1986; Renou, Chang, Anderson, & Wood, 1976; Shy et al., 1990; Vintzileos et al., 1993; Wood et al., 1981), published in the Cochrane Library (Alfirevic, Devane, & Gyte, 2006), compared the practice of continuous external fetal monitoring with intermittent auscultation. The studies included in this systematic review included 33,581 women. The review revealed that the use of continuous external fetal monitoring is associated with:

• A decrease in the frequency of one-minute Apgar scores below four (relative risk [RR] = 0.82, 95% CI [0.65, 0.98]);

• A decrease in neonatal seizures (RR = 0.5, 95% CI [0.30, 0.82]). A follow-up study of infants with seizures showed no long-term negative impact (Grant, 1989);

• An increase in the rate of caesarean delivery (RR = 1.33, 95% CI [1.08, 1.59]); and

• An increase in the total operative delivery rate (RR = 1.23, 95% CI [1.15, 1.31]).

Based on these findings, the Society of Obstetricians and Gynecologists of Canada (Liston & Crane, 2002; Liston et al., 2007), the American College of Obstetricians and Gynecologists (ACOG, 2005), the Royal College of Obstetricians and Gynaecologists (RCOG, 2008), in collaboration with the National Collaborating Centre

for Women's and Children's Health (NICE, 2007), and the Association of Women's Health Obstetrics and Neonatal Nursing (AWHONN, 2005) recommended intermittent auscultation in low-risk labouring women. Changes in fetal health surveillance strategies are recommended if the woman's risk-status changes.

Only a few labour and birthing units in Canada have policies that reflect the recommendations set forth by the various professional associations (MacDonald, 2002) and available reports suggested extremely limited compliance with the recommended organizational policies (Caesarean Section Working Group, 2000). The introduction of electronic fetal monitors in health care led to an explosive growth of continuous external fetal monitoring without evidence of effectiveness. By 1998, continuous external fetal monitoring was being used in 84% of all births in the United States (Albers, 2001). Results from a recent Canadian Maternity Experience Survey revealed that continuous external fetal monitoring was a common experience for women during labour (Chalmers et al., 2008). Most women in this survey reported receiving some form of external fetal monitoring (90.8%) and 62.9% reported receiving continuous external fetal monitoring (Chalmers et al., 2008). The divergence between recommended and actual external fetal monitoring practice by health care professionals represents a clinical care gap (Qian, Smith, Liang, Liang, & Garner, 2006).

Only two studies have measured change over time in the use of continuous external fetal monitoring and a variety of other routine practices. Qian et al. (2006) reported the results about obstetrical practices as reported in a 2002 to 2003 survey of 711 vaginally delivered women from the postpartum units of four hospitals and compared the results to data collected in 1999. During the intervening three to four years, there had

been several policy and evidence dissemination initiatives. The hospital division directors had communicated expectations for use of evidence-based practice and there had been regional dissemination and translation of evidence-based concepts and evidence pertaining to reproductive care practices. Practice rates were determined by asking the women who had delivered vaginally about the specific obstetrical practices, mode of delivery, and their views on the childbirth environment. Notes from hospital charts, if available, verified the women's interviews. Additionally in the 2002 to 2003 period, 24 practitioners, three doctors, and three midwives from each site were interviewed. They were interviewed regarding, for example, changes in policy, interventions during childbirth, and opportunities for practice change. The rate of continuous external fetal monitoring remained high (greater than 90%) at the urban hospitals and at the rural hospital, there was a statistically significant increase in the rate of women's reports from 1% to 27% ($p < .01$). There were significant decreases in some other routine obstetrical practices (pubic shaving, rectal examination, and immobility during labour) but that pattern was different across hospitals. The authors reported that the interview data from providers revealed that the changes in practice were the result more of the administrator's clear expectations for more evidence-informed practice and efforts to disseminate evidence-informed practice standards than the national publications. For one practice, the change to less evidence-informed practices was attributed to the providers' interpretation of a change in legislation. Despite the decrease in some other well-established practices, the rate of continuous external fetal monitoring stayed the same or in the rural area, increased. This lack of change in fetal health surveillance may attest to the difficulties associated with changing the practice of fetal monitoring.

The second study was performed in four hospitals. Two of these hospitals were experimental and two were control. The researchers evaluated a protocol to decrease the use of external fetal monitoring for low-risk women in labour (Davies et al., 2002). In each of the two experimental hospitals, an individually tailored hospital program, standard community-wide approach plus an active research transfer approach, was implemented. This program was developed in consultation with key hospital administrators. The usual community-wide approach was coordinated by the regional prenatal education program and was used in each of the two control hospitals. This approach consisted of passive diffusion strategies including newsletters and annual conferences. There was a statistically significant ($p < .001$) decrease in the continuous external fetal monitoring rate in one of the experimental hospitals (90.1% before versus 41.0% after the intervention) and in one of the control hospitals (99.5% before versus 91.4% after the intervention). Given the magnitude of the effect, the authors highlighted the need for future research to determine the elements contributing to the findings of a large change in practice in one of the two experimental hospitals.

Different ways of using research evidence. Different ways of using research have been noted. These are instrumental, conceptual, and symbolic. Instrumental use involves the direct/concrete application of research results to practice and is most referenced when researchers discuss evidence-based medicine (Estabrooks, 1999b). In this direct research application, conclusions and recommendations are applied to a specific clinical action. Conceptual use, however, differs from instrumental use in that it involves research use for enlightenment. It does not involve immediate and direct application in the form of actions or decisions. It can, however, provide ways of thinking about situations and

gradually bring about major shifts in awareness and reorientation of basic perspectives. The use of research evidence is influenced by efforts that are less direct and less specific than instrumental use. Conceptual use places less demand on the users. In their own time, users can make decisions regarding the implementation of research results (Beyer & Trice, 1982). Some believe conceptual use of evidence to be more prevalent than instrumental use and perhaps more significant (Caplan, 1977; Rich, 1977; Stetler, Corrigan, Sander-Buscemi, & Burns, 1999). Conceptual use represents a less specific change in behaviour and may not be easy to ascertain (Weiss, 1980).

The final type of research use, symbolic or persuasive use, involves using research to legitimate or to sustain a position. Data on the symbolic use of research are sparse (Beyer & Trice, 1982) although there is documentation of persuasive research utilization in the classic work done by Florence Nightingale (Estabrooks, 1999b). Nightingale used her documented findings to secure government support for measures she believed would lead to the improvement of British soldiers' health outcomes.

Knowledge from clinical experience: Attitude. A systematic review of six studies examining individual determinants of research utilization revealed that these determinants included attitudes, professional characteristics, education, and age (Estabrooks et al., 2003). Attitude, the determinant that has been frequently assessed, was the only one consistently to influence research use. Attitude was statistically significant in five of the six studies included in the review. Grol et al. (2005) reported the notion of a practitioner's attitude influencing the implementation of a research-based innovation. They stated that the awareness of attitudes enabled the diagnosis of

implementation problems related to the individual. It remains unclear, however, to what extent attitudes influence interest in, or adherence to the desired practice change.

Nursing researchers attempting to influence the successful implementation of practice change in obstetrics (Davies et al., 2002; Spague, Oppenheimer, McCabe, Graham, and Davies, 2008) have reported the influence of attitude, along with context, in the successful implementation of evidence into practice. Davies et al. (2002) argued that practitioners' beliefs, along with other factors in the practice setting contributed to uptake. Sprague et al. (2008) proposed that a better understanding of the influence of attitude, as well as culture, was needed and would be predictive of successful implementation. They believed that an awareness of the prevailing values and beliefs contributed to an understanding of the strength of the unit culture. While some researchers see an alignment of attitude and context, in this research I conceptualize these elements differently. Attitude is a component of the sub-element clinical experience within evidence and culture is a sub-element within context. The authors of the PARiHS framework contend that, collectively, attitude and culture are sub-elements whose strengths contribute to an individual or team readiness for change. As a practical and pragmatic tool to enable the implementation of evidence in clinical practice, Kitson et al. (2008) proposed that practitioners and researchers at the local level could use the PARiHS framework because of the consideration of various sub-elements for change. McCormack and Wright (2009) argued that this understanding of strength of the elements will help identify factors that hinder or enhance care in order to make practice change.

Recently researchers have identified attitude as a predictor of intention during the provision of care during labour. In their descriptive survey, Payant, Davies, Graham,

Peterson, and Clinch (2008) examined nurses' intentions to practice continuous labour support with both women who received, and women who did not receive an epidural analgesia. They assessed the nurses' intentions based on their responses to two scenarios: one with an epidural and one without. In the epidural scenario used, 88% of the variance in nurses' intention to provide continuous labour support was predicted by the nurses' subjective norms and their attitudes. The nurses who had lower scores in attitude had less intention to provide continuous support to labouring women who had received an epidural. These researchers did not examine the relationship between provider intentions and actual behaviour.

Knowledge from patients: Patient perception. Awareness of patient's preferences can be incorporated into clinical decision-making (Rycroft-Malone, 2004). Researchers have assessed both nurses' perceptions and labouring women's perceptions of fetal health surveillance. This discussion begins with a focus on women's perceptions of fetal health surveillance during labour.

To date, 12 studies have specifically assessed a woman's perception of various fetal health surveillance strategies during labour and delivery. Of these, 10 are descriptive (Arikan, Haeusler, Deutsch, Greimel, & Dorfer, 1998; Beck, 1980; Dulock & Hurron, 1976; Hodnett, 1982; Jackson, Vaughan, Black, & D'Souza, 1983; Kruse, 1984; McDonough, Sheriff, & Zimmel, 1981; Shalev, Eran, Harpaz-Kerpel, & Zuckerman, 1985; Shields, 1978; Starkman, 1976) and had varying weaknesses in their methodologies. The remaining two studies, including both high- and low-risk women, were RCTs comparing continuous external fetal monitoring to intermittent auscultation (Garcia, Corry, MacDonald, Elbourne, & Grant, 1985; Hansen, Smith, Nim, Neldam, &

Osler, 1985). Women in these studies reported the following disadvantages of continuous external fetal monitoring (a) enforced immobility, (b) uncomfortable belts, (c) feeling of being "tied down," (d) technical atmosphere, (e) increased anxiety, (f) undue attention to the monitor by staff, (g) feelings of competing with the monitor for attention from the husband, (h) being left alone, (i) perceptions of an invasion of privacy, (j) worries about equipment breakdowns, (k) interference with concentration, and (l) annoyance from the noise. Reported advantages included (a) understanding the rationale for monitoring, (b) being reassured, and (c) assistance with women's breathing techniques, given that the monitor output included a wave-like graph of the contraction. It is not clear if the women were advised of the effects of both approaches to fetal health surveillance.

Researchers have suggested that a greater depth of understanding of women's views of satisfaction during labour and birth is important for health care providers. Despite the majority of women being happy with labour and birth, lower satisfaction has been associated with various intrapartum events including caesarean births and instrumental vaginal deliveries (Waldenstrom, Borg, Olsson, Skold, & Wall, 1996; Waldenstrom, 1999). These events are associated with continuous electronic fetal monitoring.

Satisfaction with childbirth is associated with postnatal psychological well-being (Green, Coupland, & Kitzinger, 1990). Perla (2002) reported that a greater understanding of the impact of satisfaction assisted nurses in addressing maternal recovery and functioning issues. Grant (1998) suggested that a better understanding of women's perceptions during childbirth would enable health care providers to better address the

health care needs of women and possibly their families. An approach to fetal health surveillance that takes into consideration women's perceptions of their birth experience is warranted.

The measurement of satisfaction is complex because it is a multidimensional concept (Avis, Bond, & Arthur, 1995). In a systematic review, Hodnett (2002) concluded from the studies reviewed that the inadequacies in the existing studies on childbirth satisfaction were related to measurement issues and to factors determining satisfaction. Measurement of satisfaction was obtained inconsistently and fetal health surveillance was not specifically identified as an intrapartum event influencing satisfaction in the measurement tools used in the studies (Hundley, Milne, Glazener, & Mollison, 1997; McCrea & Wright, 1999).

A recent Canadian Maternity Experiences Survey (Chalmers et al., 2008) included external fetal monitoring in the measurement of satisfaction. Completed responses were obtained from a randomly selected sample of 6421 women. The researchers received a 78% response rate. The survey respondents whose ratings of birth were very positive were more frequently women who had midwives as their primary care providers (71.1%). Positive satisfaction ratings where other health care providers managed the care were somewhat lower (obstetrician, 52.3%; family doctor 58.3%; or nurse/nurse practitioners 53.6%). Women who did not experience any interventions in labour (64.3%) were more positive than those who experienced at least one intervention (53.4%). Interventions included electronic fetal monitoring, augmentation, induction, epidural analgesia, episiotomy, shaving, enemas, pushing on the top of the abdomen, forceps and vacuum

use, and position for birth. Not included in the survey results were ratings particular to either intermittent auscultation or continuous external fetal monitoring.

The research evidence supporting the 2007 Society of Obstetricians and Gynecologists of Canada CPG on fetal health surveillance did not include studies relating to satisfaction with fetal health surveillance (Liston et al., 2007) and the Canadian Maternity Experiences Survey (Chalmers et al., 2008) did not report women's satisfaction with fetal health surveillance. Evidence about a woman's satisfaction was reported, however, in one trial measuring women's perceptions of external fetal monitoring in preterm labour (Killien & Shy, 1989). The differences in the rankings on a Likert scale between the intermittent auscultation group (mean = 6.1, SD = 0.7) and the continuous external fetal monitored group (mean = 5.6, SD = 0.9) were not statistically significant. Based upon the research conducted to date, I identified two issues for consideration. First, recent research both on satisfaction during labour (Chalmers et al., 2008) and the guideline for fetal health surveillance during labour (Liston et al., 2007), did not report data on a women's satisfaction with fetal health surveillance. Secondly, the one study available on a women's perception of fetal health surveillance was with women experiencing preterm labour. This gap in the literature warrants studying the fetal health surveillance perceptions of women experiencing a low-risk labour.

Context. According the PARiHS framework, consideration of the context, the setting where practice takes place (McCormack et al., 2002), can provide an assessment of whether practitioners are ready to use evidence in practice. A contextual assessment can help to determine the facilitative strategies for the implementation of evidence into practice (McCormack & Wright, 2009). Kitson et al. (2008) contended that a facilitated

dialogue among health care providers is useful in exploring the status of these contextual sub-elements. The identification of enablers and inhibitors permits the researchers to match an intervention to the local context. There is a developing body of evidence about the contextual factors that influence the uptake of research evidence.

Enablers and inhibitors. One approach to assessing the way things are done in a particular context is for researchers to assist practitioners to identify factors that influence guideline uptake. For example, Ploeg, Davies, Edwards, Gifford, and Miller (2007) used qualitative thematic analysis in their reported on the participants' evaluation of seven Registered Nurses Association of Ontario guidelines and the implementation of these guidelines in 22 agencies across Ontario, Canada. A variety of facilitators and barriers influencing implementation were reported. Facilitators were at the individual, organizational, and environmental levels and included learning about the guideline, positive staff attitudes and beliefs, leadership and the unit-based champions. Barriers included negative attitudes and beliefs, limited integration of guideline recommendation, time and resource constraints, and organizational changes. These authors concluded that implementation strategies should address these factors and tailor their interventions to the group of stakeholders.

Graham, Logan, Davies, and Nimrod (2004) based on a qualitative case study, reported factors that affected the implementation of a fetal health surveillance guideline. These researchers have argued that it is necessary to identify barriers and facilitators in order to support guideline implementation. These barriers and facilitators were related to the practice environment, as well as, the individual practitioner and strategies for using the guideline. These researchers recommended that the identification of these factors

could be helpful in modifying the intervention as necessary in order to implement practice change. They suggested that interventions could be modified by (a) increasing availability of equipment, (b) changing nursing leadership, or (c) changing the physical setting. These alterations might be a critical component in enabling practice change. It is also important to remember that the identification of barriers and facilitators needs to be context specific so that the facilitation strategies chosen for practice change can be appropriate for the local level (Graham et al., 2004).

Researchers are consistent in describing the importance of identifying inhibiting factors and using enabling strategies within the specified context of implementing change. The context work of the PARiHS authors (Kitson et al., 2008) is consistent with both Ploeg et al. (2007) and Graham et al. (2004) who reported the need to identify factors that enable or inhibit a practice change. Ploeg and colleagues have found that "social interactions among nurses in learning and strategizing about guideline implementation, and in the form of collaboration and teamwork among nurses and other professionals, were important for successful guideline implementation" (2007, p. 217). This notion of social interaction is similar to the information-exchange and communication that Rogers (2003) stated was at the heart of diffusion. By understanding how ideas spread, researchers can identify the factors influencing the use of evidence and also identify the relationships between these factors and the desired outcome (Rycroft-Malone, 2004).

Facilitation. The authors of the PARiHS framework (Kitson et al., 2008) argued that successful research implementation requires appropriate facilitation. Facilitation "requires flexibility and has more to do with the ability to combine a range of different

techniques than rigidly prescribing a discrete intervention" (Kitson et al., 2008, facilitation as an intervention, para 1). From a guideline implementation perspective, facilitation can take numerous forms (Wallin, Profetto-McGrath, & Levers, 2005). These forms, as previously discussed, can range from being task focused, for example project management or resource identification, to enabling, for example personal development or action learning. Conceptual clarity regarding the characteristics of successful facilitation is limited. For example, researchers in one setting discussed the role of an external facilitator (Stetler et al., 2006), while the authors of the PARiHS framework identify using either an internal or an external facilitator. These authors do not propose which of these two types of facilitators is appropriate for which specific context.

When the aim is to use evidence from a CPG, facilitative efforts need to be enabling (Wallin et al., 2005). Rogers (1995) discussed the "cumulatively increasing influences upon an individual to adopt" (p. 259) an innovation. For example, increasing the number of times of provision of a facilitative strategy may have a greater impact upon the individual to adopt the innovation, much like the response to increasing doses of a medication. Comparably, researchers aiming to implement guidelines for Kangaroo Mother Care (Wallin, Rudberg, & Gunningberg, 2005) found that team members preferred an extended facilitation period. This preference was expressed because a natural substitute for the facilitator did not exist. It is possible that continued facilitation is necessary so that as the dose of the information or intervention increases, the quantity of information exchanged through this interpersonal network increases.

Implementation strategies. Implementation strategies have been selected by facilitators according to (a) strength of evidence, (b) strength of the context, and (c) the

professional discipline (Grimshaw, Eccles, & Tetroe, 2004; Kitson et al., 2008; Stetler, 2003). Implementation strategies aimed at improving professional practice and the delivery of effective health services have been reported individually in the literature and /or indexed within the Cochrane Library, Effective Practice, and Organisation of Care Group (EPOC). In the EPOC 2009 publication of 54 reviews, 11 were specific to implementation strategies and methods (The Cochrane Library, 2009). Of these reviews, the ones relevant to this study are (a) continuing education meetings and workshops, (b) local opinion leaders, and (c) tailored interventions. These were particularly relevant to the current study because the strategies were feasible in the particular population and context. The other strategies included in the EPOC reviews had included more than one discipline participating in the intervention or the intervention included electronic retrieval or telemedicine. In this study I conducted an intervention with nurses. Therefore, in this review I focused on interventions that were related to one discipline, nursing, and those that involved interventions that were feasible in the study setting. I will describe each of the reviews of intervention that are relevant to this study and will provide specific commentary, where possible, on the evidence that is pertinent to the nursing discipline.

The review of reported research on continuing education meetings and workshops contained 81 RCTs and involved more than 11,000 health professionals (Forsetlund et al., 2009). Of these trials, there was nursing representation in four studies. The researchers reported statistically significant outcomes in improved provider behaviour in all of the nursing studies. One of these studies included nurses in a long-term care facility (Parker, Leggett-Frazier, Vincent, & Swanson, 1995). The remaining studies were comprised of nurses in either community or public health practices (Gray, Wykes, Edmonds, Leese, &

Gournay, 2004; Mazzuca, Barger, & Brandt, 1987; Simons, Reynolds, & Morison, 2001). None were of studies in a hospital setting.

Overall, Forsetlund et al. (2009) reported that continuing education meetings can improve professional practice and healthcare outcomes with a small effect. The risk difference ranged from –0.3 to 13.6. Collectively, these studies demonstrated a difference in outcome ranging from 0.3 fold decreased to 13.6 fold increased improvement in professional practice and health care outcomes when comparing participants attendance at continuing education meetings. They reported that both continuing education meetings and workshops were less effective in changing practices when the change was related to patient outcomes that the researchers defined as less serious. In addition, the meetings and workshops were not likely to be effective in changing complex behaviours.

A second intervention review examined the use of local opinion leaders as a strategy for facilitating change in provider behaviour (Doumit, Gattellari, Grimshaw, & O'Brien, 2009). Of the 12 RCTs that made up this review, nurses were the providers of interest in two (Closs, Briggs, & Everitt, 1999; Hodnett et al., 1999). The opinion leader strategy was a successful intervention in the Closs et al. (1999) study; however, this strategy was unsuccessful as an intervention in the Hodnett et al. (1999) study. Doumit et al. (2009) concluded from 12 studies that the use of opinion leaders was a successful strategy. Future research should include a more complete delineation of the activities used by the opinion leaders and more description of professional or personality traits of the opinion leaders. This will enable both replication and a greater understanding of the attributes of local opinion leaders that contribute to effective practice change.

Fifteen RCTs comprised the review of tailored interventions to overcome identified barriers to change (Cheater et al., 2009). Tailored interventions were compared to no intervention or to an intervention that was not tailored to barriers. There was no consistency in the results of these trials. For example, Davies et al. (2002) designed a trial to determine whether using an “active approach" and an “interactive education workshop” together with hospital policy reviews, multidisciplinary meetings, rounds and unit discussions, would affect the proportion of low-risk women receiving external fetal monitoring during labour and delivery, and labour support. There was a statistically significant ($p < .001$) decrease in the continuous external fetal monitoring rate in one of the two experimental hospitals and one of the two control hospitals. Focusing on nursing within a multidisciplinary team, this was the first study to introduce a tailored unit intervention aimed at change for labouring women who received electronic fetal monitoring.

Not included in this tailored intervention review was the recent publication by Sprague et al. (2008) of a study of implementing a guideline for second-stage labour. The knowledge translation approaches used in this two-site multidisciplinary, pre- and post-evaluation study included recruiting champions, intensive education sessions, posting CPGs, and feedback. These strategies resulted in some improvement in one site and little improvement in the other. These mixed findings are similar to those reported in the larger, overall implementation review of tailored interventions (Cheater et al., 2009). The authors questioned the approaches taken to identify and addressed the barriers to change. They reported that barriers vary depending on settings over time. Further research is warranted on identifying and overcoming barriers.

Together, these reviews highlight inconsistencies in intervention effectiveness, highlight a focus on physicians as the provider, and highlight the need for further research. Among these multidisciplinary studies, participants in two of the reported studies included hospital based staff nurses (Davies et al., 2002; Hodnett et al., 1996). The roles of the nurses in the remaining studies were as either as specialists or as independent practitioners. In contrast, the Thompson et al. (2007) systematic review of interventions, aimed at increasing research use in nursing, excluded studies about nurse practitioners from their review, arguing that their practice was more similar to medical practice than to hospital based nursing. Unlike the EPOC reviews, Thompson et al. (2007) did not restrict their review to studies that reported both a change in provider behaviour and patient outcomes. One or both of these outcomes could have been reported. As a result, different studies were included in each of these reviews and the reviews are therefore not comparable.

As recently as 2009, Foxcroft and Cole, in the Cochrane EPOC Group review of organizational infrastructures to promote evidence-based nursing practice reported that they were unable to find studies that were sufficiently rigorous. They suggested that, from the studies reviewed, there were no clear implications for practice, and that future research that is both rigorous and inclusive of organizational infrastructure, is needed. Several researchers have supported Foxcroft and Cole's overall findings. Kryworuchko et al. (2009) reminded us that "knowledge translation researchers and guidelines developers must do more work to determine the most effective strategies for promoting the use of specific guidelines with specific health care providers in particular settings" (Conclusion, para 1). Kitson et al. (2008) also noted that there is a "lack of knowledge

about what methods and approaches are effective, with whom, and in what context" (Background, para1). Expectations of effective strategies that would apply in all populations and in all settings are not realistic (Clark & Thompson, 2008). That is, strategies implemented in the Birthing Unit of a tertiary care centre may not demonstrate the same effect in the medical unit of a rural hospital.

Guideline implementation strategies. The effectiveness of guideline implementation strategies has been studied in physicians (Chaillet et al., 2006; Grimshaw et al., 2006), in professions allied to medicine (Hakkennes & Dodd, 2008; Thomas et al., 1999), and in nursing (Davies, Edwards, Ploeg, & Virani, 2008; Ploeg, Davies, Edwards, Gifford, & Miller, 2007). While there is an abundance of published physician-dominated guidelines research (N=235), professions other than medicine are represented by only two systematic reviews (Hakkennes & Dodd 2008; Thomas et al., 1999). Nurses were not included in the health professional category in the Hakkennes and Dodd (2008) systematic review of the literature, while in the Cochrane Review of guidelines in professions other than medicine (Thomas et al., 1999), nurses were cited as the targeted professional group in all but one of the 14 studies. Despite not formally identifying nurses as health professionals, Hakkennes and Dodd (2008) did include nurses; however, their inclusion criteria stipulated that 50% or more of the participants had to be health professionals other than nurses and/or these health professionals had to be evaluated separately from the nurses. This lack of consistency in the inclusion of nurses in these professional groups makes it difficult to use their findings meaningfully in an evaluation of nursing activity. Generalizability of study findings is strengthened when similar groups are compared.

Thomas et al. (1999) included 18 intervention studies conducted between 1975 and 1996 in their review, encompassing 467 health care professionals. The included studies compared the use of guidelines with dissemination and/or implementation strategies with either (a) no guidelines or (b) guidelines with alternative dissemination and/or implementation strategies. The studies also compared guidelines used by professions other than medicine with standard physician care. Seven out of nine studies showed the greatest effect on improvement of outcomes of care where guidelines were compared to no guideline control. It was difficult to draw conclusions from three studies due to small samples sizes or unit of analysis errors. In these three studies, two or more dissemination and implementation strategies were compared. The remaining six studies demonstrated support for the ability of guidelines to enable role substitution.

For the most part, Thomas et al. (1999) did not identify specific implementation strategies used in the dissemination of guidelines. The strategies described in most (16/18) of the research studies were identified as one health care professional group using the guideline versus another health care professional group using the guideline. In the two studies where specific interventions were identified, the strategies were a structured intervention (Mitchell, 1999) and the use of opinion leaders (Seto, Ching, Yuen, Chu, & Seto, 1991). There were no significant changes in the study using a structured intervention; however, the opinion leader intervention resulted in a significant change. In both of these studies, nurses were not compared to other professional groups, but the unit of analysis was the nurses' uptake of the guideline. Most of the studies were single site studies, involved few health care professionals, and did not observe for sustained changes in performance. Moreover, health care professionals were aware that their performance

was being measured. Additionally, the percentage of guideline uptake was not consistently reported. Despite the authors' conclusion that there is some evidence that guideline-driven care is effective, the studies used in this review have methodological limitations and the authors recommended caution in generalizing these findings to other settings and to other professions.

In a systematic review exploring interventions aimed at increasing nursing research use, as represented by their implementation of a CPG, Thompson et al. (2007) screened 8,000 publications. Four publications met the review's inclusion criteria as one criterion was that all guideline recommendations for practice had to be mentioned. Researcher-led interactive education session were used in two of the four studies (Tranmer, Lochaus-Gerlach, & Lam, 2002; Tsai, 2003). The interactive education sessions were ineffective in increasing research use in practice. Educational meetings led by a local opinion leader, to increase implementation of a guideline, were effective at increasing research use in one study (Hong, Ching, Fung, & Seto, 1990). Given the inclusion criteria for this review and the inconsistent findings, Thompson et al. (2007) concluded that "educational meetings of varying content, duration, and frequency cannot be said to be effective research utilization interventions in nursing" (para 28). This review differed from that of Thomas et al. (1999) in two ways. First, nursing was the only health care discipline included in the Thompson et al. (2007) study. Second, the outcome of interest in the Thompson et al. (2007) review was a change in provider behaviour(s). Both reviews were consistent in the findings of mixed effects related to the various implementation strategies.

The research conducted to date indicates that the inconsistencies of implementation effectiveness may be influenced by a variety of factors. It is possible that a gap exists where researchers have not incorporated these factors in their research. These factors may be similar to the elements proposed in the PARiHS framework. Researchers need to include in their research both the providers in whom a behaviour change is desired and the relationship between the specific interventions and the contextual elements. All of the implementation strategies in these reviews have a single commonality: the researchers took the lead in determining the intervention for the participants. Contact with the researchers was limited and the support provided was practical or technical help. Approaches to teaching were often didactic with external agents. The participants did not design the process of the interventions. As proposed by Kitson et al. (2008) researchers may need to focus on an implementation strategy that includes (a) the interplay between the individuals and the organization where they work and (b) having participants play a greater role in the planning. Ajzen, Czasch, and Flood (2009) suggested that behaviour change is more likely when the participants formulate a plan for carrying out their intended action.

In a survey of Canadian guidelines developers, Kryworuchko et al. (2009) examined the processes of guideline development and implementation over two periods, 1994 to 1999, and 2000 to 2005. They also explored the guideline developers' efforts to increase the use of guidelines and to evaluate their impact. Kryworuchko et al. (2009) reported that fewer guidelines were deposited to the Canadian Medical Association Infobase from 2000 to 2005 as compared to the 1994 to 1999 period. They suggested that the decrease in guideline submissions might indicate a slowing in the development of

guidelines that are submitted to this particular database. Other associations, however, have reported an increase in guideline development. For example Registered Nurses' Association of Ontario, reported significant and influential work because of best practice guidelines (RNAO, 2010).

Kryworuchko et al. (2009) also reported a significant decrease in the developers' dissemination and implementation efforts over the two periods. They noted both a significant decrease in passive strategies and a nonsignificant decrease in interactive education and active implementation strategies. The developers had significantly increased their evaluations of the effectiveness of dissemination and implementation activities from the first to the second period. Efforts to improve patient care can be enhanced with the implementation of evidence-based guidelines (Prior et al., 2008). A decrease in these efforts will lead to a gap with respect to knowledge and agreement regarding effective implementation strategies (Grimshaw et al., 2006). While Kryworuchko et al. (2009) reported a decrease in guideline development; this is not the case in other organizations. Internationally, Guidelines International Network, a not-for-profit association of organizations and individuals, is involved in the development and use of clinical practice guidelines. That is, "Guidelines International Network seeks to improve the quality of health care by promoting systematic development of clinical practice guidelines and their application into practice, through supporting interactional collaboration" (Guidelines International Network, Introduction, para. 2). This growing organization has the world's largest guideline library containing more than 7,000 documents (Guidelines International Network, 2010).

In a review of systematic reviews, Prior et al. (2008) aimed to establish the effectiveness clinical guideline implementation strategies. Studies measuring clinical process and/or cost-benefit analysis were included in this review. Not included in the review were implementation strategies for condition-specific guidelines. A total of 33 articles met the inclusion criteria and reported in these articles was at least 714 primary studies of greater than 22,512 clinicians. The clinicians included physicians and a small number of nurse and allied health workers. Prior et al. (2008) identified 19 implementation strategies in the review studies. Effective strategies included multifaceted interventions, educational outreach, interactive education interventions, and patient-specific interventions. The authors reported, however, that the evidence for effective guideline implementation was modest. For example, they cited unclear review methodology of the primary studies. Given the question of methodological quality regarding these reviews, Prior et al. (2008) question their value in identifying effective implementation strategies.

Of those strategies identified to date, the gaps in knowledge about implementation concern (a) conceptual clarity regarding the relationship among the evidence, context and facilitation, (b) the influence of the patient's perception, (c) the role health care providers play in determining the implementation strategy, (d) the impact of barriers and facilitators, (e) the significance of social networks, and (f) the influence of attitude. These gaps could be addressed by research that is designed to further explore the relationship between the elements described by the PARiHS framework. This exploration should address (a) the influence of the patient's perception (Grant, 1998) on the providers use of guidelines, (b) the contextual nature of barriers and facilitators

(Cheater at al., 2009; Graham et al., 2004), (c) the role of the participants via communication channels (Rogers, 1995) and their role in identifying the implementation strategy (Kitson et al., 2008), and (d) the contribution of attitude to our understanding of culture (Sprague et al., 2008) and impact on behaviour change.

The implementation gap in our knowledge creates a need to investigate what strategies will best identify and address the factors that influence the use of guidelines. A new approach is needed. Action Learning is an approach that allows for the inclusion of interventions that will support the identification of these factors and of interventions that have demonstrated effect in nursing. Action Learning is a complex approach that can incorporate topics such as patient inclusion, social exchange, and contextual issues. In Action Learning, participants own control of their behaviour. In this study, the Action Learning approach is one of the two interventions tested. The other intervention is interactive education and will be explored following Action Learning.

Action learning. The concept of Action Learning originated in the pioneering work of Reg Revans in the 1940s (as cited in Smith, 2001). Action Learning was described as a continuous process that supports an environment where set members (group members) work on real issues, reflect on past actions, and plan future actions (McGill & Brockbank, 2004). More specifically, the process of Action Learning promotes a connection between reflection and action. This process enables set members to "reconsider past events, making sense of our actions, and possibly finding new ways of behaving at future events" (McGill & Brockbank, 2004, p.13). Reflection, action, and learning are achieved through double loop learning when there is a desire for major change (McGill & Brockbank, 2004). In double loop learning the subjective world of the

participant and the taken for granteds of practice are challenged. McGill and Brockbank (2004) proposed that set members ways of seeing the world would change. The issues presented are focused on the system rather than the individual. They learn from their experiences with these issues and transfer this learning into their practice. Change from the learning is likely to occur through members' re-interpretation of previous experiences, rather than through the simple acquisition of new knowledge (Revans, 1998). Thus, Action Learning, a highly structured approach to support a group or set of members, is a collaborative action and a method, to bring about change in a situation. The aim of Action Learning is to support a change in its members' knowledge and behaviour with respect to an issue.

McGill and Brockbank framed the learning by identifying four underlying values that create meaning in an Action Learning set (2004, p.129):

1. "A critical stance towards taken-for-granted knowledge",
2. "The potential for human self-development",
3. "A resistance to objectivism", and
4. "A focus on social activity".

As a supportive and challenging group learning process (McGill & Brockbank, 2004), Action Learning also incorporates each set member's world and the "social context of their everyday life" (p. 14). The social context, that is, the "organization's purpose, structure, or culture" (McGill & Brockbank, 2004, p. 108) is incorporated during the Action Learning process. Participants in an Action Learning process complete a double-loop learning cycle. Initially, the participants complete the single-loop learning cycle: reflection, generalization, testing, and experience (McGill &

Brockbank, 2004). Once the set members have completed the single-loop learning cycle, they enter double-loop learning. This next cycle is a paradigm shift of emergent knowing and ultimately, new understanding. During this shift, participants question one another on the knowledge that is "taken for granted". It is believed that this questioning will permit a better view of the participants' 'way of seeing the world' and ultimately will lead to a change in practice if this new view is not compatible with current practice. Through this lens set members can identify inhibitors to practice and plan action for future behaviour.

In order to promote the progression from single-loop learning to double-loop learning, the facilitator's role is one of support through an understanding of the contextual and cultural issues of the organization. The facilitator encourages the group members to express their underlying emotions and feelings. This expression and acknowledgment of feelings, beliefs, and values is a catalyst that empowers learning and transformation.

Action learning approaches: The social constructionist approach. There are four approaches or schools to Action Learning, each of which offers a different philosophy of learning and change (McGill & Brockbank, 2004): the scientific school (Revans, 1982), the critical reflection school (Mezirow, 1990), the experiential school (McGill & Beaty, 2001), and the social constructionist view of learning (McGill & Brockbank, 2004). Each of these approaches advocates the use of a "learning coach" and "intentional use of strategies to help people to learn from their project work" (Marsick & O'Neil, 1999, p.160; McGill & Brockbank, 2004). This study used the fourth approach,

the social constructionist view of learning, in order to achieve the double-loop learning cycle and to enable set members to develop a new way of viewing practice.

In the social constructionist approach, built on critical reflection (McGill and Brockbank, 2004), "set members are assumed to be active creators of their realities and these realities are deeply influenced by their life experience" (p. 128). Through reflective strategies (Schon, 1983), and the adoption of a humanistic philosophy, both an existential and a behaviourist approach to learning are considered. This view of learning encompasses values of support, trust, and safety (McGill & Brockbank, 2004). Interpretation of events comes from the set members' views and interpretations of the world. In this interpretation, three key behaviours or "person-centred core conditions" are required for the participants' learning and growth (McGill & Brockbank, 2004, p. 138):

1. Congruence – genuineness, realness, sharing feelings, and attitudes rather than opinions and judgments,
2. Unconditional positive regard – acceptance and "prizing" of the other, and
3. Empathy – an understanding of the other's feelings, experience, and attitudes and communicating this understanding.

Those who support the existential philosophy view Action Learning set members as recognizing responsibility for their actions. Through a balance of challenge, support, and double-loop learning, members seek change and development. As well, it is stated within the behaviourist approach that "habits and beliefs are learnt and therefore can be unlearnt by set members if they so desire" (McGill & Brockbank, 2004, p. 128). Set members learn from and with each other. In this approach to learning, the facilitator's

behaviour exemplifies the power of modeling. When participants see others succeed, they come to believe they can succeed as well (Bandura, 2004). Through modeling the desired behaviours during the Action Learning sets, members can imitate and learn skilled behaviours (Bandura & Walters, 1963). Modeling "conveys knowledge and skills for managing environmental demands" (Bandura, 2004, p. 622). Facilitator actions included in this approach are listening and attending, reflecting back and questioning, disclosing and asserting, managing emotion and conflict, establishing rapport, empathy, language and discourse, summarizing and immediacy (McGill & Brockbank, 2004; Kitson et al., 1998).

Action Learning provides an opportunity for professionals to work together on issues that do not have a clear solution and to meet regularly as a group to discuss relevant issues and personal progress. Within this social constructionist view of Action Learning both the scientific and experiential approaches see the facilitator as "often passive, act[ing] as a mirror to help individuals and team look at learning" (Marsick & O'Neil, 1999, p. 171). The aim of the facilitator is "ultimately to move away from a dependent relationship to one where the set members achieve greater autonomy" (McGill & Brockbank, 2004, p. 189).

John Heron (1989) identified the following three modes of facilitation used to move the participants towards greater autonomy:

1. Hierarchical mode. While "doing for" the group in the hierarchical mode, the facilitator initiates the group process and lays the groundwork (McGill & Brockbank, 2004),

2. Cooperative mode. The facilitator maintains a place of guidance; however, the set members begin to integrate themselves into the process, whereby the "facilitator is becoming one of the crew" (McGill & Brockbank, 2004, p. 190), and

3. Autonomous mode. The facilitator supports the conditions; however, the set is able to function independently. Set members have more space to determine direction in the autonomous mode (McGill & Brockbank, 2004).

Action learning in practice. Action Learning has been used in a variety of environments including education (Dewar, Tocher, & Watson, 2003; Dilworth, 1996; Koo, 1999), health care (Jackson, 2003; Randall, Cowley, & Tomlinson, 2000; Wilson, McCormack, & Ives, 2008), management (Bourner & Frost, 1996; Bowerman, 2003; Dilworth, 1996; Smith, 2001), and business (Bowerman, 2003; Harrison, 1996; Marquardt, 2000). Generally, the strategy of Action Learning has been used as part of a group of interventions aimed at supporting change. A variety of health professionals, including interdisciplinary health care providers (Douglas & Machin, 2004), librarians (Booth, Sutton, & Falzon, 2003), managers and educators (Harrison, 1996; McGill & Beaty, 2001; McGill & Brockbank 2004), nursing students (Graham, 1995; Haddock, 1997; Heidari & Galvin, 2003) and nurses (Bell et al., 2007; Cunningham & Kitson, 2000a; 2000b; Dzik-Jurasz, 2006; Edmonstone & MacKenzie, 2005; Herdrich & Lindsay, 2006; McCormack et al., 2008; Randall et al., 2000; West, 2005; Wilson et al., 2008), have been the participants in these efforts towards change.

The majority of the Action Learning literature consists of anecdotal reports of individual, group, or organizational experiences. To date, the methodology reported in the nursing literature that included research about Action Learning is primarily

qualitative/descriptive (Brown, 2008; Bowerman, 2003; Douglas & Machin, 2004; Heidari & Galvin, 2003; Wilson, 2003). Two quantitative studies demonstrated that Action Learning contributed to a change in practice: a pretest-posttest design by Cunningham and Kitson (2000a, 2000b) and a quasi-experimental design by McCormack and colleagues (2008). The following section describes these studies in more detail including their methodology and study descriptions.

Using an ethnographic case study approach, Bowerman (2003) explored the use of Action Learning among supervisors and managers in a government health insurance organization. The goal of this study was the development of leadership. The facilitator, using a set size that was relatively large, 13-20 participants in each set, encouraged the use of critical thinking among the Action Learning participants as one of the methods to explore leadership issues. Participants learned about their leadership style by trying out new behaviours, working on new ideas, and writing about what they learned. Study outcomes revealed that the meaning of leadership was different for participants and this meaning was influenced by the context. Participants reported that they were changed by this Action Learning experience.

Heidari and Galvin (2003) used Action Learning as a strategy to help nursing students learn to reflect. Two cohorts of nursing students (N = 288) participated in focus groups to understand the students' perspectives on Action Learning groups and their influence on their education. The findings outlined four themes: the purpose of Action Learning groups, support within an Action Learning group, application and difficulties of an Action Learning group, and areas of improvement (Heidari & Galvin, 2003). Students reported that Action Learning was "a vital part of their course" (Heidari & Galvin, 2003,

p. 54). Group members indicated that they depended on their facilitator and group member dynamics to enhance trust and confidentiality. Students reported that Action Learning groups in this study "linked theory to practice" (Heidari & Galvin, 2003, p.55).

Douglas and Machin (2004) used grounded theory to capture the perceptions of an interdisciplinary group of professionals who were involved in Action Learning. The members of the Action Learning group included mental health nurses, psychologists, social workers, occupational therapists, and the voluntary sector. The Action Learning sets were scheduled to last 6 to 12 months in this study. The purpose of these Action Learning groups was to investigate potential for change in the areas of mental health and primary care services. In order to achieve success in these areas, it was determined by the participants that Action Learning required support from managers. Due to a lack of support from the managers, these Action Learning groups lasted only two months. These researchers reported criteria by which we can measure the success of an Action Learning group. In this case, success was defined as continuing group meetings. These criteria included support, context, power, group life, and barriers.

Wilson et al. (2008) used the critical reflection approach to Action Learning. Their methodological approach was based on a realist evaluation (Pawson & Tilley, 1997) in which the researchers evaluated the relationship between context, mechanism, and outcome. Wilson and colleagues (2008) questioned, "Was action learning an effective strategy for the participants of the Action Learning set?" Additionally they wanted to know if Action Learning was effective and whether it helped the nursing staff to elicit change in clinical practice. Action Learning was one of five change strategies selected by the participating nurses. The Action Learning arm of the study consisted of

seven staff from a 12-bed special care nursery. Strategies that supported the nurses' participation in the Action Learning intervention included reimbursing the nurses who attended the Action Learning sets and negotiating with respective unit managers for assured time away from their nursing duties. This permitted nurses' attendance, thereby supporting the efforts of this study. These strategies reflected the importance of context, that is leadership, in the success of this intervention. Study outcomes included improvements in patient-centred care, such as pain management during invasive procedures, and effectiveness of nurse handover. The researchers stated that Action Learning was one of the many components of Practice Development. The use of multi-components limited their ability to identify which change strategies were responsible for the results. As well, the researchers reported that, due to the multidimensional nature of Action Learning, its evaluation is complex and challenging. Similarly, McCormack et al. (2008) used Action Learning as one of several initiatives in their research. The intervention in their quasi-experimental study promoted a significant change in five of the nine stress-related constructs in nursing. These researchers reported that they were attempting to achieve change in a "constantly changing care environment" (McCormack et al., 2008, p. 211).

Cunningham and Kitson (2000a, 2000b) used a variety of interventions including Action Learning with clinical leaders in an effort to improve the quality of patient care. These researchers used a pretest-posttest design and recruited 28 clinical nurses in leadership positions to their 18-month study. Using a multi-factor leadership questionnaire they found significant changes in 4 of the 12 nursing leadership variables measured. These variables included inspiration, active management by exception,

effectiveness, and satisfaction. Improvements in patient care were also noted in terms of the way nursing care was organized, in patient reports, and in direct observation. However, these researchers reported that "a stronger experimental design should be used' (Cunningham & Kitson, 2000b, p.40) when measuring change in a clinical environment.

Utilizing three Action Learning sets, Randell et al. (2000) worked with social workers and health visitors to examine variables that prevented effective practice in childcare. During the 6 month period (one set per month), each set identified organizational and professional issues that related to their use of evidence in practice. These researchers suggested that Action Learning is a means for identifying barriers to effective practice. Identifying the barriers enabled the health care providers to review collectively the areas within their practice that are keeping them from effective practices and enabled them to priorize the barriers for action.

Overall, clinicians, researchers, students, and managers have concluded from these projects and case studies that Action Learning contributed towards a desired practice change (Cunningham & Kitson, 2000a, 2000b; Heidari & Galvin, 2003; Wilson et al., 2008). These investigators focused on the elements of context and individual practitioner's experience. Of all studies cited, only two focused on staff nurses (McCormack et al., 2008; Wilson et al., 2008). Practice change in all projects and studies occurred through both individual and group work. Action Learning provided an opportunity to identify during the sets, issues about the workplace and then to address those issues in the set members respective settings. The strength of evidence from these studies was comprised mainly from designs that were qualitative. There was only one study with an intervention (Cunningham & Kitson, 2000a; 2000b) and none of the

reported studies utilized a comparison group. A study design that utilized an intervention, compared different groups, and attempted to control for extraneous factors would have contributed to enhanced interpretation of the effect of Action Learning in practice change.

Action learning and evidence-based practice. Through Action Learning, participants endeavour to find new ways of doing things (McGill & Brockbank, 2004). Change is facilitated with set members learning to address both the context and the evidence (issues) within their organization. In Action Learning, set members identify strategies for change based upon their local context.

Context and evidence also matter in a practice that is evidence-based. An evidence-based practice combines research evidence with the clinician's experience and each individual patient's circumstances and preferences in order to support clinical decision-making (Ellis, Howard, Larson, & Robertson, 2005). Collectively, Action Learning and evidence-based practice involve the notion of change. This change affects clinical practice, the social context, and the participants themselves. Kitson et al. (2008) argued, that in order for the facilitator to support change, he or she needed to use an intervention that draws from a whole range of methods. Within this range, they identified Action Learning as a strategy to support the implementation of evidence into clinical practice.

Action learning and PARiHS. As discussed, the implementation of a CPG is facilitated by an understanding of both evidence and context within the setting where the CPG is to be implemented (Wallin, 2005). Similarities exist between the facilitation component of the PARiHS framework and the facilitation component of the social

constructivist approach to Action Learning. First, in the PARiHS framework, facilitation may range from simply providing help and support to attempting to achieve a specific goal. Through this process of facilitation, participants are said to be able to analyze, to reflect, and to change their own attitudes, behaviour, and ways of working (Harvey et al., 2002). Within this framework, the facilitator seeks to understand and enable each of the participants (Harvey et al., 2002). In the social constructivist approach to Action Learning, Heron's (1989) three modes of facilitation are similar to these roles and the descriptions of facilitation in the PARiHS framework. In the PARiHS framework, the skill and attribute descriptions of facilitation range on a continuum from a task oriented to a holistic approach (Harvey et al., 2002). McGill and Brockbank (2004) suggested that Action Learning set members should work in a supportive and highly challenging environment where they have the guidance of a facilitator. As the group members continue to work together through this transformational learning process, McGill and Brockbank (2004) proposed that they achieve independence. They argued that, through Action Learning, set members aim to take responsibility and decide on actions to change their behaviour at future events.

Action Learning and the PARiHS framework share some approaches to the role of facilitation, as well as incorporate the evidence or the issue and the context. The authors of the PARiHS framework (Kitson et al., 2008) identified Action Learning as a facilitative intervention. Kitson and colleagues (2008) proposed that the strength of the context and the evidence should influence the choice of a facilitative intervention. Features of the environment or context that support a desired change in practice are said

to include a sense of ownership by the participants, leadership, and performance feedback. These features are also components of Action Learning.

Interactive education. Traditionally, didactic education sessions were offered as a means to inform others and with the aim to change practice. Didactic education sessions have been found to be ineffective (Prior et al., 2008). Interactive education sessions, however, as revealed by the previously discussed EPOC review, have demonstrated mixed effects. Additionally, education sessions are a strategy for practice change that staff nurses have come to see as the routine and as the first approach to practice change in clinical settings.

As a strategy for guideline implementation, researchers have reported interactive education sessions to result in a positive behaviour change in nurses (Berglund, Lefevre-Cholay, Bacci, Blyumina, & Lindmark, 2010; Friedman at al., 2009). Berglund et al. (2010) conducted comprehensive didactic interactive training sessions with health care providers in nine sites. Three of the nine sites were chosen for evaluation in that project. The education sessions included an initial two-week training, a three day follow-up, and additional practice training. The participants were health care providers and included obstetricians, neonatologists, midwives, pediatric nurses, pediatricians, and anesthesiologists. The main outcomes measures included change in interventions during labour, maternal outcomes, and hypothermia in the infants. The concluded that education sessions contributed to improved outcomes. For example, the caesarean section rate decreased significantly in two of the maternity hospitals ($p < .0001$). Statistically significant improvement was also evident in additional labour and delivery outcomes

including improvement in the use of the partogram, use of pain medication during labour, and companion presence during labour.

In the 'educate clinicians to achieve treatment guideline effectiveness' (EDUCATE) study (Friedman et al., 2009), physicians, nurse practitioners, and physician assistants in community practice were invited to participate. Of the 84 healthcare professionals who agreed to have their practice evaluated, five were nurse practitioners. The educational methods used were comprised of multiple teaching/learning activities and were offered over a 12 month period. Despite the authors' suggestion of successful guideline implementation using this interactive approach, the data has not yet been analyzed.

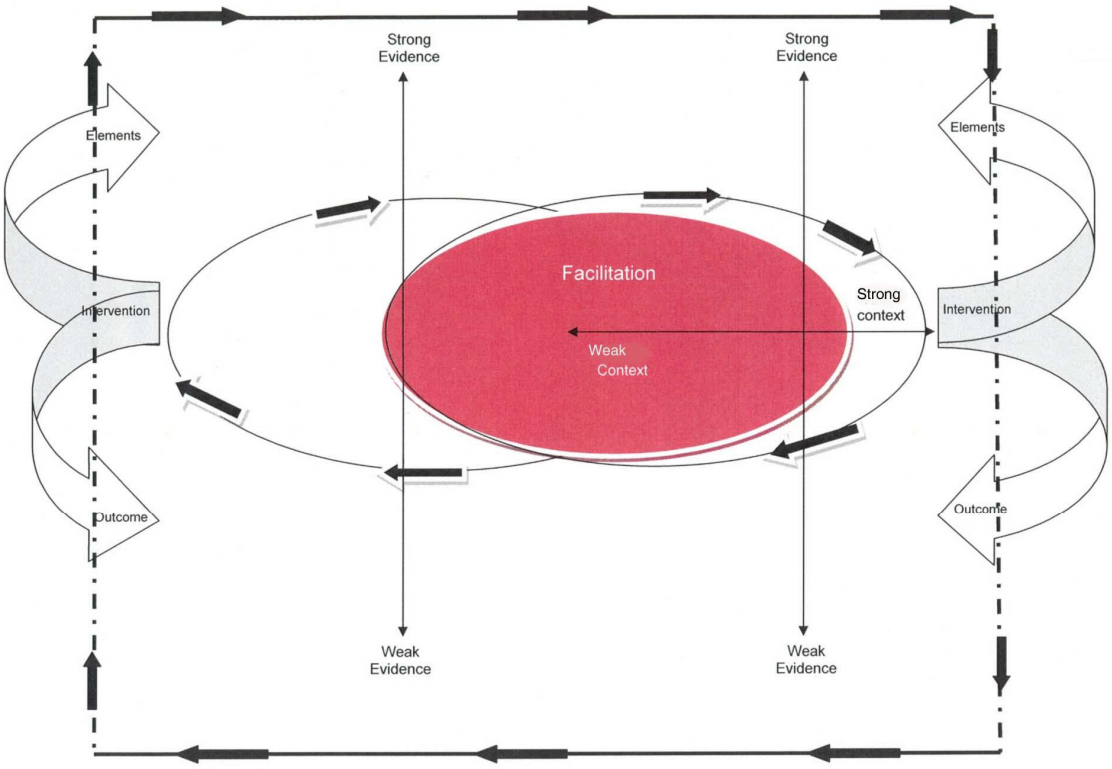
Similar elements, consistent with the interactive education strategies reported to date, are in the studies by both Berglund et al. (2010) and Friedman at al. (2009). They are interactive, multimodal, and have social exchange strategies that are similar to the learning in single loop learning. Also referred to as day-to-day maintenance learning, single loop learning has been noted to achieve immediate improvement (McGill & Brockbank, 2004). In this approach to learning, learners are proposed to gain confidence and competence (McGill & Brockbank, 2004). As a first step to behaviour change, an interactive education session was thought by the researcher to offer a cost-effective, time limited approach to guideline implementation.

Study Framework

A variety of key messages emerged from the literature and contributed to the framework for this study. First, the implementation of evidence in practice is enabled when practitioners, together with the facilitator, reviewed the strength of the evidence and

the context (Kitson et al., 2008). For example, the identification of factors that enabled or inhibited practice change is proposed to direct the actions leading to changes in practice. Second, the more task-based approaches to implementation strategies result in mixed effects. Facilitation efforts or implementation strategies based collectively upon both the evidence and context may achieve a greater success (Harvey et al., 2002; Kitson et al. 2008; McCormack et al., 2002). An interactive education intervention and an Action Learning intervention were chosen as the implementation strategies for this study based upon these observations and the gaps reported in the literature. Despite the fact that the majority of implementation literature pertained to physicians, it was clear that the elements influencing change in provider behaviour were complex and dynamic.

Figure 1. Guideline Implementation: Conceptual Framework (Adaptations, Rogers, 2003; Kitson et al., 2008)



The conceptual framework (see Figure 1) for this research was based upon the (a) literature reviewed above, (b) the diffusion of innovation theory (Rogers, 2003), and (c) the PARiHS framework (Kitson et al., 2008). Rogers' diffusion of innovation theory (2003) supported the diffusion of evidence via an implementation strategy. The arrows on the two larger circles represented the ongoing stages of adoption and communication that I proposed would be achieved through single and double loop learning. Single loop learning was symbolized by the large circle on the left of the diagram. Double loop learning was symbolized by the two large circles in this figure. I proposed that should nurses not obtain immediate improvement through single loop learning, a second strategy, double loop learning, offered an opportunity, to explore the nurses' underlying beliefs in an attempt to change practice.

The PARiHS framework was represented by the elements of evidence, context, and facilitation. The bidirectional arrowed lines that intersect the two large circles represented the continuum of strengths and weaknesses of both evidence and context. Multiple factors contributed to the strength of both evidence and context. These factors included practice change enablers and inhibitors represented by dotted (enablers) and solid (inhibitors) lines surrounding the two large circles.

In this study, strategies for practice change were derived from individual and team understanding of the context and of the evidence. Given the reported mixed effects of various implementation strategies, I chose two strategies to attempt to achieve practice change with one type of practitioner in one type of practice in a single setting. I chose the first strategy, an interactive education intervention, because I considered it time efficient in a busy obstetrical unit and because it was a strategy that was familiar to the

nurses. I chose Action Learning to be the second intervention. The Action Learning intervention represented one of the three elements in the PARiHS framework, facilitation. During the Action Learning intervention, as facilitator, I worked with nurses to identify issues related to intermittent auscultation and to develop action plans for behaviour change.

In this conceptual framework, I proposed that the implementation strategies together with the evidence and context would influence provider behaviour change. I proposed that the interactive education intervention would be sensitive to the nurses' time. I also proposed Action Learning would support the nurses to reflect on their past actions and to possibly find new ways of providing intermittent auscultation care. Action Learning would encompass the nurses' participation and the nature of their chosen strategies. I speculated that the nurses would be willing to try these approaches to change. I proposed that the implementation of an interactive education intervention would result in single loop learning where both reflective and instrumental learning take place. The nurses would then test this learning when they return to practice. Single loop learning is proposed to provide immediate results. Action is taken because of experience and reflection. Values and ways of seeing things, however, remain unchanged (McGill & Brockbank, 2004). During this intervention, the nurses reviewed and discussed the fetal health surveillance evidence. The context, although not part of the education intervention, was an underlying element, as were enablers and inhibitors to intermittent auscultation practice. Through Action Learning, however, I proposed that double loop learning would be achieved. That is, as the nurses participated in Action Learning, their assumptions were challenged and they learned new perspectives (McGill & Brockbank,

2004). Through Action Learning, reflective learning would take place with the intent to achieve both practice improvement and transformation. The paradigm shift proposed to be achieved through this reflective learning would create a new understanding. In double loop learning, the elements evidence and context had an influence on the issues chosen for the nurses' action plans during the Action Learning sets. As well, I speculated that the perceived enablers and inhibitors would influence the actions chosen by the nurses. Ultimately, the facilitative implementation strategies, the participants themselves, the evidence, and context, whether influenced by single or double loop learning, could fuel the process of change.

Summary

Within the perspective of the PARiHS framework, enhancing evidence-based practice requires consideration of the sub-elements of the evidence and of the practice context in order to determine the facilitative efforts required to support a change in practice. The complexity of these elements, their relationship to each another, and the resulting effect upon the desired outcome of practice change should be the foundation upon which effective intervention strategies are built.

In birth units, most health professionals continuously, rather than intermittently, monitor the fetal heart rate during labour. This occurs in spite of the fact that continuous external fetal monitoring in low-risk women is associated with increased caesarean section and obstetrical intervention rates without benefit to the infant. Professional practice bodies determined that the evidence was strong enough to develop a practice guideline recommending intermittent rather than continuous monitoring of the fetal heart in low-risk labouring women (Liston et al., 2007).

Researchers attempting to implement this fetal health surveillance guideline in nursing practice have observed mixed results (Davies et al., 2002; Chalmers et al., 2008). It has been concluded that many features of both the evidence, in its broadest sense, and the context have influenced this poor uptake (Pepler et al., 2005; Scott-Findlay & Golden-Biddle, 2005). For this study, I proposed to assess interventions that included both the evidence and the contextual elements required to improve the nurses' practice of intermittent auscultation, thereby improving their fetal health surveillance guideline appropriate care. An interactive education intervention, if successful, offered immediate improvement through single loop learning in a time sensitive environment. An alternative intervention, Action Learning, supported the nurses' involvement through double loop learning (McGill & Brockbank, 2004). Action Learning, a complex intervention, has yet to be tested within a RCT. Patients' experiences of the implementation of a fetal health surveillance guideline have yet to been measured.

The staff-centred approach of Action Learning has the potential to support the translation of evidence into clinical practice. The knowledge gained from testing both these implementation interventions, interactive education and Action Learning, within the diffusion of innovation theory and the PARiHS framework, has the potential to inform and advance the knowledge base about the uptake of evidence with nurses in birthing units.

Research Questions

Primary research question

1. What is the effectiveness of an Action Learning intervention for nurses on the use of guideline appropriate care (per Society of Obstetricians and Gynecologists of

Canada 2002 guideline) during an episode of care for low-risk women admitted to the Birth Unit?

Secondary research questions

2. What effect does a fetal health surveillance interactive education intervention have on Birth Unit nurses' attitudes toward intermittent auscultation and practice of guideline appropriate care?

3. What differences in satisfaction (perception) with guideline appropriate care exist between postpartum women cared for by Birth Unit nurses in the experimental group (Action Learning group) versus nurses in the control group (Usual Care group)?

4. What are the nurses' views of the enablers and inhibitors influencing the use of intermittent auscultation for low-risk labouring women?

5. What is the effectiveness of an Action Learning intervention for nurses on the use of guideline appropriate care during a portion of an episode of care for low-risk women admitted to the Birth Unit?

6. What is the effect of nurses' attitudes towards intermittent auscultation, dose of Action Learning, episode of care, and nurse group (Action Learning or Usual Care) on the use of guideline appropriate care during an episode of care for low-risk labouring women admitted to the Birth Unit?

CHAPTER 3

Methods

In order to evaluate two strategies to transfer evidence into clinical practice, I conducted research with the nursing staff in the Birth Unit of a university teaching hospital. The Fetal Health Surveillance guideline created by the Society of Obstetricians and Gynecologists of Canada (Liston & Crane, 2002; hereafter called the guideline) served as the evidence to be implemented. The guideline prescribed appropriate intermittent auscultation during fetal health surveillance for low-risk women rather than continuous electronic fetal monitoring.

I conducted this research in two phases. During Phase 1 (Figure 2), I assessed the nurses' attitudes towards their fetal health surveillance practices prior to and following an interactive education session. I also assessed their fetal health surveillance practices within the Birth Unit prior to and at the end of all interactive education sessions. All staff nurses who consented to participate in the study attended an interactive education session. All interactive education sessions were offered using the same format and content. All nurses who attended the interactive education session were eligible to participate in Phase 2 (Figure 3). In Phase 2, I conducted a randomized controlled trial (RCT) to evaluate the effectiveness of an Action Learning strategy to increase nurses' use of guideline appropriate care. This two-phase design permitted an assessment of two interventions intended to change practice: first, an interactive education and second, a more time-consuming and costly intervention – Action Learning.

Figure 2

Phase 1: Study Design Schema

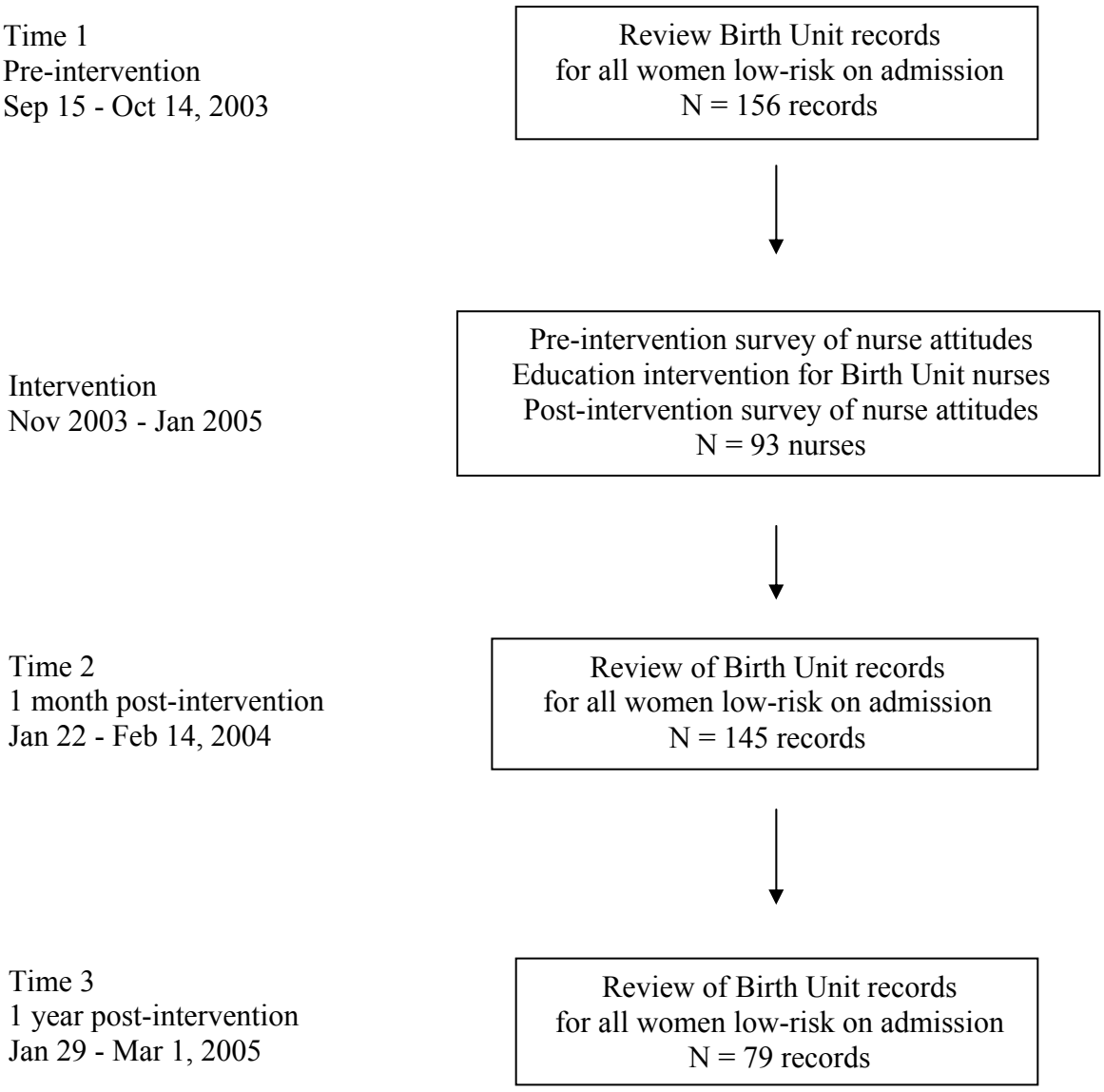
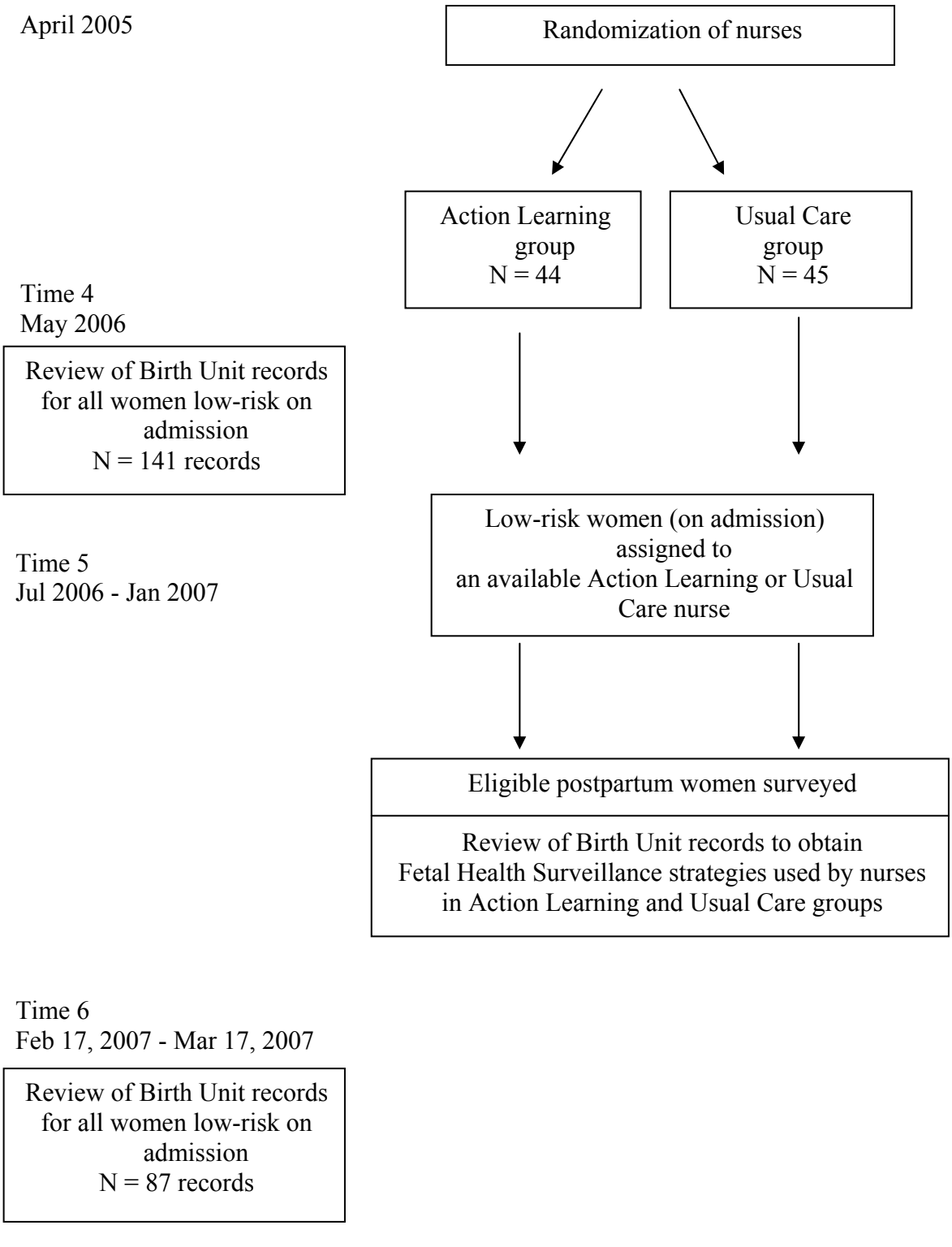


Figure 3

Phase 2: Study Design Schema



Setting: Phase 1 and Phase 2

The participating hospital is a university teaching hospital and a regional tertiary care perinatal centre serving as the only local low-risk centre in the city, and the centre for regional moderate- and high-risk women and their newborns. In 2003 when data collection began, 4497 women delivered at the hospital. Of these women, 1927 (42.85%) met the low-risk study criteria on admission to the Birth Unit (Reproductive Care Program, 2010). In 2006 and 2007 respectively, 4447 and 4618 women delivered at the hospital. Of these women, 1942 (43.67%) and 2064 (44.69%) women met the low-risk study criteria on admission to the Birth Unit (Reproductive Care Program, 2010). The hospital had 15 birthing rooms and a nursing staff of approximately 80, including 70 full-time and part-time nurses, and 10 casual nurses. Casual nurses were employed on an irregular, as needed basis, with no set schedule as to when they work.

The hospital had a fetal health surveillance policy and unit-specific procedures; however, adherence to this policy and the procedures varied by nurse. The staff nurse practice of fetal health surveillance prior to the interactive education sessions was a mixture of continuous external fetal monitoring and of intermittent fetal monitoring by doppler auscultation or electronic transducer. A philosophy of family-centered maternal and newborn care was in place and a mission and values statement that supported the use of evidence in clinical practice. I obtained nursing managerial support prior to starting the study and, following a grand rounds presentation, I obtained support from the Birth Unit physicians. Selected characteristics of the study site are outlined in Table 1.

Table 1

Hospital Procedures and Characteristics

Procedures	Health Centre Characteristics
Nurses' shifts	12 hours
Nurse to patient ratio	1:1
Language	English
Ethnicity	Caucasian
Annual deliveries	4591
Staffing variations	70% full-time positions
Physician types	Obstetricians (on site at all times), Anesthetists, Neonatologists, Family Practitioners, and Residents
Fetal health surveillance	Continuous electronic and/or intermittent auscultation
Epidural analgesia rates	74.1%
Fetal heart dopplers	8
Fetal heart monitors	1 per room + extras on unit
Central monitoring	Available at central nursing station
Chairs per room	Several
Shower	Yes
Tub	Yes
Birthing balls	Yes
Policy	SOGC 2002 Clinical Practice Guideline

Phase 1

I collected baseline data on nurses' attitudes towards the use of intermittent auscultation in clinical practice and guideline appropriate practice, conducted an interactive education intervention, and reassessed the nurses' attitudes and guideline appropriate practice. I began by assessing the nurses' adherence to the guideline one

month before, approximately one month after the first group of nurses received the interactive education session, and 12 months after the final interactive education sessions (see Figure 2). The data on the nurses' fetal health surveillance practices were obtained from the labour and delivery record (partogram). In total, I collected data from labour and delivery records three times. I also determined the changes in nurses' attitudes toward intermittent auscultation using a questionnaire administered before and after the interactive education session.

I used a pre-post design during Phase 1 to assess whether an interactive education intervention made a difference in the staff nurses' use of guideline appropriate care. This collection of data set the stage for Phase 2.

Participants

Staff nurses. All nurses working on the Birth Unit prior to Phase 1 were invited to participate in the study. The only exclusion criterion was nurses who were on leave (e.g. maternity, sick). Those who were willing to participate signed a consent form (see Appendix A) prior to receiving the interactive education intervention.

Because of unexpected delays, Phase 1 extended over an 18-month period. Staff turnover during this time necessitated repeated interventions to reach 80% of staff. Over this period, I continued to invite staff to participate.

Labouring women. During Phase 1, I reviewed charts of women who were low-risk on admission to the Birth Unit. Low-risk eligibility criteria included the following: (a) $\geq$ 37 weeks gestation, (b) singleton pregnancy, and (c) spontaneous active labour. Women were not considered to be low-risk when any of the following criteria were present: (a) required insulin for diabetes, (b) planned caesarean section, (c) required

magnesium sulphate for pregnancy induced hypertension, (d) thick meconium, (e) temperature ≥ 37.5 degrees Celsius, (f) low-lying placenta, and (g) a non-reassuring FH (Appendix B: inclusion/exclusion form).

Interactive Education Intervention

I provided 2 hour interactive education sessions on fetal health surveillance. The sessions offered an opportunity for staff to review the evidence associated with fetal health surveillance and practice interpreting fetal heart rates while engaging in interactive sessions. Given the imperfect evidence base with respect to which implementation strategies are effective for which guideline (Grimshaw et al., 2006) and the cost associated with implementation, it was felt that starting with a less expensive, less time-consuming strategy was more appropriate. Additionally, these sessions also provided an opportunity to ensure that all study participants had received comparable education.

The education content included (a) level and recommendation of evidence associated with fetal health surveillance, (b) principles of auscultation, (c) principles of Leopold's maneuver (determining the infant's lie, station, and presentation) to enable the nurse to determine where to place the doppler on the mother's abdomen, and (d) interpretation of fetal heart sounds. I presented this information using various education strategies including group discussion and individual practice opportunities because numerous researchers (Davies et al., 2008; Pagoto et al., 2007; Sinuff, Cook, Giacomini, Heyland, & Dodek, 2007) have recommended that these sessions should include opportunities for problem solving and critical thinking. These opportunities allowed staff nurses to work through situations of guideline appropriate care in interactive sessions.

Measures

Guideline appropriate care. During the three chart reviews, I recorded the nurses' practice of guideline appropriate care using the Labour and Delivery Audit Guide (see Appendix C). Classification of guideline appropriate care was assigned every 15 minutes, as per unit policy, using the Auscultation of Fetal Heart Rate Clinical Decision-Making Guidelines for fetal health surveillance in labour (Liston & Crane, 2002; see Appendix D). I measured appropriate guideline adherence as a dichotomous variable where "Yes" was 100% guideline appropriate care during active labour and "No" was failure to adhere 100% to guideline appropriate care during active labour.

Nurses' attitudes. I measured the nurses' attitudes to intermittent auscultation using the Labour and Delivery Nurses' Attitudes towards Intermittent Fetal Monitoring questionnaire (Walker, Shunkwiler, Supanich, Williamsen, & Yensch, 2001; see Appendix E) before and immediately following their 2 hour interactive education intervention.

Walker et al. (2001) developed the instrument to measure nurse's attitudes towards intermittent auscultation and reported the scores on the 17 items individually as opposed to calculating a single score. They reported the instrument's reliability (Cronbach alpha) as r = .69 (personal communication, 2002). Generally, a coefficient above r = .70 is considered satisfactory (Loiselle, Profetto-McGrath, Polit, & Beck, 2007). Therefore, the reliability of this scale was acceptable. Walker et al. (2001) did not report the instrument's validity.

I did not find another instrument in the literature that reported measuring nurses' attitudes towards intermittent fetal monitoring. I reported the results as individual items

in keeping with Streiner and Norman's (1995) recommendation to use an existing instrument as opposed to developing a new instrument.

Maternal and infant data. Maternal attributes included gravida, parity, and age. Labour and birth characteristics included length of labour, narcotic, epidural analgesia, and delivery method. The infant data I collected included Apgar score, weight, and admission to Neonatal Intensive Care Unit. I collected this data from the charts and transcribed it onto a form created for this trial (see Appendix H).

Procedures

Health record reviews. During each of the three chart review times during Phase 1, trained Research Assistants and I reviewed health records for fetal health surveillance strategies for labouring women who met the study criteria and also for birth and delivery outcomes (as per Figure 2). We conducted, for three one month periods, health record reviews of women who experienced low-risk labour and deliveries. These one month periods are represented by Times 1, 2, and 3. Due to the delays experienced during the collection of this data, Time 3 chart review was collected following the final education session.

Pre-post test: Intermittent auscultation attitude survey. The nurses participating in the interactive education intervention completed surveys regarding their attitudes towards intermittent auscultation prior to and immediately following the interactive education intervention. All of the nurses participating in the intervention completed attitude surveys.

Analysis

I entered and analyzed the data using the Statistical Package for Social Sciences (SPSS 15.1 for Windows). I assessed differences in baseline characteristics and guideline appropriate care by direct comparison (M, SD, and proportions) and compared guideline appropriate care using chi-square test.

In Phase 1, I answered research question number two: What effect does a fetal health surveillance interactional interactive education session have on Birth Unit nurses' attitudes toward intermittent auscultation and practices of guideline appropriate care? For this question, I used a paired t-test to measure changes in attitudes prior to and immediately following the fetal health surveillance interactive education intervention on each of the attitude instrument items. I also used descriptive statistics (percentage) and chi square test to describe the nurses' rate of guideline appropriate care, in each of the three times, during an episode of care.

In the subsequent section, I describe the research design and the methods for Phase 2. I discuss the relevant ontological and epistemological issues with respect to this research design and the study intervention. Additionally, I cover quality assurance procedures, data preparation, bias reduction, and ethical considerations.

Phase 2

Phase 2 was comprised of three times (Time 4 – 6). In Time 5, I used an RCT design to determine the effectiveness of Action Learning as a strategy to increase nurses' use of the guideline appropriate care during fetal health surveillance for women admitted to the Birth Unit of a university teaching hospital (as per Figure 3, p. 68). I randomized

staff nurses prior to the Action Learning intervention that was implemented in Time 5 using a randomization website, www.doppler.ca.

The primary research question was best answered using the research design of an RCT (DiCenso, Cullum, & Ciliska, 1998; Cullum, Ciliska, Haynes, & Marks, 2008). The use of an RCT design is associated with an empiricist worldview, which is strongly associated with positivism (Mantzoukas, 2007; Rycroft-Malone, 2006). In an RCT design, the researcher employs a sampling strategy so that an intervention can be applied under controlled conditions and the results can be accepted to be true with a particular level of certainty. The researcher aims to eliminate confounding influences and observer bias. In an RCT, the researcher does not consider the nature of the subjects' experiences, interpret subjects' experiences, or seek to understand the context of subjects' experiences.

In this study, I hold the assumptions that factors exist that are not confined to those that can be directly perceived or controlled (Clarke, 1998). This study was shaped with the understanding that neither the research nor the researcher was unbiased and that both were subject to cultural, social and experiential influences. This research was guided by a post-positivistic philosophy.

Both measurable and immeasurable processes characterize the Phase 2 study intervention, Action Learning, and I chose to try to capture both processes. The immeasurable processes are described as the "intuitive foundations" of clinical practice that cannot be measured by a positivistic RCT design (Ashcroft, 2004). These processes include, for example, the nurses' thoughts and feelings about their clinical practice, as well as, cultural and spiritual influences on their practice. Because I was attempting to understand both measurable and immeasurable processes, I chose a pragmatic RCT to

address the research question of effectiveness of Action Learning. A trial that is designed as pragmatic measures the effectiveness of a treatment on real, rather than ideal, clinical practices (Roland & Torgerson, 1998). Researchers measure the effectiveness of an intervention against a standard or an accepted treatment (MacPherson, 2004). The management protocol of the intervention, not the individual components of the intervention, is the focus. In addition, blinding is not always possible in a pragmatic trial (Roland & Torgerson, 1998) and as such, the difference between the experimental and control group likely reflects a real clinical response. By choosing a pragmatic RCT, I hoped to acquire knowledge of both the biases present in a clinical setting and the factors that may be difficult to capture (Hotopf, 2002). These factors were contextually bound and may not be "generalizable to all cases and all situations" (Clarke, 1998, p.1246).

According to Craig et al. (2008b), two main questions must be addressed in the evaluation of complex interventions: (1) Do interventions work in everyday practice? and (2) How do the interventions work? The assumption underlying the first question is that we measure the whole range of effects of the intervention. In this study, my intent was to assess the effectiveness of the Action Learning intervention as a whole prior to fine tuning the various components of the intervention. I planned to consider components of the intervention in future work.

Conducting an RCT of a complex intervention is quite different from conducting an RCT of a pharmacological treatment. Threats to validity arise when the intervention is complex. Some of these threats relate to challenges in replicating the intervention (Hawe, Shiell, & Riley, 2004) and controlling bias (Campbell-Yeo, Ranger, Johnston, &

Fergusson, 2009; Lindsay, 2004). These are not insuperable obstacles but they are issues that need to be taken into consideration during the RCT (Hawe, Shiell, & Riley, 2008).

At the beginning of Phase 2, and subsequent to the education intervention in Phase 1 and the Time 3 data collection, the participating Birth Unit staff nurses were randomized to Action Learning or Usual Care groups. Originally, I designed the study to randomize the labouring women to a nurse in either the Action Learning or Usual Care group. However, following an initial RCT start up, from June 2005 to October 2005, it became apparent that this initial design was not feasible because of the difficulty in randomizing labouring women. The Birth Unit was too busy to permit the charge nurse to complete this randomization procedure. The study was halted and over the next eight months, October 2005 to May 2006, it was redesigned to exclude the randomization of labouring women while preserving the randomization of study nurses to Action Learning or Usual Care groups.

In addition to the fact that I found it to be unfeasible to randomize labouring women, the evidence was clear from previous RCTs that the outcomes for low-risk labouring women were favourable with intermittent auscultation. After the study redesign, in addition to comparing the Action Learning group with the Usual Care group in Phase 2, I assessed all Birth Unit nurses' adherence to the guideline (Liston & Crane, 2002) 1 month before the initiation of the RCT (Time 4). During the six month period of the Action Learning intervention (Time 5), I examined the nurses' chart fetal health surveillance data and information regarding perceptions of the labour and birth experience if they had been cared for during labour by a study nurse. Following

completion of the six month intervention, I collected data for one month on all the Birth Unit nurses' adherence to the guideline (Time 6).

Setting

At the initiation of Phase 2, there was a major change in the Birth Unit with the appointment of a new nurse manager. The new manager verbally committed to the study. In the subsequent six months, there was a turnover of the nursing staff. The majority of these nurses were from the Action Learning group.

Sample Size Requirements

Sample size estimation to address the primary question was based upon an expectation of a 10% difference in proportions (Grimshaw et al., 2004) of the experimental and control group for adherence to the guideline appropriate care during an episode of care. I calculated sample size requirements based on a two-sided alpha at .05, a beta error at .20, and an anticipated 10% difference between the experimental and the control group with respect to guideline appropriate care, 15% among Action Learning nurses and 5% among Usual Care nurses. These conditions required a case sample size of 140 episodes of care per group (Dupont & Plummer, 1990) (280 in total).

The data collection had a defined period in this study. A six month period was set based upon the feasibility of the project and the context. Although at the end that period, the sample size was only 270, the decision was made to stop the RCT for several reasons. Extending the six month time period would have required additional approval for the intervention. This approval would have consisted of nursing staff support for an additional Action Learning set, and ethical approval to extend the intervention, to continue collecting fetal health surveillance data, and to continue asking postpartum

women to complete the Labour Experience Questionnaire. Within the educational context of this dissertation work, these factors necessitated the conclusion of data collection at six months.

Participants

Staff nurses. Eligible staff nurses during Phase 2 were those nurses who consented to participate during Phase 1.

Labouring women/postpartum women. I reviewed the charts of women one month prior to the initiation of the RCT (Time 4), during the six month period of the RCT (Time 5), and one month following the RCT (Time 6). The criteria for chart review were the same as in Phase 1 (See Appendix B).

Action Learning Intervention

Supported by a staff nurse-nominated facilitator (the principal investigator), the nurses participated in the Action Learning sets by sharing their experiences of adhering to the intermittent auscultation component of the guideline for low-risk labouring women (Liston & Crane, 2002). Together, the nurses discussed with me, factors that inhibited or enabled their use of the guideline. These discussions provided an opportunity for the nurses to clarify their values and goals, and plan their nursing care for appropriate intermittent auscultation (McGill & Brockbank, 2004; Wilson et al., 2008). I proposed that it was through these periods of reflection that learning took place when the nurses considered both their social and subjective contexts.

My nomination as facilitator took place in the following way. During an inservice session about the project, the staff nurses were informed that they could select the facilitator for the Action Learning sets. They immediately inquired if I could be the

facilitator. They stated that they trusted me and would like to learn more and engage in discussion about intermittent auscultation and guideline appropriate care with me. They were all familiar with my experience with regional workshops on (teaching) fetal health surveillance. Following their request, I informed them that I had previously participated, as a set member, in Action Learning and that I had facilitator training.

The recommended period for this intervention is six months to one year (McGill & Brockbank, 2004). I conducted the intervention for six months because this was the first time Action Learning was used as a strategy in an RCT. I felt the six month period would provide preliminary information to assess effectiveness of this strategy. Set members received $50/set to acknowledge their effort and their participation in sets on a day they were not working in the Birth Unit.

The Action Learning nurses and I met regularly to evaluate their intermittent auscultation efforts, solve problems, adjust strategies, and plan future actions accordingly. An initial introductory Action Learning set was provided for all Action Learning nurses (Hughes & Bourner, 2005). This initial set was comprised of three phases (see Table 2). Following this initial set, the Action Learning nurses met monthly in groups of four to six to discuss their experiences with intermittent auscultation. In each set, each nurse identified at least one process or one factor that she would like to see changed or modified in order to feel more supported in intermittent auscultation. These changes were related to the context for fetal health surveillance for low-risk labouring women. For example, the nurses identified the availability of dopplers on the unit.

Table 2

Action Learning Set Schedule

Action Learning sets	Initial meeting	Second and subsequent meetings
Time frame	Minimum of two hours	Minimum of two hours
Number of sets	One meeting	Minimum monthly meeting (minimum five meetings)
Number of participants	Minimum of two nurses	Minimum of two nurses
Phases and/ schedule	Three phases: 1. Introduction to workshop: purpose, structure, and format of Action Learning sets. 2. Worked in pairs/triads (begin identifying issues and using group skills). 3. Process review (reflection).	Schedule included: 1. Opening the set, warm-up (5 minutes). 2. Ground rules established (second meeting only). 3. One or more set members presented (15 minutes each member) issues arround their intermittent auscultation experiences. 4. Individual set members identified and presented action plans (what they were going to do when they returned to clinical practice the following month). The plans were made based upon the issue presented and the feedback received (10 minutes each member). 5. Reflection/group wrap-up (10 minutes).

An environment of high challenge was created for the Action Learning nurses through the questions posed by their colleagues regarding each other's approaches to intermittent auscultation and guideline appropriate care. Set members listened to each

presentation. In order for the set members to understand the presenter's issue, we used reflection and questioning in response to the presenter. Set members also asked clarifying questions of the presenter if they needed to understand the presenter's fetal health surveillance intermittent auscultation issue more thoroughly.

Questions by set members were intended to benefit the presenter and not to serve the remaining members' desire for more detail about the issue. The focus during a presentation was to support the presenter. Questioning was intended to further the presenter thinking and awareness of their respective issue. Established ground rules required that only one set member spoke at a time and that all members respected comments from one another. Between monthly sets, members carried out their attempts to implement their approaches or plans. Set members reviewed the implementation efforts of the selected approaches or plans at subsequent Action Learning sets.

The goals of set attendance were: (a) to leave each meeting thinking about their respective practices, (b) to think about how they could increase their rate of intermittent auscultation, and (c) to reflect on enhancing their skills in sharing "their story" at each set meeting. Set members achieved these goals through the process of presenting issues to other set members. During these presentations, each presenter had the potential to develop a skill set. These skill sets included congruence, self-disclosure, managing emotion, and reviewing feedback (McGill & Brockbank, 2004).

My responsibilities, as facilitator, during a set included the following,

1. I reinforced the rationale / research evidence for intermittent auscultation in low-risk labouring women. I supported nurses in the Action Learning set by providing information to enhance their understanding of the intermittent auscultation evidence, the

contextual and the cultural issues of the organization, and appropriate intermittent auscultation clinical practice change. For example, this included information that was in the guideline (Liston & Crane, 2002) and, when they were interested and requested them, research articles pertaining to intermittent auscultation. We discussed issues such as the attitudes and beliefs held by staff on the Birth Unit, how decisions were made regarding fetal health surveillance, and how the nurses were evaluated on their performance.

2. Supporting and challenging nurse-led initiatives for practice change when discrepancies between the nurses' practice and that of the current guideline were found. I used multi-method approaches for learning that were determined by each set. They included listening, restatement, summarizing, questioning, empathy, and giving feedback and information (McGill & Brockbank, 2004). My supportive attributes ranged from task-oriented to holistic and enabling (Kitson et al., 2008; Rycroft-Malone et al., 2004). For example, through helping and enabling we established a relationship where I supported the Action Learning nurses to begin identification of areas of change for their guideline appropriate care, rather than a relationship where I cajoled the Action Learning nurses into practice change (Boydell & Blantren, 2007).

3. I provided anonymous grouped intermittent auscultation practice results to the nurses in the Action Learning set. I also provided outcome data to individual nurses during one-to-one coaching as it related to their practice of intermittent auscultation. Regular access to the facilitator between sets was an important part of the Action Learning intervention (McGill & Brockbank, 2004). McGill and Brockbank designed their intervention to provide support to set members in order to understand Action Learning and to address their respective issues (2004). Between sets, I met once with

each Action Learning nurse (maximum 10 to 15 minutes), reviewed her action plan from the previous set, provided support for carrying out these various action points, provided feedback on any of her identified practice changes and on postpartum women's perception of their labour experience. Ongoing feedback during each set and during one-to-one coaching was a strategy intended to reinforce the intermittent auscultation strategies and enhance guideline appropriate care (Ervin, 2005; McGill & Brockbank, 2004).

4. I provided anonymous grouped Labour Experience Questionnaire results to the nurses in the Action Learning set that the women had returned to that point. Through feedback, I was able to share with the Action Learning nurses the grouped results from the Labour Experience Questionnaire so that we could discuss the mothers' reported satisfaction during their birth experience. It was important to make the Action Learning Sets relevant to the intermittent auscultation needs of the Action Learning nurses. Craig et al. (2008b) stated that if allowed, adaptation of a complex intervention to a local setting may help the intervention to work better. Adaptation empowered participants to take control of their learning.

5. During the sets, the group reviewed the enablers and the inhibitors for change in intermittent auscultation practice and I kept a log of all issues expressed by the staff nurses during the Action Learning Sets and one-to-one coaching. Identification of the enablers and inhibitors helped to make it possible for the nurses to tailor their individual strategies for changing intermittent auscultation practice. The nurses chose to integrate specific components into their respective actions based upon their individual practices

and additional discussion regarding the barriers and facilitators identified in Graham et al. (2004).

Through the Action Learning intervention, I presented the nurses with an opportunity to make their own choices and come to understand the nature of their practice with intermittent auscultation via Action Learning. As facilitator, I spent a comparable amount of time with each of the nurses in the Action Learning group. During the sets, my role was to facilitate their discussion and conversation with the aim of the nurses leading the various topics of discussion. The activities in which the nurses participated allowed them to reflect on their actions. They better understood their attitudes and beliefs regarding intermittent auscultation and how these beliefs connected to their practice.

Measures

Primary outcome. The primary outcome was the effect of the Action Learning intervention on the nurses' use of guideline appropriate care. During the six month RCT, women's partograms were reviewed in order to assess the nurses' use of guideline appropriate care for low-risk women admitted to the Birth Unit. The unit of analysis was the episode of fetal health surveillance care, admission to the Birth Unit through to delivery, for women in active labour who had been assessed to be low-risk upon admission. As previously stated, I measured success as a dichotomous variable where "Yes" was 100% guideline appropriate care during active labour and "No" was failure to adhere 100% to the guideline appropriate care during active labour. During an episode of care, the nurses were to implement the guideline as per the woman's risk status. For example, when it became necessary to augment a woman's labour with oxytocin,

adherence to guideline appropriate care was the use of continuous electronic fetal monitoring.

An episode of care, from admission to delivery, was chosen for a variety of reasons as the unit of analysis for capturing guideline appropriate care. These reasons included nurses' attendance with labouring women and application of the guideline. Nurses in the Birth Unit work 12 hour shifts. This means that they may or may not be present with a woman for her entire labour, but are there for a majority of the labour.

Application of the guideline was intended for the entire birth experience, admission to delivery. Guideline application should not be related to work hours. As well, the standard of care for fetal health surveillance was the unit policy for all staff nurses. Given that a particular nurse was not always present for all of a low-risk woman's labour, if 80% of the care was provided by a study nurse in the same group (Action Learning or Usual Care), that episode of care was included. This choice was based upon previous research regarding birth unit nurse practice and behaviour change (Hodnett et al. 2002). Unlike midwives, a particular nurse did not provide all the care during labour and delivery. Pragmatically, I deemed 80% of care by study nurses as the best proxy for representing an episode of care. Additionally, the guideline was written for labour, defined as an episode of care in this study, as opposed to components of labour. It was policy in the Birth Unit and was a standard of practice that nurses were required to follow. As previously described, classification of guideline appropriate care was determined based on the Auscultation of Fetal Heart Rate Clinical Decision-Making Guidelines for fetal health surveillance in labour (Liston & Crane, 2002) and documented every 15 minutes on the Labour and Delivery Audit Guide (see Appendix C).

Secondary outcomes. The secondary outcomes collected during this phase were maternal perceptions of labour and birth, guideline appropriate care during a portion of an episode of care, and enablers and inhibitors to intermittent auscultation practice.

Maternal perception of labour and birth. Prior to hospital discharge, that is, within approximately 48 hours of a vaginal delivery or 72 hours of a caesarean delivery, women reported their perceptions of labour and birth using Part I of the Labour Experience Questionnaire (Killien & Shy, 1989; see Appendix F). This 53-item, seven-point Likert scale has an overall score equal to the mean of all item responses; the higher the score, the greater the satisfaction. Killien and Shy (1989) reported internal consistency to be r = .81. They identified three sub-scales through factor analysis with 135 women: (a) fetal monitoring experience (alpha = .85), (b) medical support (alpha = .85), and (c) nursing support (alpha = .76). They indicated that these sub-scales were related dimensions (inter-correlations ranged from .43 to .67), and they did not report the instrument's validity.

I chose to use the Labour Experience Questionnaire because Killien and Shy (1989) reported good internal consistency and I did not find any published literature that measured labour experience comparing women who were monitored continuously with women who were monitored intermittently. Additionally, Streiner and Norman (1995) supported the use of an existing instrument rather than developing a new instrument.

Killien and Shy (1989) did not report which specific items should be scored on each of the three subscales and I was unable to ascertain this information from the authors directly. As a result, I consulted a panel of three nurse experts to assist with determination of which items should be assigned to the subscales. These panel members

agreed (100%) with item assignment and I proceeded to score the scales with these items. I decided to retain this instrument because of the agreement of item appropriateness from the panel of experts.

Guideline appropriate care during a portion of an episode of care. I collected this data to determine the proportion of nurses who used guideline appropriate care during a portion of an episode of care. A portion is a segment of an episode of care, such as admission to augmentation. Each of these portions was scored, similar to an episode of care, using the Labour and Delivery Audit Guide (See Appendix C). I identified eight portions of guideline appropriate care during an episode of care: (1) admission to epidural analgesia, (2) post epidural analgesia to delivery, (3) admission to non-reassuring fetal heart rate, (4) post non-reassuring fetal heart rate to delivery (5) post epidural analgesia to augmentation, (6) admission to augmentation, and (7) post non-reassuring fetal heart rate to epidural analgesia, and (8) admission to meconium.

Enablers and inhibitors to intermittent auscultation practice. These data were collected using two methods. First, subsequent to caring for a labouring low-risk woman, each Action Learning nurse identified the factors that she found had influenced her use of intermittent auscultation. The nurses reported this information on a Fetal Health Surveillance Enabler and Inhibitor data collection form developed for this trial (see Appendix G). I developed this form based upon my own clinical practice of intermittent auscultation, the fetal health surveillance literature (Davies et al., 2002; Graham et al., 2004; Walker et al., 2001), and existing evidence about the barriers and facilitators to using research evidence in other practice areas (Estabrooks, 1999b; Estabrooks et al., 2003; Hutchinson & Johnston, 2004).

Prior to Phase 1, Birth Unit staff nurses reviewed this data collection form. They assessed the form for clarity and content (face validity). Each nurse agreed with the items on the form and in response to a suggestion by one nurse, I added a section for additional comments. The form consisted of 14 possible enablers and 17 possible inhibitors. Following each low-risk delivery, Action Learning nurses indicated the inhibitors and enablers that applied during that specific episode of care. The responses indicated on this form were reported by a count of the items that the nurses checked. I grouped the nurse's individual item responses into issues relating to the practice environment, adopter concerns, patient/family, physician, and labour events. Qualitative comments were not included in this count.

Secondly, nurses discussed both enablers and inhibitors to intermittent auscultation practice during the Action Learning sets and during the one-to-one meetings between the Action Learning sets. I used field notes to record these enablers and inhibitors. When similar enablers and inhibitors were discussed between members of each of the four sets I recorded the issue once; however, I documented all actions (based upon the enablers and inhibitors) taken by the nurses.

Other data. Other data included dose of the intervention (the number of Action Learning sets that the Action Learning nurse attended), length of an episode of care, and maternal data. I recorded the dose of the intervention in my field notes. The length of an episode of care was obtained from the Fetal Health Surveillance Patient Demographic – Labour and Delivery Form (see Appendix H). Also included on that form were maternal attributes (gravida, parity, and age) and labour and delivery characteristics (length of

labour, narcotic, epidural analgesia, and delivery method). These maternal data were collected from the charts and transcribed onto this form that I created for this trial.

Procedures

Recruitment and randomization. Following Time 3 in Phase 1 and after the 31 additional nurses completed the interactive education intervention, all study nurses were randomized to the experimental Action Learning group or to the Usual Care control group. I conducted randomization and allocation to each study group by using a computer-generated random table with permuted blocks of six, and allocation was concealed using a randomization website, www.doppler.ca.

Following delivery and transfer to the postpartum unit, one of the Research Assistants or I approached eligible women, and invited them to participate in the trial by completing the Labour Experience Questionnaire. An information letter (see Appendix I) regarding the trial, which accompanied the questionnaire, advised women that maternal and infant outcome data would also be retrieved from their respective charts. Completion of the Labour Experience Questionnaire served as a woman's consent to participate.

Action learning nurses. Action Learning nurses participated in the Action Learning intervention and completed the Fetal Health Surveillance Enablers and Inhibitors Form following their care of a low-risk labouring woman. Action Learning nurses stopped completing these forms when they felt they had identified all the inhibitors and enablers that they noted in their practice.

Usual care nurses. Following the education intervention, the nurses in the Usual Care group continued with their usual fetal health surveillance practice of care for low-risk labouring women. There was no additional intervention with these nurses.

Research assistants. The study Research Assistants collected the fetal health surveillance data from the charts of women who were low-risk on admission to the Birth Unit and cared for by nurses in either the Usual Care or the Action Learning group. Three Research Assistants were baccalaureate-prepared nurses with Birth Unit experience and the fourth Research Assistant was a fourth year nursing student with both postpartum and Birth Unit experience. None of the Research Assistants were study nurses. Research Assistant knowledge and experience was important and aided in the extraction of complex chart data concerning fetal health surveillance. The Research Assistants were masked to randomization and study questions. Research Assistant training took place during a two week period before intervention initiation and as they were hired during the study. During this training time, I provided detailed responsibilities. The Research Assistants practiced the collection of guideline data using "Test" records. I did not collect the practice forms.

During Time 5, the Research Assistants or I checked the postpartum unit patient log regularly in order to identify postpartum women who met the criteria for low-risk status on admission to the Birth Unit. The Research Assistants or I approached eligible women and asked them to participate. Interested women completed the questionnaires prior to discharge and returned the completed questionnaire to either their assigned postpartum nurse or study personnel.

Health record reviews. During each of the three time periods during Phase 2, the Research Assistants or I reviewed health records for fetal health surveillance strategies for labouring women who met the study criteria and also for birth and delivery outcomes (as per Figure 3). Due to the delay between Time 3 (in Phase 1) and the

introduction of Phase 2 (and Time 5, the RCT), I completed an additional one month health record review (Time 4) of nurses' guideline appropriate practices prior to restarting the RCT (Time 5). I completed this additional health record review because there could have been changes in nurses' guideline appropriate practices during the delay between Time 3 and the initiation of the RCT (Time 5).

Health record reviews during Time 5 were conducted throughout the six month intervention. Following Time 5, health record reviews during Time 6 allowed a further assessment of guideline appropriate practices one month following the completion of the RCT.

Quality assurance procedures and data preparation. I reviewed each of the first five charts completed by the Research Assistants. I verified that fetal health surveillance data were correctly extracted and recorded by having one of the Research Assistants repeat data extractions from the medical records on 10% of the sample during the first two months. During this verification, a Research Assistant identified inconsistent practice by two Research Assistants in relation to adherence to the inclusion criterion of "greater than 80% of care is provided by a study nurse." Of the charts reviewed during this time (N = 55), 14 were excluded from analysis due to this error. Following this observation, and with ongoing random checks of collected data, the overall accuracy of data extraction between the Research Assistants was 100%. The Research Assistants did not miss any further data during the chart review. The only data missing for analysis was due to documentation errors or omissions by the Birth Unit staff nurses. Staff nurses' failure to chart was evident in areas such as patient's age, number of

live births, and delivery time. For example, of the 270 episodes of care from admission to delivery during Time 5, 20 (7.41%) records did not have the woman's delivery time.

A Research Assistant and I reviewed a 10% random sample of all criteria for errors and missing information. The extent and frequency of the sampling was determined based upon the number of errors identified. There were no obvious errors noted.

The postpartum women did not always answer all the questions on the Labour Experience Questionnaire. I excluded four cases with greater than 10% missing values from analysis. I replaced the remaining missing values with the participants' mean score for the remaining items.

Analysis

I entered and analyzed the data using the Statistical Package for Social Sciences (SPSS 15.1 for Windows). All primary and secondary research question analyses were by intention-to-treat. I compared nurses' clinical practice of guideline appropriate care by their assigned group rather than by any other group that they may have fallen into post-randomization. I calculated proportional differences and 95% CI. Comparisons of episodes of care that were provided by nurses in the Action Learning group and episodes of care provided by nurses in the Usual Care group were done using chi-square tests. I assessed differences in baseline characteristics by direct comparison (means, SD, and proportions). I made these comparisons overall by those who both completed the interactive education intervention and were randomized, as well as by group allocation.

Research question number 1. What is the effectiveness of an Action Learning intervention for nurses on the use of guideline appropriate care (per Society of

Obstetricians and Gynecologists of Canada 2002 guideline) during an episode care for low-risk women admitted to the Birth Unit?

Research question number 5. What is the effectiveness of an Action Learning intervention for nurses on the use of guideline appropriate care during a portion of an episode of care for low-risk women admitted to the Birth Unit?

Research question number 6. What is the effect of nurses' attitudes towards intermittent auscultation, dose of Action Learning, episode of care, and nurse group (Action Learning or Usual Care) on the use of guideline appropriate care during an episode of care for low-risk labouring women admitted to the Birth Unit?

For research questions 1 and 5, I calculated the proportion of nurses using guideline appropriate care during an episode of care and used chi-square tests, as well as the 95% CIs to determine between group differences. For research question 6, I used direct logistic regression to explore the interaction between the predictor variables and the use of guideline appropriate care respectively.

Direct logistic regression is the method of choice "if there are no specific hypotheses about the order or importance of predictor variables" (Tabachnick & Fidell, 2007, p. 454). I explored the relationships between a variety of predictor variables and the outcome of guideline appropriate care. I assessed for ratio of cases to variables, linearity in the logit, absence of multicollinearity, and absence of outliers. Predictors were included when there were an adequate number of cases per cell, when there was a linear relationship between the predictors and the logit transformation of the dependent variable, when none of the variables was redundant, and when no outliers were present.

I initially assessed seven predictor variables based upon their clinical and theoretical meaningfulness (Garson, 2008). I checked for the intercorrelations among the predictor variables. I maintained those that had a significant relationship with the dependent variable and discarded those that were strongly related to one another. In addition, I used one predictor, dose of the intervention. This predictor was not significant in the univariate analysis, but was theoretically meaningful. According to the PARiHS framework (Rycroft-Malone, 2004), facilitation is one of the three components influencing the use of evidence in practice. In this study, I conceptualized facilitation, in part, as dose of the intervention. I anticipated that the greater the dose received, that is, the greater number of Action Learning sets attended, the greater the amount of facilitation. Therefore, I retained dose of intervention as a predictor. Tabachnick and Fidell (2007) supported the use of theoretical predictors in logistic regression.

Research question number 3. What differences in satisfaction (perception) with guideline appropriate care existed between postpartum women cared for by Birth Unit nurses in the experimental group (Action Learning group) versus nurses in the control group (Usual Care group)?

Differences in women's perceptions of monitoring and medical and nursing support on the Labour Experience Questionnaire were measured using the Wilcoxon signed rank test to report the postpartum women's responses according to each of the three subscales (fetal monitoring experience, medical support, and nursing support) scores and the total scale scores.

Research question number 4. What are the nurses' views of the enablers and inhibitors influencing the use of intermittent auscultation for low-risk labouring women?

The Action Learning nurses' responses on the Fetal Health Surveillance Enabler and Inhibitor Form following their care of a low-risk labouring woman were assessed and grouped into two categories: the enablers and the inhibitors. Previous research findings (Graham et al., 2004) were similar to these groupings. The various items on the form were grouped and counted, response percentage, to represent factors related to evidence and context such as practice environment, adopter concerns, patient/family issues, physician influence, and labour events. The issues raised during the Action Learning sets that were different from those identified on the Enabler and Inhibitor form were captured to represent the same factors.

Exploratory analysis of action learning attendees and usual care nurses. Because more than one-third of the nurses who had been randomized to the Action Learning group did not attend any of the Action Learning sets, I completed an exploratory analysis to determine whether those who participated in the intervention differed from the nurses in the Usual Care group in their adherence to the guideline. This comparison was between the 35 Usual Care and the 17 Action Learning nurses (148 versus 90 episodes of care). Because this difference in attendance could have led to a variability in outcomes achieved (Sidani, 1998). I compared the groups in the same manner as described above for the primary study question. I conducted this exploratory analysis of attendees and Usual Care nurses since the limited number of nurses' attending the Action Learning sets increased the likelihood of committing a Type 2 error (Sidani, 1998).

Bias Reduction

Systematic errors have the potential to influence the credibility of study results and the generalizability of study findings. I took several measures to reduce such systematic errors. The potential errors included: confounding, masking, contamination, co-intervention, and losses to follow-up. Each of these errors was taken into consideration prior to initiating this trial and each will be reviewed.

Confounding. When this study began, the nursing manager on the Birth Unit was supportive of the study, offering assistance to help in any way. At that time, the nursing staff included a large consistent core group of nurses that had been on the unit for a long time. Over time and several study delays, the Birth Unit experienced a change in management and, according to the reports during the Action Learning sets, a change in morale of the nurses. This change resulted in senior nurses leaving the Birth Unit and the addition of new staff. Additionally, prior to starting the RCT in Phase 2, this study was redesigned when a decision was made that randomization of labouring women was not a necessary component of the study's outcomes. The influence of this time delay and the resulting change in management and staff contributed to real life challenges for the study. What resulted was an RCT that had uneven numbers of participants in the control and experimental group, and the awareness of the study among the remaining staff members. This meant that the Usual Care group, because they could have learned of the desired outcomes of the intervention (increased adherence to the guideline), may have changed their behaviour. A change in behaviour would have influenced the data collected from the control group and caused an underestimation of the true association. Because of an

increased awareness, more control nurses may have initiated intermittent auscultation and thus contributed to the level of difference observed in guideline adherence.

An additional potentially confounding factor was present in this study: the principal investigator as facilitator. Given my role as principal investigator, facilitator, and staff nurse, a bias may have been present in my relationship with the participants. The post-positivistic approach taken in this study, however, supported the principal investigator acting as the facilitator. Had I been working within a strictly positivistic paradigm, I would have had total detachment from the study process. However, I adhered to the assumptions of post-positivistic philosophy in making decisions about the appropriateness of the principal investigator being the facilitator. Clarke argued that the researching human contributes to the shaping of the research process (1998). In addition, Giddings and Grant held that researcher objectivity is impossible (2007). I argue that, based on the positions of these philosophers, it was appropriate that I, as principal investigator, assume the role of facilitator of the intervention.

Masking. The nurses were encouraged to avoid divulging their group allocation to the labouring women for whom they cared. It was not possible to mask the method of fetal health surveillance provided by the study nurse. To assess for bias due to unblinding during the recruitment process, the research assistant or I asked the postpartum women if they had learned during labour to which group their nurse was assigned. None of the postpartum women was aware of their nurses' study group.

The research assistant collecting data from the postpartum chart was also masked to the group assignment of the nurse who provided the fetal health surveillance care. Because viewing the partogram enabled the research assistant to see how the postpartum

women had been monitored during their admission, there was a potential that this could lead to unblinding. As a result, the research assistant did not look at the partogram until all other data were collected.

Contamination. Efforts were made to avoid the influence of the intervention with the Action Learning nurses on the Usual Care nurses. The nurses in the Action Learning group provided, as assigned, ongoing fetal health surveillance to low-risk labouring women. The nurses in the Usual Care group were expected to provide care as per their previous fetal health surveillance practice. The Action Learning nurses agreed not to discuss the activities of the Action Learning sets, nor their respective actions to increase guideline adherence.

When an episode of care carried over a change of shift, the Charge Nurses were asked to assure that patient assignment was consistent. The assignment on the subsequent shift came from the same study group, Action Learning or Usual Care, and at a minimum, 80% of the care provided during an episode of care was from a nurse in the same study group in the trial.

Co-intervention. If Action Learning was effective, there may have been changes on the Birth Unit initiated by the Action Learning nurses. These changes, additional interventions such as extra treatment and different care, might have affected the care provided to women in one group compared to the other (Keirse & Hanssens, 2000). In order to assess for this possibility, unit-based data (for example, interventions discussed during the Action Learning sets) were collected at several points in the study in order to record the management received by the different groups. Figure 2 (p. 67) and Figure 3 (p. 68) summarizes these data collection points.

Losses to follow-up. I took several measures to avoid losses to follow-up. First, I employed intention to treat analysis in this study. Each episode of care was analyzed as if the Action Learning group nurse had received the full intervention, regardless of the dose actually received. Second, women in the study gave birth and left the hospital within a short time period. Since the secondary outcome data, perception of birth experience, were collected in the immediate postpartum period, there were no losses. Finally, there were no further losses to follow-up with respect to the remaining maternal and fetal data as they were obtained from chart review.

Ethical Considerations

I received ethical approval from the research ethics boards of the participating hospital and McGill University. Nurses were invited to participate through the display of posters on the Birth Unit and by word of mouth. They were aware that their participation was voluntary. Physicians were informed of the study through a formal presentation at grand rounds. Nurses read and signed the study consent form prior to entering the study. They received both an information sheet containing study details and a copy of the consent form. Postpartum women read and kept an information sheet containing study details and completion of the postpartum Labour Experience Questionnaire was accepted as consent.

All data were secured in a locked cabinet at both the participating hospital and Dalhousie University. Anonymity and confidentiality were maintained by using numeric identification codes to label all study data. Access to the data was limited to the research team. A list of the chart numbers and names was kept separately from the data collection forms. I destroyed the list of codes linked to nominal information following the

completion of data analysis. Study data will be maintained for 5 years following the study. This data will then be destroyed. Study personnel were available throughout the study to address participant concerns. The Tri Council Policy Statement: Ethical Conduct for Research Involving Humans (NSERC, 2008) and the World Medical Association Declaration of Helsinki (National Institutes of Health, 2008) were adhered to during the study.

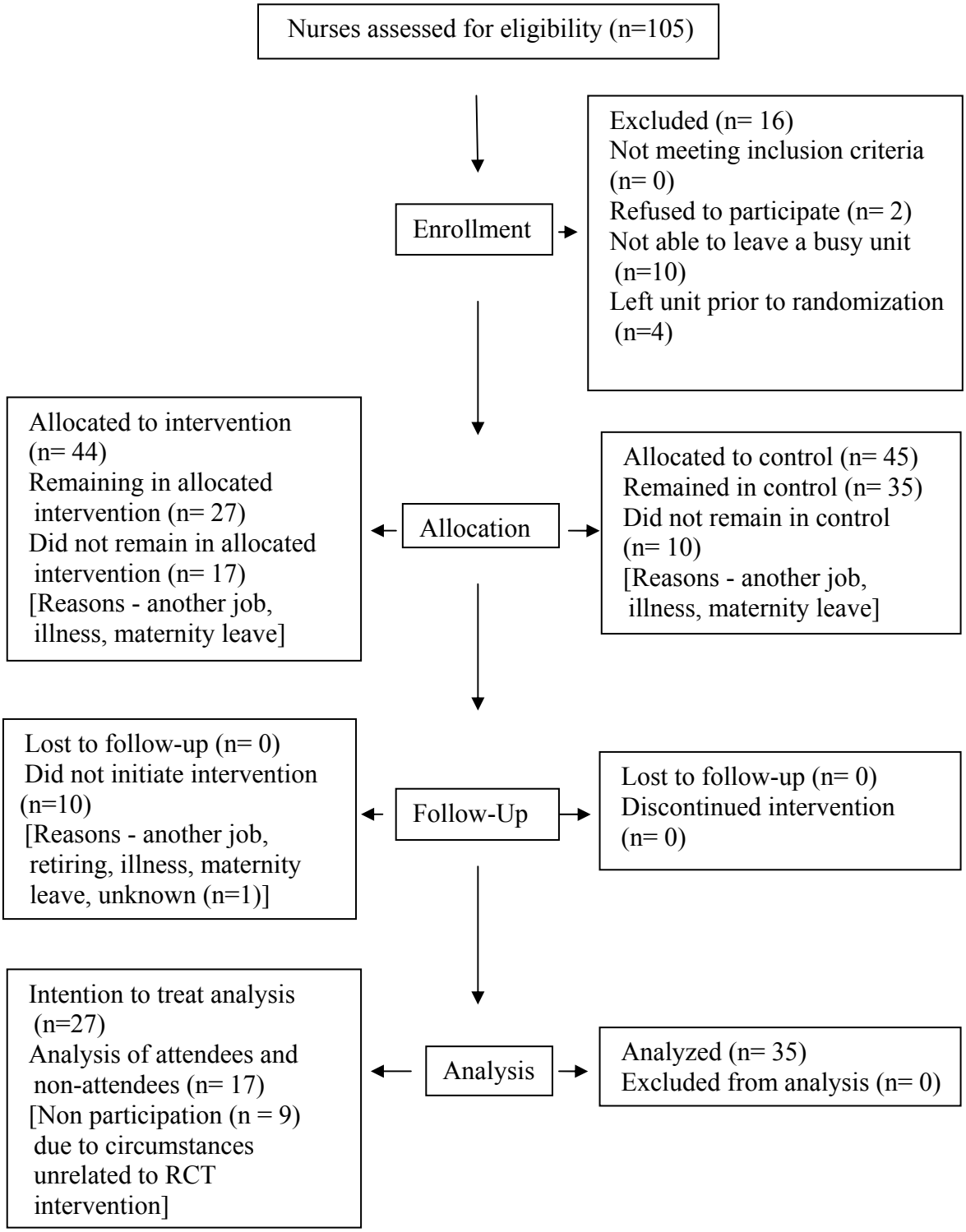
CHAPTER 4

Results

I will present the study results in three sections according to the study procedures. The first two sections will deal with the results of the two different interventions on Birth Unit nurses' fetal health surveillance practices. In the first section, I will present the participant characteristics during Phase 1 and the findings on whether a fetal health surveillance education intervention made a difference in the staff nurses' use of guideline appropriate care and on nurses' attitudes (Phase 1). In the second section, I will present the participant characteristics during Phase 2 and the primary outcome regarding the effects of an Action Learning set on nurses' guideline appropriate practices (Phase 2). In the third and final section, I will address the remaining secondary research questions and the analysis of attendees and non-attendees (Phase 2). Subsequent to the Participant Flowchart (See Figure 4), I will present these three sections.

Figure 4

Participant Flowchart



Participants: Phase 1

Staff nurses. In total, 95 of the possible 105 Birth Unit nurses expressed an interest in participating. I obtained consent from 93 nurses; only two nurses chose not to participate. The nurses ranged in age from 23 to 57 years (see Table 3). The majority were diploma educated, had worked more than one year in the Birth Unit, were full-time employees, and had received previous education regarding the appropriate use of fetal health surveillance during labour.

Table 3

Nursing Staff Characteristics

Characteristics	N = 93
Age	
Mean (SD), years	38.2 (9.1)
Range	23 – 57
Education	
N (%)	
Diploma	42 (45.2)
Degree	26 (28.0)
Both	25 (26.9)
Birth unit (>1 year)	
N (%)	
Yes	80 (86.0)
No	13 (14)
Employment status	
N (%)	
Casual	8 (8.6)
Part-time	29 (31.2)
Full-time	56 (60.2)
Fetal health surveillance education prior to Phase 1	
N (%)	
Yes	74 (79.6)
No	19 (20.4)

Labouring women. During the first month long review of the labour and delivery partogram, I reviewed 380 charts assessing for women who were low-risk on admission to the Birth Unit. Of these 380 charts, 156 charts were from women who were low-risk on admission to the Birth Unit. The numbers of low-risk women during each data collection time varied with the fewest women in Time 3 (N = 80) and the greatest number of women in the baseline period (N = 156).

The maternal ages were comparable at each data collection time (mean age = 30 years). The majority of women were having their first or second child. The women in Time 3 had the shortest average length of labour (mean = 397 minutes). Length of labour during all data collection times ranged from 26 minutes to 1915 minutes. Approximately 75% of the women in two of the three data collection times had epidural analgesia. However, during Time 3, labouring women had the fewest epidural analgesia (59.5%). Additionally, in Time 3, labouring women had the least use of oxytocin for augmentation of labour (18.8%). Women in Time 1 and Time 2 had comparable use of oxytocin (21.2% and 22.8% respectively). This use of oxytocin was comparable with the participating hospital's use of oxytocin for augmentation of labour in 2007 – 22.7% (Reproductive Care Program, 2008). I present the demographic and labour characteristics of these women in Table 4.

Table 4

Low-Risk Labouring Women Characteristics

Characteristic	Baseline	Post education session	Post education session
	Time 1	Time 2	Time 3
Maternal age (years)			
N	152[a]	145	79[a]
Mean (SD)	29.1 (5.1)	30.1 (5.5)	30.0 (5.8)
Number of live births			
N	156	145	79[a]
% 1	51.9	51.7	36.7
% 2	35.3	34.5	44.3
% ≥ 3	12.8	13.8	19.1
Length of labour (minutes)			
N	143[a]	124[a]	75[a]
Mean	539.0	549.6	396.6
(SD)	(312.6)	(304.6)	(278.7)
Range	54–1614	26–1915	44-1288
Epidural analgesia			
N (%)	118 (75.6)	115 (79.3)	47 (59.5)
Oxytocin			
N (%)	33 (21.2)	33 (22.8)	15 (18.8)

[a] = Charts where nursing documentation was not completed.
No data were missed during the chart reviews (Time 1, 2, 3).

Phase 1: Fetal Health Surveillance Interactive Education Intervention: Impact on Nurses' Attitudes and Practices

The interactive education intervention contributed to a significant change in the nurses' beliefs and attitudes about fetal health surveillance. Over the 18 month period, I conducted a total of 20 education sessions. The number of participants in each of these interactive education sessions ranged from two to six staff nurses. I offered these

interactive education sessions at the end of a shift, prior to the nurses going home, and when the unit was not busy. Each nurse attended only one session. This interactive education intervention, however, did not result in a change in the nurses' practice of guideline appropriate care.

The impact of an interactive education intervention on nurses' attitudes toward intermittent auscultation. At baseline and after the education intervention, the nurses' attitudes toward intermittent auscultation varied depending on the specific survey items addressed. For example, at the posttest, on a scale from 1 to 5, the nurses' mean scores ranged from "disagree" with a mean value of 2, to "agree" with mean scores greater than 4 on some items (see Table 5). The nurses disagreed, that is, mean scores less than 3, with 6 of the 17 survey items. Of these items, three related to the patient's request for fetal heart monitoring. The nurses disagreed that labouring women want (M = 2.44) or expect continuous external fetal monitoring (M = 2.67), and ask for intermittent auscultation (M = 2.15). The nurses' also disagreed that continuous external fetal monitoring should be the standard of care (M = 2.17). They disagreed that the physicians were willing to order intermittent auscultation (M = 2.96).

Nurses agreed most, scores greater than three, with items that reflected their acceptance of intermittent auscultation. The nurses agreed that they were willing to intermittently monitor (M = 4.45), had time for intermittent auscultation (M = 4.15), and that intermittent auscultation should be the standard of care (M = 4.27).

Following the interactive education intervention, nurses' attitude responses changed significantly on 5 of the 17 items. These items were related to standards of care, research evidence, and nursing care. For example, the nurses agreed more that

intermittent auscultation impacts nursing care ($t = -3.14$, $p < .05$) and continuous external fetal monitoring shows an increase in maternal and neonatal morbidity ($t = -5.11$, $p < .05$), and agreed less that women want continuous external fetal monitoring during labour ($t = 2.32$, $p < .05$).

In Table 6, I present the descriptive statistics, in a similar format used by Walker et al., (2001) for the nurses' posttest scores responses to the individual survey items on the knowledge and attitude questionnaire. The nurses agreed or strongly agreed with most of the items indicating their supportive attitude toward intermittent auscultation during labour. In the present study, the reliability coefficient was low with an alpha of r = .29.

Table 5

Nurses' Intermittent Auscultation Knowledge & Attitudes Prior to and After Fetal Health Surveillance Education (N = 93)

Attitude Questions	PreMean	PostMean	CI	t
1. Women ask about using intermittent auscultation	2.05	2.15	[-.21, .02]	-1.69
2. Continuous external fetal monitoring should be standard of care	1.84	2.17	[.66, -.01]	-2.05*
3. I am willing to intermittently monitor	4.34	4.45	[-.28, .06]	-1.25
4. Women want continuous external fetal monitoring in labour	2.59	2.44	[.02, .28]	2.32*
5. Hospital provides clear intermittent auscultation guidelines	3.71	3.61	[-.07, .26]	1.15
6. Women have the right to choose the method of fetal monitoring	3.67	3.75	[-.30, .13]	-0.81
7. Hospital's current approach to fetal monitoring is adequate	3.37	3.24	[-.08, .34]	1.23

8. Research on continuous external fetal monitoring shows increase in maternal and neonatal morbidity	3.34	3.88	[-.75,-33]	-5.11*
9. Women expect continuous external fetal monitoring in labour	2.77	2.67	[-.03, .24]	1.59
10. Nurse has time for intermittent auscultation	4.17	4.29	[-.26, .02]	-1.69
11. Nurse to patient ratio problem for intermittent auscultation	1.82	1.90	[-.29, .12]	-0.82
12. My input affects hospital unit policy changes	2.99	3.13	[-.30, .02]	-1.71
13. Doctor willing to order intermittent auscultation	3.12	2.96	[-.03, .35]	1.68
14. Few barriers to implementing intermittent auscultation	3.39	3.19	[-.06, .44]	1.54
15. Intermittent auscultation impacts nursing care	3.05	3.44	[-.63, -14]	-3.14*
16. Easy to implement intermittent auscultation	3.74	3.70	[-.17, .26]	0.40
17. Intermittent auscultation should be standard of care	4.10	4.27	[-.32. .03]	-2.37*

*p < .05, Measured on a five-point Likert scale- ranging from strongly disagree (1) to strongly agree (5). M > 3 = agreement with statement; M < 3 = disagreement with statement

Table 6

Responses to Individual Survey Items – Post Interactive Education Session (N = 93)

Question	Mean Median (SD)	Frequency (%)
1. Most of the women you care for in labour ask you as a nurse about using intermittent fetal monitoring.	2.15 2.00 (.92)	D (76.3) N (11.8) A (11.9)
2. Continuous external fetal monitoring should be the standard of care for the labour of essentially healthy women.	2.17 2.00 (1.31)	D (77.4) N (4.3) A (18.3)
3. As a nurse, I am willing to intermittently monitor essentially healthy women in labour.	4.45 4.00 (.54)	N (2.2) A (97.8)

4.	Women want to be continuously monitored in labour.	2.44 2.00 (.71)	D (53.7) N (40.9) A (5.4)
5.	This hospital provides clear guidelines for the use of intermittent fetal monitoring.	3.61 4.00 (.99)	D (19.4) N (14.0) A (66.7)
6.	Essentially healthy women have the right to choose the method of fetal monitoring used in their labour.	3.75 4.00 (1.00)	D (14.0) N (12.9) A (73.2)
7.	This hospital's current approach to fetal monitoring is adequate.	3.24 3.00 (1.00)	D (31.2) N (20.4) A (48.4)
8.	Research on continuous fetal monitoring demonstrates an increase in maternal and neonatal morbidity without an increase in benefits to women and infants.	3.88 4.00 (.98)	D (13.0) N (8.6) A (78.5)
9.	Women expect to be continuously monitored in labour.	2.67 3.00 (.84)	D (48.4) N (32.3) A (19.4)
10.	The labour nurse has sufficient time available to provide intermittent fetal monitoring.	4.29 4.00 (.64)	N (9.7) A (90.3)
11.	Nurse to patient ratio is a problem in providing intermittent fetal monitoring	1.90 2.00 (.93)	D (81.7) N (9.7) A (8.6)
12.	I feel my input affects my hospital unit policy changes.	3.13 3.00 (.95)	D (27.7) N (29.0) A (43.1)
13.	Our doctor/nurse-midwives are willing to order intermittent fetal monitoring for essentially health women in labour.	2.96 3.00 (.92)	D (38.8) N (25.8) A (35.5)
14.	There are few barriers to implementation of intermittent fetal monitoring.	3.19 4.00 (1.00)	D (33.4) N (16.1) A (50.5)
15.	Intermittent fetal monitoring would impact the nursing care I give to essentially healthy women in labour.	3.44 4.00 (1.16)	D (26.9) N (6.5) A (66.6)
16.	At this hospital, it would be easy to implement intermittent fetal monitoring for essentially healthy women in labour.	3.70 4.00 (.87)	D (11.9) N (18.3) A (69.9)
17.	Intermittent fetal monitoring should be the standard of care for all essentially healthy women in labour.	4.27 4.00 (.71)	D (11.9) N (18.3) A (69.9)

D = disagree, N = neutral, A = agree

Nurses' use of guideline appropriate care. During the initial baseline month, the nurses performed guideline appropriate care from admission to delivery with 7.1% of the 156 labouring women who met the study criteria. Following the initial interactive education intervention, when 62 of the nurses had completed the intervention, the nurses' rate of adhering to the guideline in Time 2 increased to 11% for the 145 women who met the study criteria. No further nurses received the education intervention between Time 2 and Time 3. During Time 3, 12 months following Time 2, the nurses' rate of guideline appropriate care was 6.3% for the 79 low-risk labouring women during that month (see Table 7). There were no statistical differences in guideline rates between Time 1 and Time 2 ($X^2 = 1.46$, $p = .23$), Time 1 and Time 3 ($X^2 = 0.04$, $p = .84$), and Time 2 and Time 3 ($X^2 = 1.33$, $p = .25$).

Table 7

Phase 1 – Nurses' use of Guideline Appropriate Care during an Episode of Care by Time Period

Guideline Appropriate Care	Time 1 N = 156	Time 2 N =145	Time 3 N =79
Yes			
n (%)	11 (7.1)	16 (11.0)	5 (6.3)
No			
n (%)	145 (92.9)	129 (89.0)	74 (93.7)

Participants: Phase 2

Staff nurses. In total, 93 staff nurses consented to participate. Prior to randomization, 4 of these original 93 nurses left the Birth Unit; 89 nurses remained. At

the initiation the RCT, 27 of these nurses were no longer working on the Birth Unit; 62 nurses remained to participate in the RCT.

Twenty-seven nurses, 38.6% (17/44) in the Action Learning group and 22.2% (10/45) in the Usual Care group, who had agreed to participate in the study left prior to the beginning of Phase 2 for the following reasons: moving to another job, retiring, illness, or maternity leave. Within the first week of conducting the RCT, 2 of the remaining 27 Action Learning nurses left the Birth Unit for outside employment and three additional nurses left the Birth Unit due to illness. Shortly thereafter, three nurses reported personal situations that would prevent them from attending the Action Learning sets due to prolonged periods of absence from the Birth Unit and one additional nurse retired. Of the remaining 18 nurses, 17 (94.4%) participated in the Action Learning sets. I present the background characteristics of nurses participating in the Action Learning and the Usual Care groups in Table 8 and 9.

The nurses participating in the RCT component of Phase 2 ranged in age from 23 to 55 years. The majority of Action Learning nurses attending the sets had both a diploma and a degree, while the majority of the nurses in the Usual Care group had a diploma. The majority of nurses in both groups had worked more than one year in the Birth Unit and were full-time employees. Fewer of the Action Learning nurses (48.1%) had participated in fetal health surveillance education prior to Phase 1 than the Usual Care nurses (71.4%). This difference was not statistically significant (chi square = 2.92, $p = .09$).

Table 8

Nursing Staff Characteristics

Characteristics	Usual Care nurses (n = 35)	Action Learning nurses (n = 27)
Age		
Mean (SD), years	39.1 (9.0)	38.8 (9.1)
Range	23 – 52	25 – 57
Education		
N (%)		
Diploma	17 (48.6)	11 (40.7)
Degree	8 (22.9)	8 (29.6)
Both	10 (28.6)	8 (29.6)
Birth unit (>1 year)		
N (%)		
Yes	33 (94.3)	24 (88.8)
No	2 (5.7)	3 (11.1)
Employment status		
N (%)		
Casual	1 (2.9)	4 (14.8)
Part-time	11 (31.4)	10 (37.0)
Full-time	23 (65.7)	13 (48.1)
Fetal health surveillance education prior to Phase 1		
N (%)		
Yes	25 (71.4)	13 (48.1)
No	10 (28.6)	14 (51.9)

Because 10 of the 27 Action Learning nurses who were expected to participate never attended the Action Learning sets, I present the characteristics of the attendees and non-attendees in Table 9. These nurses ranged in age from 25 to 57 years. The majority in both groups had a degree with a greater percentage of nurses in the Attendee group having a degree. The nurses had worked for more than one year in the Birth Unit and had

full time employment. The nurses attending (n = 17; 47.1%) the Action Learning sets and not attending (n = 10; 50.0%) the Action Learning sets were comparable in their participation in fetal health surveillance education prior to Phase 1. There were few differences between these groups and none of the differences were statistically significant.

Table 9

Action Learning Nurses' Characteristics

Characteristics	Attendees Action Learning nurses (n = 17)	Non-attendees Action Learning nurses (n = 10)
Age		
Mean (SD), years	39.8 (7.3)	36.5 (11.59)
Range	27 – 55	25 – 57
Education		
N (%)		
Diploma	6 (35.3)	5 (50.0)
Degree	3 (17.6)	5 (50.0)
Both	8 (47.1)	_
Birth unit (>1 year)		
N (%)		
Yes	16 (94.1)	8 (80.0)
No	1 (5.9)	2 (20.0)
Employment status		
N (%)		
Casual	2 (11.8)	2 (20.0)
Part-time	7 (41.2)	3 (30.0)
Full-time	8 (47.1)	5 (50.0)
Fetal health surveillance education prior to Phase 1		
N (%)		
Yes	8 (47.1)	5 (50.0)
No	9 (52.9)	5 (50.0)

Labouring women. During Phase 2, I reviewed a total of 498 low-risk labours and deliveries. I present the demographic and labour characteristics of the women experiencing these labours and deliveries in Table 10. The numbers of low-risk women during each data collection time varied with the fewest women in Time 6 (N = 87) and the greatest number of women in the six month period of Time 5 (N = 270). In total during Time 5, 897 postpartum women met the criteria of low-risk (Reproductive Care Program, 2008). Of these women, 345 were approached to participate (38.5%). Some women were not approached to participate in the study because research team members (Research Assistants) were unavailable because of illness (n = 30), weekends (n = 60), evenings (n = 100), and holidays (n = 100), or because the woman did not receive at least 80% of her care from a study nurse (n = 262). Of the 345 women approached, 270 (78.3%) participated.

The maternal ages were comparable at each data collection time (mean age = 30 years). The majority of women were having a first or second child. The women in Time 6 had the shortest average length of labour (M = 489 minutes). Length of labour during all data collection times ranged from 31 minutes to 3381 minutes. Approximately 75% of the women had epidural analgesia (comparable to the epidural analgesia rate cited in Table 1). The use of oxytocin during these three data collection periods was slightly higher than for Phase 1 of the study and higher than the hospital's use of oxytocin for augmentation of labour in 2007- 22.7% (Reproductive Care Program, 2008).

Table 10

Characteristics of Low-Risk Labouring Women

Characteristic	Baseline	Intervention	Post Intervention
	Time 4	Time 5	Time 6
Maternal age (years)			
N	141	268[a]	87
Mean (SD)	29.9 (5.3)	28.9 (5.4)	28.9 (5.2)
Number of live births			
N	141	270	87
% 1	45.4	56.3	59.8
% 2	41.1	31.5	28.7
% ≥ 3	13.4	12.2	11.5
Length of labour (minutes)			
N	121[a]	251[a]	85[a]
Mean (SD)	547.5 (402.4)	548.1 (365.8)	488.6 (302.4)
Range	66–3381	58–2319	31–1735
Epidural analgesia			
N (%)	112 (79.4)	201(74.4)	87 (73.6)
Oxytocin			
N (%)	41 (29.1)	98 (36.3)	28 (32.2)

[a] = Charts where nursing documentation was not completed.
No data were missed during the chart reviews (Time 4 & 6).

Postpartum women. I present in Table 11 the demographic characteristics of postpartum women who completed the Labour Experience Questionnaire during Time 5. Similar to characteristics of the low-risk labouring women (Table 10), the maternal ages and the number of live births, between these two groups, postpartum women cared for by either an Action Learning nurse or a Usual Care nurse, were comparable. The average

lengths of labour were also similar. The differences between the remaining characteristics were not statistically significant ($p > .05$).

Table 11

Characteristics of Postpartum Women

Characteristics	Cared for by Usual Care nurse (N =148)	Cared for by Action Learning nurse (N = 122)	p
Age			
Mean, years	28.5	29.3	-
Range	15 – 46	17 – 43	
Number of live births (%)			
1	59.5	52.5	
2	27.7	36.1	
>3	12.8	11.5	-
Range	1 – 5	1 – 8	
Length of labour			
Minutes, mean	555.6	538.6	
Range	58.0 – 2319.0	85.0 – 2249.0	-
Narcotic Analgesic (%)			
No	29.1	26.2	
Yes	70.9	73.8	-
Epidural Analgesia (%)			
No	25.0	26.2	
Yes	75.0	73.8	-
Delivery method (%)			
Vaginal	74.8	81.8	
Caesarean section	10.9	9.9	
Other*	14.3	8.3	-

* forceps and vacuum extraction
- = $p > .05$
SNCU = special nursery care unit

Phase 2: Baseline, Effects of an Action Learning Intervention on Nurses' Practice, and Follow-up

The nurses' practice of guideline appropriate care (Liston & Crane, 2002) increased following an initial RCT start up (between Time 3 and Time 4). Between Time

3 and Time 4, 30 additional Birth Unit nurses received the interactive education intervention. During Time 4 (14 months after Time 3), Birth Unit nurses performed guideline appropriate care during an episode of care with 16.3% of the 141 eligible episodes of care. During the six month Action Learning intervention (Time 5), the overall study nurses' use of guideline appropriate care increased 3% (from Time 4) to a rate of 19.3% for the 270 eligible episodes of care. The pattern of attendance for the 17 nurses that attended the Action Learning sets is as follows: 58.8% attended all six sets (10/17), 11.7% attended five sets (2/17), and 29%, attended four sets (5/17). During Time 6, Birth Unit nurses' performed guideline appropriate care with 18.4% of the 87 eligible episodes of care (see Table 12).

The difference between rates of guideline appropriate care in Time 3 (6.3%) and Time 4 (16.3%) was statistically significant ($X^2 = 4.54$, $p = .03$).

Table 12

Phase 2 – Nurses' use of Guideline Appropriate Care during an Episode of Care by Time Period

Guideline Appropriate Care	Time 4 N = 141	Time 5 N = 270	Time 6 N = 87
Yes			
n (%)	23 (16.3)	52 (19.3)	16 (18.4)
No			
n (%)	118 (83.7)	218 (80.7)	71 (81.6)

Primary research question

Nurses' use of guideline appropriate care: Effect of action learning intervention (Time 5). During the six month period of the Action Learning intervention

(Time 5), study nurses in the Action Learning group provided fetal health surveillance care in 122 episodes of care from admission to delivery and study nurses in the Usual Care group provided fetal health surveillance care during 148 episodes of care from admission to delivery. Nurses in the Action Learning group performed guideline appropriate care during 23% of the 122 episodes of care. Nurses in the Usual Care group performed guideline appropriate care during 16.2% of the 148 episodes of care. This 6.8% difference in guideline appropriate care between the Action Learning group and the Usual Care group was not statistically significant (p = .163, see Table 13). The Action Learning group was 6.7% above the overall nurses' rate in Time 4 (23.0% versus 16.3%) while the Usual Care group was almost the same (16.2% versus 16.3%).

Table 13

Study Nurses use of Guideline Appropriate Care (Time 5) during an Episode of Care

Study Group	Guideline Appropriate Care		Chi Square	df	p	OR	CI
	No, n (%)	Yes, n (%)					
Usual Care n=148	124 (83.8%	24 (16.2%)					
Action Learning n = 122	94 (77.0%	28 (23.0%)	1.95	1	.16	1.54	[0.84-2.83]
Total, N = 270	218	52					

Secondary research questions

Changes in guideline appropriate care in different portions of an episode of care. A portion of an episode of care is a specific component of the full episode of care

(admission to delivery). In this study, I identified eight portions within an episode of care. Throughout these portions, guideline appropriate care did not differ significantly between the nurses in the Action Learning group and the nurses in the Usual Care group. Within two of the eight portions, guideline appropriate care post non-reassuring fetal heart rate to epidural and guideline appropriate care admission to meconium, the number of cases was insufficient to carry out chi square analysis. I conducted a Fisher exact test of these two groups. Rates of guideline appropriate care in these two portions of episodes of care did not differ significantly (see Appendix J). Although there was not a significant difference between groups in the remaining six portions of an episode of care, the Action Learning nurses' compliance with the guideline was approximately 5% to 10% greater than the Usual Care nurses were in four of the six portions. These included admission to epidural analgesia, post epidural analgesia to delivery, post epidural analgesia to augmentation, and admission to augmentation.

Predictors of the use of guideline appropriate care. I explored the predictive effects of both nurses' and labouring women's characteristics on the nurses' use of guideline appropriate care from admission to delivery using direct logistic regression. Predictors that were statistically significant in the univariate analysis with the dependent variable, guideline appropriate care, were entered into the initial logistic regression model. The predictors that were significant included length of labour, epidural analgesia use, narcotic analgesic use, and number of nurses per episode of care. I also included in the initial model an additional predictor (dose of the intervention). Despite lack of a statistically significant relationship with the outcome, this predictor is theoretically related. Overall, this initial model was significant when all five independent variables

were entered ($X^2 = 23.83$, p = .0001) (See Table 14). In this initial model, 100% of those who did not follow guideline appropriate care were predicted correctly and none of those who followed guideline appropriate care was predicted correctly. When I considered all five variables together, both epidural analgesia use and narcotic analgesic use were significant. This suggests some correlation among the predictors since length of labour and number of nurses per episode of care were significant when used alone. Dose of the intervention failed to predict use of guideline appropriate care whether used alone or with the other predictors.

Table 14

Variables Predicting use of Guideline Appropriate Care during an Episode of Care (N = 250)

	B	Wald t	P	OR	95.0% CI	
					Lower	Upper
Narcotic(1)	1.061	5.279	.022	2.890	1.169	7.144
Epidural(1)	1.339	10.709	.001	3.815	1.711	8.506
Lol	.000	.413	.521	1.000	.999	1.001
Norncare	-.085	.230	.631	.919	.650	1.298
Doseintv	.021	.109	.741	1.021	.901	1.158
Constant	-2.481	12.862	.000	.084		

Lol = length of labour, Norncare = number of RNs caring for patient, Doseintv = does of the intervention, B = beta, Wald t. = Wald t significance, OR= odds ratio

In a subsequent model, I removed two of the variables that were not significant in Table 14 and ran a model with three predictors: narcotic analgesic use, epidural analgesia use, and dose of the intervention (see Table 15). Overall this model was also significant ($X^2 = 24.65$, p = .0001). In this model, 97.7% of those who did not follow guideline appropriate care were predicted correctly, and 15.4% of those who did follow

guideline appropriate care were predicted correctly. Both epidural analgesia use and narcotic analgesic use were once again significant. Dose of the intervention was not significant.

Table 15

Variable Predicting Use of Guideline Appropriate Care during an Episode of Care (N = 270)

	Beta	Wald	p	OR	95.0% CI	
					Lower	Upper
Intervention dose	.078	1.809	.179	1.082	.965	1.212
Epidural(1)	1.397	17.218	.000	4.041	2.089	7.816
Narcotic(1)	1.062	6.110	.013	2.893	1.246	6.715
Constant	-2.878	41.758	.000	.056		

Action learning nurses' perspectives on enablers of and inhibitors to the use of intermittent auscultation. Using the Enablers and Inhibitors data collection form**,** nurses identified different factors influencing their use of the guidelines in the hospital setting. They identified a greater number of enablers than inhibitors (see Table 16). Most (n = 15) of Action Learning nurses who attended the intervention sessions completed forms. They completed a total of 47 forms. There were a variety of items comprising the enablers (N = 14) and the inhibitors (N = 17).

Table 16

Enablers and Inhibitors Identified on the Action Learning Nurses' Form

	Inhibitors N = 51	Enablers N = 224
Practice environment n (%)	3 (5.9)	75 (33.5)
Adopter concerns n (%)	-	34 (15.2)
Patient / Family n (%)	1 (2.0)	33 (14.7)
Physician n (%)	3 (5.9)	12 (5.4)
Labour events n (%)	44 (86.3)	70 (31.3)

Nurses identified events during labour, such as signs of a non-reassuring fetal heart rate, as the dominant type of inhibitor to the uptake of the guideline. Nurses identified the following types of events as the main situations that led them to do continuous external fetal monitoring rather than intermittent auscultation: (a) non-reassuring fetal heart rate (n = 15, 29%), (b) the use of an epidural analgesia (n = 10, 20%), (c) the use of oxytocin (n = 7, 14%), or (d) the presence of meconium (n = 4, 7.8%)

When reporting enablers of the guideline, nurses less frequently identified the physician and more frequently identified the practice environment. They reported such practice environment factors as: supportive nurses (n = 21, 9.4%), doppler availability (n = 25, 11.2%), and a clear unit policy (n = 26, 11.6%). Events during labour were cited second most frequently as enablers of the guideline. The nurses felt that events during labour enabled them to follow the guideline. These events included reassuring fetal heart rate (n = 39, 17.4%), the use of an epidural analgesia (n = 12, 0.05%), second

stage/pushing (n = 10, 0.04%), and ambulation (n = 9, 0.04%). The nurses' identifying the physicians less frequently, as enablers of the guideline, is consistent with their discussion during the Action Learning Sets.

Action learning sets: Identified enablers and inhibitors. During the Action Learning sets, the nurses discussed both the aspects of Action Learning that supported their learning and the enablers and inhibitors that influenced their practice of intermittent auscultation. I captured their discussions in field notes. For example, the nurses reported that they felt I heard their concerns through my listening and my documentation. Given my previous relationship with the Action Learning nurses, they commented that a relationship of trust existed prior to initiating the Action Learning sets and that trust developed further during the Action Learning intervention.

Enablers and inhibitors to intermittent auscultation were discussed during the Action Learning sets. For example, the nurses spoke of their understanding of evidence and what it meant or did not mean to their respective intermittent auscultation practice. For many of these nurses, the evidence that they felt contributed to their practice of fetal monitoring was more than research findings. Knowing that the guideline was based on both research evidence and clinical practice, as discussed in the interactive education intervention, was more in line with their perception of evidence.

Some of the factors that the nurses discussed during the Action Learning sets were similar to enablers and inhibitors identified on the form described above. Nurses participating in the Action Learning set presented four main items related to their practice of intermittent auscultation: (a) epidural analgesia use, (b) inconsistency among colleagues, (c) long-standing practice and lack of education, and (d) values / beliefs.

With the exception of epidural analgesia use, I considered the remaining three items to fall within the previously identified issue of "adopter concerns" and to be new items. I categorized "epidural anesthesia use" as a labour event issue. I will present these four items as the Action Learning nurses themselves described them.

Epidural analgesia use. During Time 5, the majority of labouring women, greater than 70%, received epidural anesthesia during the course of their labour. As described under Setting and as reported by the Action Learning nurses, unit policy required the nurse to continuously monitor the fetal heart rate for one hour following the initiation of epidural analgesia. Following this hour of continuous external fetal monitoring and if the woman's status remained low-risk, a nurse was to return to intermittent auscultation. The majority of nurses participating in the Action Learning set identified that returning to intermittent auscultation, once they had initiated continuous external fetal monitoring, had been a challenge in their practice. One nurse stated, "Once you get them on the monitor it is easier to leave them there than take them off. And if we do take them off, someone at the desk is certain to ask why." As a collective, and in each Action Learning set, the nurses spent a great deal of time discussing this practice and potential means to encourage stopping continuous external fetal monitoring one hour post-epidural analgesia.

Inconsistencies in practice among various practitioners. Consistently throughout the Action Learning sets, the nurses talked about their inconsistencies in understanding the research evidence and their practice regarding fetal health surveillance. The nurses stated that, while they did not understand 'what all that research means', they felt that more than the findings of research contributed to their practice decisions. They identified

practice inconsistency not only among themselves as staff nurses, but also amongst the physicians, residents, and family physicians. For example, one Action Learning nurse spoke of her colleague who maintained continuous external fetal monitoring in spite of the presence of a reassuring fetal heart rate. Other nurses described the practice of colleagues who carried out a 20-minute continuous monitoring strip each time they admitted a new patient to the Birth Unit. "Why do they think that each new admission needs a strip? We don't all do this." Despite the availability of a unit policy and a guideline that advocated the best available research evidence for fetal health surveillance practice, nurses reported that inconsistencies such as these created challenges to practicing according to the guideline or policy.

Long-standing, entrenched practices. The nurses also reported that the inconsistencies in fetal health surveillance practice were affected by the long-standing practice of the approach to fetal health surveillance. Continuous external fetal monitoring, as reported by the Action Learning nurses, has been the method of choice for the majority of health care practitioners in the birth unit for many years. Within the last 10 years, the introduction of a policy encouraging the use of intermittent auscultation among low-risk labouring women has led to discussion of and a challenge to the "ways of listening" to the fetus's heart rate. The use of both continuous external fetal monitoring and intermittent auscultation on the unit has led nurses to question which practice is the most appropriate. Newer staff nurses see the more experienced nurses using continuous external fetal monitoring and many of the nurses stated that they believed that the physicians preferred continuous external fetal monitoring. The Action Learning nurses stated that introducing fetal health surveillance changes to a unit that is "used to one

way" was not an easy feat. They also reported that encouragement to use intermittent auscultation was not evident.

Values. The nurses stated that if intermittent auscultation were important and necessary, it would be discussed and encouraged more on the unit by their clinical leaders, their manager, and the physicians. Nurses said that the lack of encouragement and reinforcement to perform intermittent auscultation led them to believe that intermittent auscultation was not a valued practice. One of the Action Learning nurses talked at length about giving something that is valued the attention and time it deserves. She stated, "If we are supposed to use intermittent auscultation you'd think we would be told that every now and then" and "it's been at least 10 years since I last had a performance review. Nobody here has told me that I need to auscultate. I know we have a policy, but why bother if it is not reinforced?" Given these comments, the nurses in the Action Learning group reported appreciating the feedback they received, intermittent auscultation and postpartum women's satisfaction, regarding their study participation.

Satisfaction in labour experience: Differences between women cared for by action learning versus usual care nurses. Women reported no differences in satisfaction with their birth experience whether or not they were cared for by an Action Learning or Usual Care nurse. The distribution of the women's' responses was skewed to the right; therefore, it was invalid to use the t-test for this analysis. I have presented the results of the non-parametric analysis Wilcoxon signed rank test in Table 17. There were no statistical differences between the postpartum women's responses when employing the Wilcoxon method. In this study, the internal consistency (Cronbach's alpha) for the

Labour Experience Questionnaire was r = .62. The internal consistency scores for the three subscales were all less than .6.

Table 17

Labour Experience Questionnaire Results

Labour Experience Questionnaire Subscale and Total Scale	N	Mean Rank	Sum of Ranks	Test Statistic Z	p
Fetal monitoring experience (17 items)					
Action Learning	122	139.75	17049.50	-0.81	.42
Usual Care	148	132.00	19535.50		
Medical support (9 items)					
Action Learning	122	132.79	16139.00	-0.62	.54
Usual Care	148	138.15	20446.00		
Nursing support (14 items)					
Action Learning	122	137.87	16820.50	-0.45	.65
Usual Care	148	133.54	19764.50		
Total scale (53 items)					
Action Learning	122	135.86	16575.00	-0.07	.95
Usual Care	148	135.20	200010.00		

Additional Analysis

Exploratory analysis of attendees and usual care nurses. During the six month period of Time 5, study nurses in the Action Learning group who attended the intervention (n = 17) provided fetal health surveillance in 87 episodes of care from admission to delivery and study nurses in the Usual Care group (n = 36) provided fetal health surveillance during 148 episodes of care from admission to delivery. Nurses who did attend the Action Learning sessions performed guideline appropriate care during 24.1% of the 87 episodes of care. This compares to the overall rate of 23.7% revealed in the intent-to-treat analysis. Nurses in the Usual Care group performed guideline

appropriate care during 16.2% of the 148 episodes of care. This 7.9% difference in guideline appropriate care between the Action Learning attendees group and the Usual Care group is not statistically significant (p = .14) (see Table 18). The Action Learning attendees group is 7.8% above the nurses' rate in Time 4 (24.1% versus 16.3%) while the Usual Care group is almost the same (16.2% versus 16.3%).

Table 18

Study Nurses' Use of Guideline Appropriate Care (Action Learning Attendees) during an Episode of Care

Study Group	Guideline Appropriate Care		Chi Square	df	p	OR	CI
	No n (%)	Yes n (%)					
Usual Care n=148	124 (83.8%)	24 (16.2%)					
Action Learning n = 87	66 (75.9%)	21 (24.1%)					
Total N = 235	190	45	2.22	1	.14	1.62	(0.87-3.21)

Summary

I conducted a two-phase study to explore how two different interventions, an interactive education intervention and Action Learning, influenced nurses' use of guideline appropriate care during an episode of low-risk labour care. Following baseline assessments of fetal health surveillance practice and nurses' attitudes and beliefs, study nurses (N = 93) participated in a fetal health surveillance interactive education

intervention. A statistically significant change in attitude was evident in 5 of the 17 items on the knowledge and attitude scale. Nurses strongly agreed that intermittent auscultation should be the standard of care for low-risk labouring women. Despite their generally positive attitude towards intermittent auscultation, the nurses' rate of guideline appropriate care did not change significantly following the interactive education intervention.

Following an initial RCT start up prior to Phase 2, there was a statistically significant change in the nurses' practice with the rate of guideline appropriate care increasing by 10% to 16.3%. During the six month period of the Action Learning intervention (Time 5, RCT), the Action Learning nurses had a 6.8% higher rate of guideline appropriate care than the Usual Care nurses did, but this difference was not statistically significant. During the intervention (Time 5) 10 of the 27 nurses randomized to the Action Learning group did not participate in the Action Learning sets for reasons that were not related to protocol deviation. These reasons included pregnancy, illness, leaving the Birth Unit and personal reasons. The 17 Action Learning nurses who attended the Action Learning sets had a 7.9% higher rate of guideline appropriate care than the Usual Care nurses did. This difference was not statistically significant. During Time 6, nurses demonstrated a slight decrease in the rate of guideline appropriate care from the RCT (Time 5) period (18.4% vs 19.3%). This difference, however, was not statistically significant.

The Action Learning intervention did not have a significant effect on the nurses' use of guideline appropriate care during an episode of care. Additionally, satisfaction

levels in postpartum women did not differ by whether their care was given by Action Learning nurses or by Usual Care nurses.

The only variables that predicted nurses' use of guideline appropriate care from admission to delivery were epidural analgesia and narcotic analgesic use. The nurses discussed these inhibitors during their Action Learning sets. The nurses left the Action Learning sets with the intention of changing their intermittent auscultation practice related to epidural analgesia and narcotic analgesic use. The nurses stated that, between sets, they changed their practice related to these inhibitors. Although entered in the logistic regression model, dose of the intervention and length of labour were not predictors of guideline appropriate care.

During their Action Learning set presentations, the nurses presented and discussed additional enablers for and inhibitors of intermittent auscultation. The presentations and discussions related to personal concerns regarding their intermittent auscultation practice, events in their practice environment, issues relating to patient, family, physician, and events during labour. The Action Learning nurses also presented and discussed several other issues related to their use of intermittent auscultation. These issues included epidural analgesia use, inconsistency in practice among colleagues, long-standing practice, the status of fetal health surveillance education in the unit, and values / beliefs regarding fetal health surveillance.

In the following chapter, I will discuss these results incorporating previously reported research and the theoretical model and framework relevant to this study.

CHAPTER 5

Discussion & Conclusion

In this chapter, I present the key study findings and the contribution of this research to Rogers' theory of the diffusion of innovations (2003) and the promoting action on research implementation in health services (PARiHS) framework (Kitson et al. 2008). I conclude with an overview of the study strengths, limitations, implications, and future directions.

Key Study Findings

Neither the interactive education intervention nor the Action Learning intervention had a significant effect on nurses' use of guideline appropriate care during an episode of care for low-risk labouring women. These findings contrast with previous researchers' findings in studies that the participant reported changes in their clinical practice following educational session or Action Learning as implementation strategies (McCormack et al., 2008; Prior et al., 2008; Wilson et al., 2008). Such change in practice was not evident in this study. McCormack et al. (2008) and Wilson et al. (2008) both found that a series of interventions, including Action Learning, resulted in a practice change. Prior et al. (2008) reported that among the various education intervention approaches, interactive education was an effective intervention for practice change. I present the remaining key study findings, the factors that influence guideline uptake, to show how my results align with the work of others. While neither intervention had an impact on the nurses' practice, other findings in this study provide some indications of why and/or suggest directions for further research and development of the PARiHS framework.

Implementation strategies. I assessed two implementation interventions in this study: interactive education and Action Learning. I offered the interactive education sessions, as an intervention during Phase 1, to all study participants. I offered these sessions for two reasons. I wanted (1) to offer nurses information that was consistent with the evidence, and (2) to determine if providing information about the evidence via an interactive education intervention would have an effect on guideline appropriate care and the nurses' attitudes towards intermittent auscultation.

The delivery of the interactive education intervention did not result in a statistically significant change in the nurses' use of guideline appropriate care (Time 2 and Time 3) during an episode of care. This finding is inconsistent with the work of authors who showed that interactive education sessions can be effective (Grimshaw et al., 2004; Prior et al., 2008). Grimshaw et al. (2004), in a systematic review, reported modest effects when evaluating multifaceted interventions, including educational outreach, against no-intervention control. Of the 22 evaluated dichotomous process measure studies, five of the studies yielded statistical significant results. In these five studies, Grimshaw et al., (2004) reported an absolute performance improvement with a median effect size of 10%, with a range of -4% to 17.4%. Grimshaw et al. (2004) also reported that in the review there were no studies in which educational outreach alone was compared with no-intervention control. Davies et al. (2002) and Rashotte, Thomas, Gregoire, and Ledous (2008) also reported a practice change following an interactive education intervention. In these education intervention studies, when a change occurred, other strategies in addition to interactive education, were implemented. In addition, the Davies et al. (2002) study had two experimental and two control sites, and the practice

change occurred in only one of the experimental and one of the control sites. Perhaps the single interactive education intervention in this study, with no other facilitative interventions, accounts for the lack of adoption of guideline appropriate care.

Providing education on fetal health surveillance was not a new initiative in the Birth Unit. Nurses on the study unit traditionally received fetal health surveillance education on a regular basis. In the 10 years prior to the initiation of this study, the offering of regular fetal health surveillance education had diminished. For example, of the final 30 nurses consenting to participate, 83.3% (25/30) had not received formal fetal health surveillance education. As demonstrated in the rates of guideline appropriate care at baseline, the previous traditional education efforts also had not changed the guideline appropriate practices of the Birth Unit nurses. It was not common practice on the study unit for anybody to monitor the nurses' charting with respect to the recommended fetal health surveillance practices. Both an ongoing provision of fetal health surveillance education and an assessment of the nurses' adherence to these recommended practices may help to ensure a more consistent reflection in the nurses' clinical practice.

In this first RCT of Action Learning as an intervention to change provider intermittent auscultation behaviour, I found a lack of between group differences (Time 5). This finding contrasts with the findings of previous research using Action Learning. Cunningham and Kitson (2000a; 2000b) for example, reported a change in leadership and the organization of patient care. Wilson et al. (2008) reported improvements in patient care. These researchers identified that the following factors contributed to the nurses' change in practice: set members (a) presenting and discussing issues at an Action Learning set, (b) developing a plan, and (c) carrying out that plan. Rayner, Chisholm,

and Appleby found that when nurses self-identified practice issues and learned strategies for change, they were more likely to test the boundaries of these practice issues and work towards changing their practice (2003).

The nurses in the Action Learning group in the current study did report testing of the boundaries of their intermittent auscultation practice issues. For example, they developed a plan for changing their practice of intermittent auscultation with the use of epidural analgesia and narcotics analgesic. These plans did not translate to a statistically significant difference in practice between the control and experimental groups. While it is possible that the intervention does not work, there are additional issues that may account for this lack of difference. These issues include attrition, research design, and measurement issues. First, it is possible that the attrition difference in the study populations contributed to the outcomes of the current study. Study participation, in Phase 2, involved only the randomized staff nurses who remained on the Birth Unit during Time 5 (RCT). Second, previous research, using Action Learning, used a pre-post design with no comparison groups. The use of this design meant that, in this study, all unit staff were involved in the Action Learning intervention and there was no way to conclude that it was the intervention that had produced the effect. The change, for example, could have been due to historical change.

An RCT design may not be inclusive of all unit staff, but it does control for other events that may be simultaneously occurring in the unit. Using a cluster RCT design, however, would be inclusive of all unit staff while controlling for history and local contamination. Finally, in this study, the researcher used 100% guideline adherence as the measure to assess practice change. Participants were judged to adhere to the

guideline only if they precisely followed 100% of the guideline. In previous research (Davis et al., 2002), guideline adherence was not preset to 100%. The researchers in that study considered improvement in practice to be achieved as long as there was a statistically significant change in practice, regardless of the precision of guideline adherence.

Lack of difference may also be attributed to the length of time the Action Learning intervention was offered. I offered the nurses in the Action Learning group the intervention for six months. Randall et al. (2000) also had a six month timeline and reported an improvement in performance. Other researchers (Cunningham & Kitson, 2000a; 2000b; Wilson et al., 2008) conducted an Action Learning intervention for longer than six months and reported a change in nursing behaviours. In contrast, in an RCT of a theoretically grounded tailored intervention with public health physicians, Forsetlund et al. (2003) discussed the impact that the length of their intervention had on the findings. Their multifaceted intervention had some effect on knowledge; however, there was no evidence of effect on the professionals' behaviour. These researchers commented that 1.5 years was perhaps not a long enough period to expect a change in performance. Although the Action Learning nurses responded favorably to the intervention in the current study and were demonstrating ownership in their sets by booking the meetings and by beginning to assume facilitative responsibilities, it is possible that an intervention conducted for six months was not long enough to see a change of practice between groups.

Action Learning nurses participating in this study stated that they felt like they were 'just getting going' by the sixth month. McGill and Brockbank (2004) identified a

six month period as the minimum amount of time for an Action Learning set. Practitioners in the study setting were not routinely engaged in activities that heightened their awareness of the strengths and weaknesses of existing practices. Given the length of time that these providers had not followed the guideline and the number of issues (inhibitors) that the nurses identified and acted upon between sets, offering the intervention for a longer period of time might have resulted in greater change in intermittent auscultation practice. Additionally, Action Learning was an approach to practice change that was new to this nursing staff. The unit did not have a culture that was marked by ongoing practice change activities. In order to incorporate ongoing practice change activities and for a practice change intervention to 'fit' the local context, a cultural shift may be necessary and may take longer.

Action Learning, as an implementation strategy, presents several implications for use in clinical practice. These implications include the acceptability, the feasibility, and the utility of the intervention. Similar to the adopter's perceptions of the evidence (Rogers, 2003), researchers need to assess the individual's and team's perception of the intervention. These perceptions will influence the nature of the diffusion process and they will be unique to each setting. Action Learning was an approach to practice change that was new to the nursing staff and to the hospital. In order to 'fit' a local context where the culture is not involved in ongoing practice change activities, researchers may need to offer a longer-term intervention that focuses on the collective development of an evidence-based practice. When implementing a longer-term intervention, the researchers must think about the feasibility and the clinical utility of the intervention. In planning an intervention, one must assess the potential advantage of using it in practice and what

benefit will be derived (Sidani, Epstein, & Moritz, 2003). In the case of choosing a longer-term intervention such as Action Learning, researchers should determine the feasibility and clinical utility of the intervention for the hospital. For example, researchers could conduct a cost-benefit or economic analysis.

Both the context and the evidence influence the success of an intervention for practice change. Despite practitioners' reported acceptance of Action Learning, a busy unit cannot always accommodate interventions that are both costly and time consuming. Web-based learning strategies, for example, have been described as interventions that can accommodate these issues and are amenable to the context and the evidence. In a context where learning needs to be accessible by all care providers, web-based learning has demonstrated acceptability among study participants (Hills, Robinson, Kelly, & Heathcote, 2010; Robson, 2009). Combining problem-based e-learning with published guidelines, Robson (2009) used a mix methods approach to assess knowledge, acceptability, and practice change. Three web-based modules were completed by 45 primary care participants, of whom 43 were general practitioners and two were nurses. Overall, the participants reported enjoying the use of the modules, finding them easy to follow, and reported that their practice had changed following the module.

Implementation research guided by the PARiHS framework, proposes that the context and the evidence guide the use of a facilitative implementation strategy. Problem-based learning in the Robson (2009) study incorporated problem-solving and judgment-making skill in an on-line facilitative strategy. While this web-based approach did not occur in real-time, it did occur at the convenience of the participants and it did receive a favourable evaluation. The findings, however, demonstrated two main

weaknesses. Evidence of acceptability of the intervention in this study cannot be generalized to nurses and change was self-reported. Future research including nurses, documentation of guideline practice change, and assessment of the strength of the context and evidence will lend support to the use of a web-based strategy as a method of implementing guidelines in clinical practice.

Factors influencing guideline adherence. The nurses' use of intermittent auscultation was influenced by a variety of factors. These included events from the labour and practice environment, and maternal satisfaction/perception of labour. The Action Learning nurses' identification of these factors shares some similarities with other published studies. For example, Graham et al. (2004) reported that these factors influenced nurses' auscultation practice. Based on previous research (Estabrooks et al., 2003), I also proposed that nurses' attitude influenced their intermittent auscultation practice. The nurses, however, demonstrated that their generally positive attitudes did not influence their use of intermittent auscultation. I have included attitude in this section.

Labour events. The labour events that most influenced the nurses' use of intermittent auscultation were the receipt of epidural analgesia and receipt of narcotic analgesic. During their Action Learning sets, the nurses discussed and developed plans to change their behaviour in these specific types of practice situations. The analysis of these events as predictors of guideline appropriate care demonstrated that the Action Learning nurses did use the appropriate fetal health surveillance with both epidural anaethesia and narcotic analgesics. The intensity of the group's discussions, and

subsequent action plan by the nurses, may have influenced how well these two particular labour events predicted the nurses' practice of guideline appropriate care.

While the nurses in this study placed emphasis on the inhibiting influence of labour events, only one previous study (Graham et al., 2004) has reported that nurses identified labour events, such as initiation of epidural anesthesia, as an inhibitor to intermittent auscultation. Furthermore, these reports occurred only at one of the four participating hospitals and the nurses referred specifically to epidural analgesia as the event that encouraged the use of continuous external fetal monitoring.

Other researchers (Altaf, Oppenheimer, Shaw, Waugh, & Dixon-Woods, 2006; Hindley & Thomson, 2005; Luyben & Gross, 2001) have not reported labour events as inhibitors to the practice of intermittent auscultation. The care providers in these three studies, however, were midwives. In both the Altaf et al. (2006) and the Hindley and Thomson (2005) studies, the midwives reported labour events during semi-structured interviews. The midwives in the Luyben and Gross (2001) study completed a questionnaire, which also allowed the midwives to report labour events. There are two possible reasons why the results of this current study do not support these previously reported results. First, in this current study the care providers were nurses. Second, the labouring environments were different. Perhaps the difference in the perception of labour events as inhibitors to the practice of intermittent auscultation was related to the difference in professional backgrounds of the care providers and the difference in the labouring environments of the care providers. The findings of this current study highlight the relationship between the kinds of issues that care providers report and clinical decision-making in their respective practices. The midwifery practice of intermittent

auscultation may be quite different from a Birth Unit nurses' practice in a tertiary care setting. Different professional groups perceive different inhibitors and this may influence their respective clinical decision-making.

Ajzen et al. (2009) suggested the development of an implementation plan, such as the nurses' action plan. They argued that such a plan indicates an implementation intention and is assumed to be effective because the plan may contribute to a sense of commitment to perform the behaviour (Ajzen et al., 2009). When developing their action plans the nurses did not discuss much about intermittent auscultation and narcotic analgesic use. They spoke, however, at length about the use of epidural analgesia and their practice of intermittent auscultation. During their Action Learning sets, nurses reported quite frequently that it was easier, once a woman got an epidural, to leave her on the monitor. Similar to previous researchers (Altaf et al., 2006; Hindley & Thomson, 2005), the nurses in the current study had the opportunity to talk about their fetal health surveillance practices. Their report of inhibitors and their action plan may have contributed to epidural analgesia predicting their use of guideline appropriate care.

Practice environment. The practice environment included several enablers and inhibitors to intermittent auscultation. These included issues related to policy, equipment, social networks, and entrenched practices. These factors are, in general, consistent with those identified in other research (Graham et al., 2004; Hodnett, 1997; Payant et al., 2008) and in the PARiHS framework (Kitson et al., 2008). There are, however, factors that are reported in previous research that the Action Learning nurses did not identify in this study. An example of previously reported factor is the perception of legal benefits associated with continuous external fetal monitoring (Graham et al.,

2004; Liston et al., 2007). This medical-legal misconception (Liston et al., 2007) has contributed to the belief and subsequent external fetal monitoring practice of many labour and delivery nurses. The differences in reported inhibitors may be accounted for by contextual differences of the respective research settings or differing beliefs and values of healthcare providers.

Policy. Although the study unit had a long-standing policy requiring intermittent auscultation, the baseline data showed that few nurses followed that policy. Other researchers have reported that policies enabled nurses' application of research evidence in practice (Graham et al., 2004; Luyben & Gross , 2001; Squires, Moralejo, & Lefort, 2007). The practice patterns that were inconsistent with unit policy and the nurses' discussion about no leadership expectation of adherence to policy suggest that presence of a policy was not sufficient to influence change. It may be that the impact of the policy depends on both the specific practice and what policy says.

Equipment. Availability of equipment in the practice environment can influence the use of intermittent auscultation. Nurses in the Action Learning sets discussed their frustration regarding the availability of dopplers for intermittent auscultation. The dopplers were kept at the nursing station and not in the patient's room. However, the electronic fetal monitors were kept in the patient's rooms. Previous researchers reported that doppler availability enabled nurses' practice of intermittent auscultation (Graham et al., 2004). In a busy unit, available equipment means that nurses do not need to spend time looking for equipment (Rutherford, Moen, & Taylor, 2009), but rather can spend the time they need with labouring women. When dopplers are not readily available, the nurses during the Action Learning sets said they were more likely to put the labouring

woman on external fetal monitoring. Kitson et al. (2008) proposed in their framework that the right equipment is necessary to successfully implement the intervention.

Social networks. The nurses reported that their interactions with their colleagues influenced how they practiced. Their discussions of professional social networks were consistent with the work of multiple authors that showed that the implementation of evidence can be influenced by one's social network. Gerrish, Ashworth, Lacey, and Bailey (2008) reported that junior nurses identified problems in accessing information in order to change practice. It is possible that the culture of nursing disempowered junior nurses and influenced their implementation of evidence-based practice. Rogers (1995) supported this notion by stating that "practice guidelines are adopted (or rejected) on the basis of interpersonal communication with peers" (p. 328).

Hodnett (1997) and Payant et al., (2008) suggested that nurses, who do not practice according to the norm, run the risk of being set apart from their peers. The basis for perceived social pressure or subjective norms is the belief that a group of, for examples coworkers, would approve or disapprove of performing certain behaviour (Ajzen & Cote, 2008). It may be that the expectations and interactions of a peer group contribute to practice behaviours. Previous research has concluded that there are differences in the relative skills of junior and senior clinical nurses in evidence-based practice (Gerrish et al., 2008) and that senior nurses put forth the greatest influence on the clinical culture (McCormack et al., 2002). In order to understand and accommodate these differences, and to explore the role of social pressure in evidence-based practice, researchers can focus on determining how both junior and senior nurses can be enabled to enact evidence-based practice. Research can be designed in which junior and senior

nurses are studied as matched pairs. The research question could be constructed as follows: what is the influence of clinical experience, skill, and knowledge, on the implementation of evidence in clinical practice? These matched pairs could be exposed to new evidence for a change in clinical practice and then be observed in their efforts to implement change. Additionally, the researcher could employ qualitative methodology to explore communication patterns and experiences within junior nurse-senior nurse pairs, and within the nurses' social networks. This kind of research could contribute to knowledge about the variables influencing nurses' uptake of evidence, and possibly lead to testing of various approaches to facilitating uptake in the nurses' broader community of practice.

Entrenched practice. The nurses reported they had been using continuous external fetal monitoring in their practice for many years. Despite the availability of a unit policy recommending intermittent auscultation for low-risk labouring women, the nurses persisted to monitor continuously. Others supported the identification of the impact of a long-standing practice (Cameron, Roberts, Bell, & Fisher, 2007; Godin, Belanger-Gravel, Eccles, & Grimshaw, 2008; Hindley & Thompson, 2005).

Practices are seen as being entrenched when staff resorted to old knowledge (Cameron et al., 2007) perhaps because it is a "deeply ingrained cultural expectation" (Hindley & Thomson, 2005, p. 313). Supporting the notion that habitual behaviours are difficult to change (Godin et al., 2008), Honkanen, Olsen, and Verplanken found that a strong habit guides one's intention more than attitudes (2005). Similar to this study, these authors reported that it was more challenging to change a practice if it has been a long-standing practice. They suggested that in order to establish a new habit we must

focus on proper reinforcement. Proper reinforcement may mean (a) the use of feedback, (b) the use of local data to raise awareness of discrepancies in practice, and (c) the involvement of leadership from the unit. Of these three methods of reinforcement, I incorporated all but the involvement of local leadership. Change for an entrenched practice requires an appropriate intervention strategy, an exploration of the meaning of the entrenched practice to address the desired change, and working with "an involved and motivated unit manager to implement change" (Kardong-Edgren, 2001, p. 374).

Maternal satisfaction/perception. Maternal satisfaction was unrelated to the nursing group (Action Learning or Usual Care) from which the women received care. It is possible that this lack of difference occurred because the Action Learning intervention did not result in a statistically significant increase in the nurses' use of guideline appropriate care. Killien and Shy (1989) did not find a significant difference in satisfaction of women who were continuously monitored versus those who were monitored intermittently. Participants in the Killien and Shy (1989) study, however, were in preterm labour. Waldenstrom (1999) and Waldenstrom, Hildingsson, Rubertsson, and Radestad (2004) found that negative birth experiences had been associated with medical interventions, such as external fetal monitoring. Had Action Learning been effective, I would have anticipated a difference in maternal satisfaction between groups.

Despite the evidence, practitioners are still using external fetal monitoring and as a result, women may believe it is necessary (Sandin-Bojo, Larsson, & Hall-Lord, 2008). Sandin-Bojo et al. (2008) argued that the public may not be aware of the implications of external fetal monitoring. As evidenced by recent research, women are not specifically

asked about their satisfaction with intermittent auscultation or continuous external fetal monitoring (Chalmers et al., 2008). Future obstetrical survey research that is inclusive of satisfaction with and understanding of fetal health surveillance practices will contribute to our understanding of women's preferences during labour.

Nurses' attitudes. The nurses' attitudes toward the recommended practice of intermittent auscultation were, according to their scores on the scale and reports in the Action Learning sets, positive. That is, the majority of nurses agreed with the practice of intermittent auscultation during labour. The nurses reported agreement in 11/17 questions on the intermittent auscultation attitude questionnaire. This generally consistent report of positive attitude was not reflected in practice. Recently, Canadian researchers examined the attitudes of Canadian maternity care practitioners towards labour and birth (Klein et al., 2009). These researchers reported that health care providers, including nurses, held both positive and negative attitudes towards routine electronic fetal monitoring. However, as demonstrated in previous research (Graham et al., 2004; Klein et al., 2009; Walker et al., 2001), those positive attitudes were not reflected in practice. The theory of planned behaviour, developed and tested by Ajzen (2002) and Fishbein, Hennessy, Yzer, and Douglas (2003), explains that phenomenon. Despite being motivated by a positive attitude, people might not perform the desired behaviour. Achieving behaviour change requires directing the researcher's attention to the strength of the nurses' attitude and towards the specific behaviour. The measures of attitude and desired behaviour change must involve the same action, target, context, and time element. Perhaps the measurement of attitude in the current study, while focusing on intermittent auscultation with low-risk labouring women, was too broad.

Measurement needs to reflect a narrow behavioural disposition (Ajzen & Cote, 2008). The study guideline was comprised of a variety of recommendations for the use of intermittent auscultation and continuous external fetal health surveillance during active labour. Attitude measurement may be more precise if the questionnaire items refer to a specific intermittent auscultation guideline recommendation. For example, a researcher could measure nurses' attitudes about guideline appropriate care with women who are receiving epidural analgesia. Alternatively, measurement of attitudes about the seriousness of maternal outcomes associated with an increase in caesarean deliveries might also be considered.

The nurses in the current study, when focused on a specific component of fetal health surveillance in low-risk labours, developed a plan for change. These plans were developed based upon their attitude toward the behaviour, the interprofessional social norms of the unit, and the behavioural control within the Birth Unit. In the current research, the nurses identified factors that inhibited or enabled their intermittent auscultation practice and they shared their perceptions of their social networks and of their entrenched practices. The nurses' plans were related to the use of intermittent auscultation following an epidural. Following the Action Learning intervention, epidural analgesia was reported to be a statistically significant predictor for guideline appropriate care. In future research using Action Learning, planning for change using specific recommendations from the guideline would contribute to the PARiHS framework and to our understanding of the complex factors influencing the facilitative efforts for implementing evidence into clinical practice.

Change in practice between time 3 and time 4. I did not anticipate the statistically significant increase in the rate of guideline appropriate care during an episode of care from 6.3% at Time 3 to 16.3% at Time 4. A number of factors may have contributed to this increase. They include facilitation and social networks (Rogers, 2003), conceptual research utilization (Stetler, 1985), and the Hawthorne effect (McCarney et al., 2007).

Facilitation and social networks. Rogers (2003) theory may explain the 10% practice improvement between Time 3 and Time 4. Rogers identified a variety of factors that contributed to the initial adoption of an innovation (2003). He labeled as innovators and early adopters, the first group of individuals in a system to adopt an innovation (Rogers, 1995). He argued that interpersonal networks influenced the adoption of an innovation. My regular presence as a clinician and the researcher, and the presence of other research team members on the Birth Unit, and our communication that included daily reminders for randomization and other communications, may explain this early adoption (Rogers, 2003). An alternative explanation is the number (n = 31) of new staff that were hired and consented, between Time 3 and Time 4, to participate in the study. This presence and communication may have been a form of social marketing and influenced a change in the nurses' behaviours (Health Canada, 2008). An increase in interpersonal communication may have stimulated the innovators and early adopters. "The number of adopters per unit of time takes off" (Rogers, 1995, p. 281) once communication regarding the study begins.

The peer influence among these innovators and early adopters could potentially account for the initial increase in the guideline adherence. According to Rogers' theory,

once networks begin, and the appropriate amount of time is offered, the news of an innovation spreads throughout a system from peer to peer (2003). This initial spreading of an innovation contributes to the initiation of the S-shaped curve of diffusion (Rogers, 1995). Following Time 4, the rate of guideline appropriate care in the control group stayed the same and the rate of guideline appropriate care in the experimental group changed, however, the change was not statistically significant. Once the Action Learning sets commenced, the Action Learning nurses were asked not to talk with the Usual Care nurses about the intervention or their intentions to change practice. It has been noted that, during their work processes on a regular shift of work, nurses "have almost continuous informal, as well as formal, opportunities for oral communication" (O'Brien & Pearson, 1993, p. 122). Asking the Action Learning nurses not to share the details of the study intervention with the Usual Care nurses may not have been realistic. I will further discuss this issue of communication in the limitation section of this chapter.

Conceptual research utilization. The increase in the nurses' adherence to the recommendations of the guideline between Time 3 and Time 4 can also be explained by various ways in which research evidence can be 'used'. Over a period of 16 weeks, I was present, on a daily basis, to explain the study details to the nurses and to address protocol questions. This presence and interaction may have influenced a 'conceptual use' of research evidence. This period may have allowed the nurses to think about what the research-based recommendations might mean to their practice (Stetler, 1985; Weiss, 1980). It was a time to think about intermittent auscultation more. This is a form of conceptual use. This conceptual use may have developed over the full year, during which time I redesigned the study, and resulted in some nurses converting to the use of

intermittent auscultation. For some, the innovators and early adopters, interventions that help them get to the point of thinking about change, may be enough to tip the balance to the use of guideline appropriate care. Perhaps a cumulative effect was occurring where the actual behaviour change occurred at an unspecified time (Stetler, 1985). Weiss (1980) has referred to this impact of research knowledge as knowledge creep and decision accretion. I measured neither contextual events nor conceptual use during this time. It may be that the facilitation, the initial strength of the context, and the accumulation of information over this year, influenced the nurses' intermittent auscultation practice behaviours and the resulting guideline appropriate care.

Hawthorne effect. Study participants may also have responded by improving behaviour when they were aware that they were involved in a research study (Hawthorne effect; McCarney et al., 2007). However, study participants were aware of study participation from Time 1. This awareness did not result in a significant practice change during Phase 1 or Phase 2 of the study. There was a statistically significant change in guideline appropriate care only between Time 3 and Time 4. The nurses were aware, throughout all periods of data collection, that their practice was being monitored.

Contributions to the PARiHS Framework

The PARiHS framework supported the choice of Action Learning as an implementation strategy (Kitson et al., 2008). Based upon the study nurses interpretation of the evidence and their context, they planned their actions for change while participating in the intervention of Action Learning. This facilitative strategy, however, did not result in a significant improvement in guideline appropriate care between the nurses in the Action Learning group and the nurses in the Usual Care group. In this

section I will present findings that suggest further development of the PARiHS framework and a finding that validates the framework.

One of the key elements in practice that is said to influence the uptake of research evidence is facilitation. There are two aspects of the element of facilitation that may have influenced study outcomes: the qualities of the person facilitating and the method of facilitation. While the authors of the framework proposed the importance of the characteristics of the facilitator, they have not yet developed specific propositions about this.

The type of relationship or the connection between the facilitator and the participants seems to be an important issue to examine more explicitly. It is not yet clear what effect this relationship or connection may have on the implementation of evidence in clinical practice. While the PARiHS authors proposed that the facilitator may be an 'internal or external agent' (Kitson et al., 2008), it may be beneficial to identify whether the facilitator has an established level of support and respect from those with whom he or she will be interacting.

Previous researchers (Stetler et al., 2006), in a series of semi-structured interviews, examined the concept of facilitation. Their purpose was to increase researcher's awareness about the nature of facilitation across numerous research projects. Their findings related to an external role of facilitation. They described facilitation as a distinct role with many behaviours and activities. In the current study, the facilitator was both a staff nurse and an outside researcher. The Action Learning nurses were aware of these dual roles and spoke of the dual role as being an asset to the intervention. They argued that the facilitator did not have to use group time to establish a relationship of

trust and authenticity, but could begin facilitating the work of the group immediately. Future research with the PARiHS framework is needed to further test facilitation. This research might include testing the contributions of an internal and an external facilitator intervention and the contributions of these types of facilitators to the success of implementation.

In this study, I measured the nurses' attitudes as an example of evidence related to the sub-element clinical experience. I speculated that nurses' attitudes be included as evidence about their clinical experience. The PARiHS framework does not clearly address the influence of practitioners' attitudes toward the evidence within clinical experience, even though the framework authors do discuss attitude within the facilitation element (Kitson et al., 2008). Other researchers (Estabrooks et al., 2003), however, reported that attitude was the most significant individual determinant influencing research use. Future research needs to test the individual factor of attitude and its relationship with context. If there is a relationship between individual attitude and context, this may lead to including individual attitude as a factor in the PARiHS framework. For example, future research might include the use of an implementation strategy that incorporates the influence of the practitioner's attitude or alternatively, the use of an implementation model that describes the adopter. For example, the Ottawa model of research.

During the Action Learning sets, the Action Learning nurses provided additional comments about the evidence components that influenced their use of intermittent auscultation. For example, they stated that the most important outcome of childbirth was a healthy baby, not the interventions used during the labour and delivery. This further

disclosure of attitude prompted the Action Learning nurses to challenge each other during their presentations and to focus their discussions.

If the Birth Unit nurses' beliefs towards birth were not congruent with low-intervention care for labouring women, that is, if they believed that intermittent auscultation would jeopardize the goal of a healthy baby, a conflict would exist with their application of guideline appropriate care. Additionally, given the entrenched nature of intermittent auscultation practice (Chalmers et al., 2008), it may be that the nurses' positive attitudes to intermittent auscultation were not strong enough to overcome other beliefs regarding the characteristics of the guideline to result in a change in their intermittent auscultation practice. These findings indicate a need to expand both the individual nurse and the local data components of the PARiHS framework. This nurse component would include more than his/her clinical experience. It would include his/her attitude, beliefs, and goals. The local data component would include more than the patterns of patient outcomes. It would also include data about the current or entrenched practice. Given the void of information about the influence of practitioner characteristics in the PARiHS framework (B. McCormack, personal communication, May 5, 2010) and the identification of additional influencing factors issues such as attitude, social norms, and social networks by the Action Learning nurses, the PARiHS framework needs to be extended to include practitioners characteristics. These propositions should be tested in implementation research.

Intentions to change a specific behaviour are influenced by the specific action, the context, and the amount of time the behaviour is to be performed (Ajzen & Cote, 2008). The changes in context over the three and a half years of this study, such as the

changes in Nursing Manager and the work environment of the Birth Unit, highlight the need for choosing a facilitative implementation strategy whose duration can capture contextual changes. Kitson et al. (2008) and McCormack and Wright (2009) advocated a contextual diagnostic assessment and evaluation at the beginning of a facilitator's work with a group. In the current study, the managerial and subsequent work environment changes occurred after the facilitative approach was chosen. Given the entrenched nature of intermittent auscultation, and the resulting number of issues raised by the Action Nurses during their sets, there was not enough time to present all issues. For example, the managerial changes on the Unit were identified but not presented and discussed. In a pragmatic study, or in an operational activity that attempts to alter practice, change is probably inevitable and re-evaluation may be necessary as the project progresses (Titler, 2010). A facilitative implementation strategy should be long enough to allow nurses to discuss the various contextual changes.

Strengths

Several strengths were evident in this study. First, the majority of nursing staff, greater than 80%, agreed to participate in both study phases. The study nurses provided a minimum of 80% of the care to the participating postpartum women during the RCT. Second, as recommended by previous research (Davies, 2002; Graham et al., 2004), the nurses identified the inhibitors and enablers of intermittent auscultation and planned or attempted actions to overcome the inhibitors. Third, the Research Assistants who collected the fetal health surveillance data were blind to the nurses' study group assignment during the RCT component of the study. Fourth, selection bias was not an issue for the RCT component of the study since randomization was centrally controlled

and concealed by the web-based tool. Fifth, all but one of the Action Learning nurses who participated in the intervention attended at least four of the six Action Learning sets.

Methodological Issues and Study Limitations

Both phases of this study had a number of potential threats to internal validity.

Sample size and unit of analysis. A labouring woman may have different nurses caring for her at different times during the period of active labour. As a result, these episodes of care may have involved more than one study nurse. The recorded outcome was the nurses' use or non-use of guideline appropriate care during the episode of care. With episode of care as the unit of observation, the sample size calculation assumes that the sole determinant of guideline appropriate care is whether the nurse attended the Action Learning program. It is likely that nurses have varying predispositions to use intermittent auscultation, and labouring women have varying predispositions regarding (and affecting) its use. The analysis took no account of the length of the episode of care, nor of the variation in the nurse's predisposition or the labouring woman's predisposition, neither in the sample size calculation nor in the analysis. As a result, the study may be underpowered in its design and anticonservative in the statistical conclusions (calculated p-values being smaller than the true p-values). A more precise sample size calculation would require advanced knowledge of the magnitude of the systematic inter-nurse and inter-mother components of variation. Even with a more accurately calculated sample size, little could have been done to address the lack of power given the study timeframe and the limited number of nurses at the study hospital who were available to participate in the study.

Generalized estimating equations (GEE) would have provided a more rigorous approach to the analysis. Given the limited amount of data and the fact that there are two repeated measures random effects (nurses and labouring women) that would need to be considered and accounted for, the feasibility of the GEE approach is unclear.

Contamination. All study nurses were aware of the purpose, design, and desired outcome of the study. Nurses in the Usual Care group were aware that there might be differences in the practices and the outcomes between groups. This was not a concern initially, since intermittent auscultation was consistent with the existing Birth Unit policy. This policy had been in effect for several years prior to the initiation of the study. As well, I asked the Action Learning nurses not to share the details of their Action Learning intervention with the Usual Care nurses.

Although blinding controls for bias, it was not possible to blind the study nurses to their group assignment. In light of this, efforts were made to blind as much of the process as possible. Following randomization, I asked study nurses not to share their study allocation with the labouring woman for whom they provided care. The Birth Unit charge nurses did not alter their usual method of designating patient assignment. The assignment of consecutive admissions continued in the usual manner whereby the charge nurse assigned a nurse based upon her availability. Following delivery, when questioned by the research assistant, all participating postpartum women stated that they were not aware of the group assignment of their labour and delivery nurse. As well, the Research Assistants conducting data extraction were blind to group assignment. Future implementation research would benefit from using a cluster randomized design as a means to avoid this threat of contamination among the staff nurses.

The guideline appropriate care rate reported in Time 4 included all low-risk labours that met the study criteria. The guideline appropriate care rates recorded during this time resulted from low-risk labours that were attended by all nurses in the Birth Unit. Over the course of the Action Learning intervention, the nurses in the Usual Care group maintained the rate of guideline appropriate care reported in Time 4 (16.3% in Time 4 vs. 16.2% in Time 5). Guideline appropriate care rates reported in Time 5, however, resulted from low-risk labours that were attended only by study nurses. As a result of the difference in the nurses' (Birth Unit nurses versus Study nurses) who cared for women that met the low-risk labour study criteria during Time 4 and Time 5, I could not assess for a similarity or a difference between the guideline appropriate care rates obtained during these two times.

Testing. Before and after the education intervention, all study nurses completed the Attitudes to Intermittent Fetal Monitoring questionnaire. It is possible that the statistically significant results obtained on some items from the posttest were the result of the testing threat (Behi & Nolan, 1996; Slack & Draugalis, 2001). As a result, of the education, the nurses may have "simply learned to provide the right answers" (Slack & Draugalis, 2001, p. 2175). It is also possible that, since I was a colleague of the nurses and the study facilitator, their attitudes were reflective of a social response bias.

Attrition. Prior to and during Time 5, 41 study nurses (44% of the original 93 randomized study nurses) left the Birth Unit for various reasons that were unrelated to the study. This loss resulted in groups with unequal sizes during Time 5. It is not known whether the nurses leaving the Birth Unit led to a biased control or biased experimental group, or if their departure may have affected the results.

Study measures. Both instruments (Attitude to Intermittent Auscultation Questionnaire and Labour Evaluation Questionnaire) used in this study had reported psychometric properties that were satisfactory. However, both instruments had been previously used only once and had little or no published comparative data. They were chosen based upon personal conversations with the respective researchers, their previously reported psychometrics, and the scope of the proposed trial. In the current study, the resulting psychometrics for these instruments were weak. As a result, the nurses' attitude scores were not used as predictors in the logistic regression modeling.

Integrity of the intervention and of facilitation. Intervention fidelity has been identified as necessary when conducting an RCT of a complex intervention (Campbell-Yeo et al., 2009; Lindsay, 2004; Spillane et al., 2007). Spillane et al. (2007) stated that the consistent implementation of the same intervention in a standardized format may prove to be challenging. These authors stressed the need for recognizable and replicable intervention processes, principles, and sequences.

In a trial aiming to implement evidence into clinical practice, the facilitative intervention needs to be adaptable to the strengths and the weaknesses of the evidence and the context (Kitson et al., 2008), and to the identified barriers and facilitators (Graham et al., 2004). The intervention needed to be adaptable, while maintaining its principles and adhering theoretically to the framework of evidence implementation. The reality of an Action Learning intervention is that each group of nurses attending an Action Learning set brought with them a different perspective about the evidence and the context. To address both these contrasting requirements and the nature of an Action Learning intervention, the intervention was implemented according to a set of principles

and as facilitator; I had to adapt these principles to each of the sets' participants. A study limitation, however, is that I did not collect detailed process data pertaining to the Action Learning intervention. This is a necessary step for future research.

A careful review of my field notes revealed that, despite my need to respond to each situational response, I remained true to the principles of Action Learning, the planned context and the processes for the Action Learning sets as outlined in Chapter 3. I used a variety of approaches to ensure that the group dynamics unfolded in a way that was consistent with the principles of Action Learning. These approaches included humanistic, existential, and behaviourist concepts. For example, through the application of humanistic concepts, set members were provided an opportunity to present their experience with trying to change their practice. The environment for this presentation was supportive, challenging, and was void of judgment. An existential approach supported the creation of relationships among set members, and a behaviourist approach encouraged group members to pick up and model my behaviours as facilitator. There is, however, a potential bias in this validation process as it relies solely on my field notes. My documentation was not validated. Alternatively, for example, I could have used an independent observer, video, or independent reviewers to validate my field notes that indicated adherence to the principles.

From the perspective of a traditional RCT, an internal facilitator and an implementation strategy, such as Action Learning, may be construed as problematic. Consistent with a post-positivistic philosophy the research and the researcher are not unbiased (Clarke, 1998; Routledge, 2007). They are subject to cultural, social, and experiential influences that may be more than what is directly perceived. Therefore, it

may not be possible for one person to capture all of the influences. For example, the researcher may not capture accurately the participants' feelings and emotions. As the researcher, I attempted to capture in my field notes any issues discussed in the Action Learning sets that might relate to an influence on the nurses' practice. One such issue, for example, was the Action Learning nurses' descriptions of their perceptions about differences in healthcare providers' perspective about fetal health surveillance strategies.

A positivist approach did not underpin the RCT design in this research. Rather, I used a post-positivistic approach in a pragmatic RCT that enabled me, as facilitator, to capture the complexities in the clinical setting and the additional influences (Hopotf, 2002). These additional influences, not usually captured using the traditional RCT design included perspectives such as the nurses' thought processes, their beliefs about their practice, and the rationale for their behaviours. The goal of this research was to change practice. Work group effectiveness and cooperation are engendered by trust (Tanghe, Wisse, & van der Flier, 2010). Trust is proposed as one of the influences necessary to create the conditions where change can take place. It is also recognized as a component of the post-positivist perspective (Routledge, 2007). An internal facilitator contributed to a trusting relationship with the study participants (Harvey et al., 2002; Kitson et al., 2008).

External validity. Several features of the context in the current study compromised the generalizability of the study findings. The study setting employed a policy of a one-to-one ratio of nurse to active labouring patient. In addition, the nursing staff at the participating hospital knew the study facilitator. It is difficult to determine

whether these two features influenced the study outcome and are consistent with other sites where intermittent auscultation is practiced.

Implications for Practice and Future Directions

This research, including the processes and the outcomes of the Action Learning intervention, highlight several areas for practice and future research. These areas include health care providers, meaningful practice change, social validity, Action Learning, context, and research design.

Health care providers. To date, research concerning successful implementation strategies for knowledge translation has been dominated by research focused on physicians (Grimshaw et al., 2004). In the current study, I explored a knowledge translation implementation strategy with nurses as the primary focus. Different types of health care providers in the clinical area, not a sole discipline, are usually involved in the transfer of evidence into clinical practice. Dopson (2007) reported that the dimensions of organizational complexity, including knowledge translation, knowledge, multiple actors, professional and cognitive boundaries, and context are relevant to knowledge translation research. In the future, researchers in knowledge translation should begin by incorporating a systems approach. They should focus first on an interprofessional approach including both nurses and physicians in health care team. Lessons learned from this focused approached could then be applied to research involving the overall health care team.

Meaningful practice change: Outcomes to be measured. Previous literature does not address what constitutes a meaningful or acceptable change in intermittent auscultation practice. Given the complexities of nursing practice, using an outcome

measure of 100% guideline adherence may have been overly restrictive. It may not have been realistic or reasonable to expect that in everyday nursing practice, guidelines will be followed 100% of the time. While the research evidence supporting the use of intermittent auscultation is strong, the required dosage of this fetal health surveillance practice has not been previously reported.

Qian et al. (2006) identified an obstetrical practice as routine when it occurred more than 65% of the time. Perhaps a more realistic assessment of an intervention to improve the use of intermittent auscultation could be made by targeting a lower level of practice consistency, rather than a complete, correct application of the guideline 100% of the time. Expectations of 100% guideline application may constrain the professional judgment or discretion of the healthcare provider system (Amalberti, Auroy, Berwick, & Barach, 2005), as well as limit inclusion of patient preference. Future research should identify an incremental change (Pascaris, Shields, & Wolf, 2008) with which guideline appropriate care must occur. The goal of this research would result in future intermittent auscultation performance progressing along time.

In a prospective evaluation of a clinical guideline recommending hospital length of stay in upper gastrointestinal tract hemorrhage, 70% guideline adherence in the experimental group achieved the expected outcome, a reduced length of hospital stay (Hay, Maldonado, Weingarten, & Ellrodt, 1997). Sidani et al. (2003) reported that in order to meet the needs of the individuals, an intervention may require some adaptation. These authors stated that "uniform implementation of an intervention is not consistent with clinical reality" (Sidani et al., 2003, p. 251). While no researchers reported a meaningful rate of guideline adherence, physicians at the study hospital agreed that 80%

represents an acceptable adherence (C. Craig, personal communication, 2008). There may indeed be some point at which a higher dose has no further impact on the outcomes (Manojlovich & Sidani, 2008). Gluck (2007) commented on a framework for patient safety in women's health care stating that "the ideal of a 100% safe health-care system is unattainable, but there must be continual improvement" (p. 525).

A more meaningful approach to measuring guideline implementation may also be made by measuring a change in practice using a specific portion of the guideline. Glouberman, Enkin, Groff, Jadad, and Stern (2006), in their review of entrenched health care practices in Canada, the United Kingdom, and Australia proposed that smaller-scale change resulted in greater success in transferring evidence into practice. Implementation efforts could be directed to one portion of the guideline, for example, from administration of epidural analgesia to delivery. Achieving success in one portion of an episode of care could support the focusing of efforts to additional portions of an episode of care. Future research, focusing on a more realistic guideline uptake and smaller scale change in intermittent auscultation change may provide more immediate results and as such, set the stage for greater use of intermittent auscultation among Birth Unit nursing staff.

Social validity. When an intervention is acceptable to study participants, Czaja and Schulz (2003) suggested that this is reflective of social validity. Social validity represents an interpretation of what the intervention means to the study participants. Acceptance of an intervention means that study participants are more likely to participate (Foster & Mash, 1999). Future research concerning Action Learning should include an assessment of the social validity in which the participants evaluate the acceptability of the intervention. For example, the participants could rate Action Learning in terms of its

process. A process review would enable the set members to evaluate their experiences with the features of the Action Learning intervention.

Action learning. Despite the lack of significance identified in this first test of an RCT design using an Action Learning intervention, the nurses' accepted Action Learning. Previous researchers, using different research designs, reported both acceptance and successful practice change with Action Learning. Given the overall acceptance of Action Learning, future research with the goal of successful practice change needs a research design that is inclusive of all staff and incorporates the realities of a complex setting. For example, a cluster RCT that incorporates a pragmatic methodology.

In the current study, I implemented Action Learning for six months. Perhaps a longer time frame, for example one year, would enable nurses to learn and to take action on a greater number of the discussed issues. As well, these Action Learning sets took place outside the hospital and I conducted them on days that the nurses were not working. Researchers have highlighted the value of managerial support to increase the success of research transfer (Gifford, Davies, Edwards, Griffin, & Lybanon, 2007). For example, in a study by Wilson et al. (2008) in which nurses achieved success with Action Learning, they met one-half day per month during their workday. Nurses in future Action Learning research need to be given the time to meet during their workday. This tangible demonstration of management support may contribute to the success of the intervention.

Context. In future research, there is much to learn about the context in order to achieve evidence-based practice change (Titler, 2010). This can be achieved by using, as suggested by Kitson et al. (2008) and McCormack, McCarthy, Wright, Slater, and Coffey

(2009), a diagnostic score as a starting point for the assessment of the strength of the context and the evidence. This diagnostic score, for example the Context Assessment Index (McCormack et al., 2009), would need to be completed by the study participants in advance of implementing the intervention. Kitson et al. (2008) and McCormack et al. (2009) proposed that the outcome of such an assessment could further support the researcher's decision for a facilitative intervention. Strategies for implementation, based upon both the staff feedback and a diagnostic assessment, may contribute to a success practice change.

The pragmatic nature of this study, including the realities of a busy clinical unit and the potential for ongoing change, highlight the need for continued monitoring in an implementation study. As previously stated, assessment can occur formally via an instrument such as the Context Assessment Index (McCormack et al., 2009). Alternatively, informal discussions can take place between the facilitator and the care providers. The non-static nature of the hospital context reinforces the contribution of the context to the implementation of evidence in clinical practice and a possible need for ongoing evaluation. Kitson et al. (2008) stated that the strength of the context establishes the application of the facilitative intervention. Clinical practice is an evolving environment where change is ongoing. The choice of a facilitation intervention needs to include ongoing contextual discussion between the study participants and the research when efforts are being made to implement evidence and change provider behaviour.

Research design. In the clinical trial portion of the study, the practitioners' participation in the Action Learning intervention may have contributed to validity issues such as contamination. That is, nurses in the Usual Care group were aware that the

intervention was taking place. Despite the Action Learning nurses' assurance that they would not share their actions with the Usual Care nurses, these nurses worked together on the Birth Unit and may have inadvertently shared experiences. Overcoming this bias may be aided through a different study design. Methodological approaches that could address such a validity threat include a cluster RCT (Campbell-Yeo et al., 2009; Puffer, Torgerson, & Watson, 2005), a pre-post design (Cunningham &Kitson, 2000a; 2000b), or alternative methods for clinical research (Sidani et al., 2003). These alternate methods are proposed as an approach that reflects clinical realities by incorporating modifications in four aspects of clinical research: participant selection criteria, assignment to treatment options, implementation of the intervention, and selection of outcome measures.

Conclusion

To better understand the effectiveness of implementation strategies in a birthing environment, I used two interventions with the aim of increasing the nurses' guideline appropriate care during the episode of low-risk labour. These two interventions were interactive education and Action Learning. Despite the nurses' reported positive attitude to intermittent auscultation, neither intervention changed the nurses' practice.

The nurses identified a variety of enablers and inhibitors related to their practice of intermittent auscultation. The main factors were the lack of attention to the unit policy, the availability of appropriate equipment, the social networks at work, and the entrenched practice of electronic monitoring. Two predictors were also found to contribute to the nurses' guideline appropriate practice: epidural analgesia use and narcotic analgesic use. The nurses identified these predictors during their Action Learning sets as inhibitors to intermittent auscultation. Through discussions, they

identified actions in an effort to work with these issues and change their practice. The implementation of those planned actions may account for the Action Learning nurses' appropriate guideline care during the portions of care that involved epidural analgesia use and narcotic analgesic use.

The findings of this nursing study contribute to the field of knowledge translation. Although both interventions tested, an interaction education intervention and an action learning strategy, had been reported as being effective in previous research reported, neither resulted in successful transfer of evidence into practice in this study. This finding contributes to the need for further research in the field of knowledge translation focused on the identification of effective implementation strategies. These results point towards exploring qualities and methods of internal versus external facilitation, situational context, and meaningful practice change. As a result of this study, I have contributed recommendations for further development of the PARiHS framework.

Research concerning the PARiHS framework and the effectiveness of implementation strategies needs to continue as a focus in the field of knowledge translation. The findings of this study, however, reveal several areas for future research. First, the evidence element of the PARiHS framework needs further elaboration. Elaboration should include the individual characteristics of the local adopter and the local data, and will then need to be tested. Second, future research should assess and measure the nature and the role of both an internal and external facilitator to further understand their contributions to the change process and their respective relationships with care providers. Third, an organizational systems approach to implementation research is needed that includes nurses and physicians. Fourth, implementation strategies need to be

tailored to the realities of the health providers, their practice, and their environment. Fifth, researchers need to monitor both conceptual and direct research use as outcome variables. Sixth, a research design that is inclusive of all staff members and the measurement of a meaningful practice change will incorporate the real world conditions of everyday practice. Finally, research that includes the contributions of an entrenched long-standing practice, the compatibility of the evidence with health care providers, and the providers' intentions for implementation effectiveness will strengthen our understanding of effective implementation strategies.

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Appendix A

Information and Consent Form - Nurses

STUDY TITLE: The Effects of Action Learning (AL) on Nurses' Use of Fetal Health Surveillance (FHS) Auscultation Guideline with Low Risk Laboring Women – The FHS Trial.

PRINCIPAL INVESTIGATOR: Erna Snelgrove-Clarke, RN, PhD(candidate) at the School of Nursing, McGill University, Staff Nurse, Birth Unit IWK Health Centre, & Assistant Professor, School of Nursing, Dalhousie University

CO INVESTIGATORS: Judith Ritchie, RN, PhD, Nursing Research, MUHC & McGill University
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Gordon Flowerdew, PhD, CH&E, Dalhousie University

SPONSOR: Knowledge Transfer Fund- IWK Women & Newborn Program
ARCASN Research Seed Grant Award

INTRODUCTION:

You are being invited to participate in the research study named above. It is important that you understand the purpose of the study, how it may affect you, the risks and benefits of taking part and what you will be asked to do, before you decide if you want to take part. This information and consent form is to help you decide if it is in your best interest to take part in this study. You do not have to take part in this study. Taking part is entirely voluntary (your choice). If you have any question that this form does not answer, the research nurse or Principal Investigator will be happy to give you further information.

PURPOSE OF THE STUDY:

Fetal Heart Surveillance refers to the monitoring of an infant's heart-beat during labor. All women have their infant's heart rate monitored during labor. The method of monitoring – continuous or intermittent, however, depends upon the risk status of the laboring woman and her infant.

The purpose of the FHS Trial is to find out if Action Learning is an appropriate strategy for increasing nurses' use of a clinical practice guideline concerning fetal heart surveillance among low-risk laboring women. We are also interested in determining laboring women's satisfaction with their labor and birth experience.

STUDY DESIGN:

Staff nurses who work in the Birth Unit will be invited to take part in this trial of FHS.

The strategy in this study for encouraging listening to the infant's heart rate during labor is called Action Learning. The nurse providing care will be from one of two groups:
(1) Usual Care
(2) Action Learning
The FHS trial is being conducted because we do not know if this strategy – Action Learning - will encourage listening to the baby's heart rate during labor.

Usual Care is currently a mixture of continuous external fetal monitoring and intermittent fetal monitoring by auscultation or electronically. Staff nurses are encouraged to follow hospital policies and guidelines for FHS during labor.

Action Learning is being implemented as a strategy to encourage listening to the infant's heart rate during labor, as indicted by the policies and procedures. This includes the use of periodic auscultation (using hand-held doppler ultrasound instrument or periodic use of an external ultrasound transducer of an electronic monitor) immediately after a contraction for one minute every 15 to 30 minutes in active labor and every 5 minutes in the active portion of second stage.

If you agree to take part in the study, you will be randomized to either the Usual Care Group or the Action Learning group. Randomization means that you will be allocated, in a process similar to a coin flip (using a computer), to either the Usual Care Group or the Action Learning Group.

All Birth Unit nurses choosing to participate will receive the same education for fetal health surveillance. The only difference in the two groups of nurses is that those in the Action Learning Group will have the opportunity to meet regularly and discuss the various methods they use for listening to the baby's heart rate

Action learning is a continuous process where set (group) members work on real issues and take the time to reflect and learn from their experiences. It is a way of learning from individual actions, and from what is happening around us, by taking the time to question, understand, to gain insight, and learn how to act in the future. The focus of an ALS is on the individual and their actions. A peer facilitator will support nurses in the ALS in their efforts to monitor the infant's heart rate intermittently with low-risk laboring women. Nurses in the ALS will play an active role in the achievement of intermittent auscultation. They will work together (in groups of four to six) designing strategies to bring about appropriate FHS changes to their practice.

POTENTIAL HARM:

There are no known risks associated with participating in this study.

POTENTIAL BENEFITS:

Some nurses may benefit from participation. Nurses who have taken part in other studies of medical and nursing care during pregnancy and birth have frequently stated that they appreciate an opportunity to tell researchers of their experience.

ALTERNATIVES TO THE STUDY:

Before deciding to enroll in this study, you should know that you do not have to take part in the study. Whether or not you decide to participate, you will otherwise provide usual nursing care to a woman and her infant during labor and birth.

WITHDRAWAL FROM PARTICIPATION

Participation in the study is entirely voluntary (your choice). You may decide not to enroll or you may withdraw from the study at any time. This will not affect you at the IWK Health Centre in any way. You participation in the study may be ended if in the opinion of the study staff it is not safe or reasonable for you to continue. If the study is changed in any way that could affect your decision to continue to participate, you will be told about the changes and you may be asked to sign a new informed consent.

COSTS AND REIMBURSEMENT

Participation in this study will not result in any expenses to you. Every effort will be made to ensure that participation in this trial will take place during your regular work hours. Otherwise, you will be compensated for your time.

CONFIDENTIALITY

Any information that is learned about you will be kept private. Study staff will have access to your study records. In addition, the records may be shown to personnel of Research Services Office of the IWK Health Centre and the regulatory authorities in Canada and the United States. Published results will not contain any information that could identify you. Study records will be stored in a locked area and will be kept for 10 years past the age of majority as required by the IWK Research Ethics Board.

RESEARCH RIGHTS

Your signature on this form will show that you have understood to your satisfaction the information about the research study. If you become ill or injured as a result of participating in this study, necessary medical treatment will be available at no additional cost to you.

By signing this document you are not waiving any of your legal rights, nor are you releasing the investigator(s), institution(s), and/or sponsor from their legal and professional responsibilities. You have the right to ask questions about this study at any time. If you have any questions at any time during or after the study about these legal rights or about research in general and you would like an independent opinion, you may contact the Research Office of the IWK Health Centre at 470-8765, Monday to Friday between 9am and 5pm.

CONTACT PERSON

The research nurses carry a pager at all times. Their names are Una Dewtie and Jodi Simpson. If you have any questions or concerns following your enrollment, you may call the IWK Health Centre at 470-8888 and ask for either of them to be paged. You may also contact the Principal Investigator at 494-2490.

STUDY FHS: The FHS (Fetal Heart Surveillance) Trial

Participant ID: _____
Participant INITIALS: _____

Participant Consent - Nurses

I have read or had read to me this information and consent form and have had the chance to ask questions which have been answered to my satisfaction before signing my name. I understand the nature of the study and I understand the potential risks. I understand that I have the right to withdraw from the study at any time without affecting my employment in any way. I have received a copy of the Information and Consent Form for future reference.

Name of Participants: (Print) _____
Participant Signature: _____
Date: _____ Time: _____

STATEMENT BY PERSON PROVIDING INFORMATION ON STUDY

I have explained the nature and demands of the research study and judge that the participant named above understands the nature and demands of the study.

Name: (Print) _____
Signature: _____ Position: _____
Date: _____ Time: _____

STATEMENT BY PERSON OBTAINING CONSENT

I have explained the nature and demands of the research study and judge that the participant named above understands the nature and demands of the study.

Name: (Print) _____
Signature:_____ Position: _____
Date: _____ Time: _____

Other people present at time of signing:

Name (Print)_____
Signature: _____ Position: _____
Date:_____ Time: _____

Appendix B

FHS – Patient Demographics

Participant No ———————

Questions to ask in the ELAU

1. Gravida	
2. Para	
3. Abortion – spontaneous	Yes[1]
	No[2]
4. Abortion – termination	Yes[1]
	No[2]
5. Age	
6. Partner(present)	Yes[1]
	No[2]
7. Attend prenatal classes	Yes[1]
	No[2]
8. Singleton	Yes[1]
	No[2]
9. Vertex	Yes[1]
	No[2]
10. Temperature (> 37.5)	Yes[1]
	No[2]
11. Cervical dilatation (> 7cm)	Yes[1]
	No[2]
12. Low-lying placenta	Yes[1]
	No[2]
13. Planned induction	Yes[1]
	No[2]
14. Non-reassuring FHR	Yes[1]
	No[2]
15. Meconium	Yes[1]
	No[2]
16. Gestational diabetes	Yes[1]
	No[2]
17. Severe PIH	Yes[1]
	No[2]
18. Admission to Birth Unit	Yes[1]
	No[2]
19. Eligible to participate	Yes[1]
	No[2]
20.Consent signed	Yes[1]
	No[2]

Appendix C

Research Assistant FHS Guide

Audit Form – FHS Labor & Birth

Nurse ID _____ **Participant No** _____

Date of shift Time (circle one) 0700-1900 1900 - 0700

FHR Events	7:00 7:15	7:15 7:30	7:30 7:45	7:45 8:00	8:00 8:15	8:15 8:30	8:30 8:45	8:45 9:00	9:00 9:15	9:15 9:30	9:30 9:45	9:45 10:0	10:00 10:15	10:15 10:30	10:30 10:45	10:45 11:00	11:00 11:15	11:15 11:30	11:30 11:45	11:45 12:00	12:00 12:15	12:15 12:30	12:30 12:45
FHR[1]																							
Intermittent FH (ausc)[2]																							
Continuous FH[3]																							
Accel[4]																							
Decel[5]																							
LTV[6]																							
STV[7]																							
Reassuring FH[8]																							
Non-reassuring FH[9]																							
Spiral Electrode[10]																							
Oxytocin Stim[11]																							
D/c Oxytocin Stim[12]																							
Notify Dr[13]																							
Scalp Sampling[14]																							
Vaginal Exam[15]																							
Increase IV fluids[16]																							
Pulse[17]																							
B/p[18]																							
Temp[19]																							
Position																							

Change[20]																							
Anxiety/Pain Reduction Measures[21]																							
Supportive Care[22]																							
Oxygen[23]																							
D/c oxygen[24]																							
Epidural[25]																							
Narcotic[26]																							
2nd stage not-pushing[27]																							
2nd stage pushing[28]																							

Research Assistant FHS Guide

Audit Form – FHS Labor & Birth

Nurse ID _____ **Participant No** _____

Date of shift Time (circle one) 0700-1900 1900 - 0700

FHR Events	12:45 13:00	13:00 13:15	13:15 13:30	13:30 13:45	13:45 14:00	14:00 14:15	14:15 14:30	14:30 14:45	14:45 15:00	15:00 15:15	15:15 15:30	15:30 15:45	15:45 16:00	16:00 16:15	16:15 16:30	16:30 16:45	16:45 17:00	17:00 17:15	17:15 17:30	17:30 17:45	17:45 18:00	18:00 18:15	18:15 18:30	18:30 18:45
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Position Change																								

Anxiety/Pain Reduction Measures																								
Supportive Care																								
Oxygen																								
D/c oxygen																								
Epidural																								
Narcotic																								
2nd stage not-pushing																								
2nd stage Pushing																								

Research Assistant FHS Guide

Audit Form – FHS Labor & Birth

Nurse ID _____ **Participant No** _____

Date of shift Time (circle one) 0700-1900 1900 - 0700

FHR Events	18:45 19:00	19:00 19:15	19:15 19:45	19:45 20:00	20:00 20:15	20:15 20:30	20:30 20:45	20:45 21:00	21:00 21:15	21:15 21:30	21:30 21:45	21:45 22:00	22:00 22:15	22:15 22:30	22:30 22:45	22:45 23:00	23:00 23:15	23:15 23:30	23:30 23:45	23:45 24:00	24:00 00:15	00:15 00:30	00:30 00:45
FHR[1]																							
Intermittent FH (ausc)[2]																							
Continuous FH[3]																							
Accel[4]																							
Decel[5]																							
LTV[6]																							
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Oxytocin Stim[11]																							
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Notify Dr[13]																							
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Increase																							

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Position Change[20]																							
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Supportive Care[22]																							

Oxygen[23]																							
D/c oxygen[24]																							
Epidural[25]																							
Narcotic[26]																							
2nd stage not-pushing[27]																							
2nd stage pushing[28]																							

Research Assistant FHS Guide

Audit Form – FHS Labor & Birth

Nurse ID _____ **Participant No** _____

Date of shift Time (circle one) 0700-1900 1900 - 0700

FHR Events	00:45 01:00	01:00 01:15	01:15 01:30	01:30 01:45	01:45 02:00	02:00 02:15	02:15 02:30	02:30 02:45	02:45 03:00	03:00 03:15	03:15 03:45	03:45 04:00	04:00 04:15	04:15 04:30	04:30 04:45	04:45 05:00	05:00 05:15	05:15 05:45	05:45 06:00	06:00 06:15	06:15 06:30	06:30 06:45	06:45 07:00
FHR[1]																							
Intermittent FH (ausc)[2]																							
Continuous FH[3]																							
Accel[4]																							
Decel[5]																							
LTV[6]																							
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Position Change[20]																							
Anxiety/Pain Reduction Measures[21]																							
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Oxygen[23]																							
D/c oxygen[24]																							
Epidural[25]																							
Narcotic[26]																							
2nd stage not-pushing[27]																							
2nd stage pushing[28]																							

Research Assistant FHS Guide

Labor & Birth

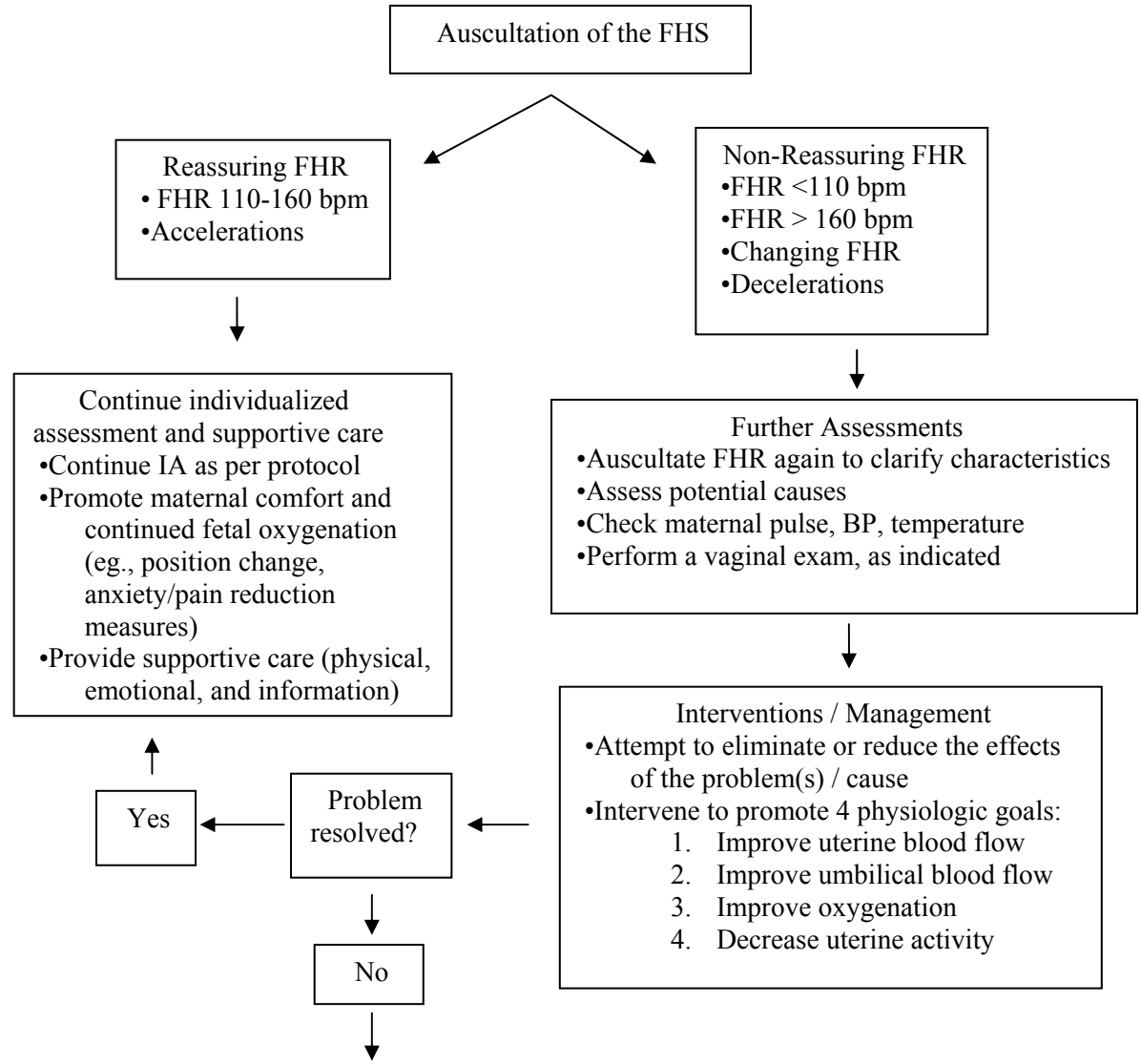
Using the schedule collect all the participants FHS data using the partogram and patient notes over the course of their labor and birth. Please identify which nurse was assigned to the participant. Complete each 15-minute time frame following the instructions below.

Completion of FHS Guide

1. **FHR –** FHR baseline is between 110 bpm – 160 bpm. A single FHR is generally indicated for auscultation and a range for the continuous FHR. Write the number / range indicated on the partogram
2. **Intermittent FH auscultation** –Enter a check mark for auscultating the FH (otherwise leave blank)
3. **Continuous FH** – Enter a check mark for continuous monitoring (otherwise leave blank)
4. **Acceleration** – An increase of 10 – 15 beats above baseline. Enter a check mark if indicated on partogram; provide FH rate
5. **Deceleration**– A decrease below baseline. A variable is v-shaped and can occur before, during, or after a contraction; An early deceleration if u-shaped and is the mirror image of a contraction; a late deceleration is u-shaped also, it ends after the contraction if over and is accompanied by decrease FH variability. Enter a check mark if indicated on partogram; name type; provide FH rate
6. **Long term variability** – Assessed using a 10 minute segment of a FH tracing for range or amplitude of the FH; absent, decreased, avg., or increased; Indicate using code from partogram
7. **Short term variability** - Assessed only when a spiral electrode is in place. Either present or absent; indicate n/a or present or absent
8. **Reassuring FH** - FH baseline within 110 – 160 bpm range and accelerations present; indicate with a check mark if applicable
9. **Non-reassuring FH** – FHR baseline outside of 110 – 160 bpm range; changing FHR; decelerations present ; indicate with a check mark if applicable
10. **Spiral electrode** - used to monitor the FH internally; indicate with a check mark if used
11. **Oxytocin stimulation** – indicate with a check mark if used;
12. **D/c oxytocin stimulation** – indicate with a check mark if d/c
13. **Notify doctor**- indicate with a check mark
14. **Scalp sampling**- indicate with a check mark; obtained from the notes
15. **Vaginal exam** – indicate if performed (from partogram), and write dilatation
16. **Increase I/V fluids** – indicate with a check mark if increased; from notes or I/V fluid sheet

17. **Pulse** – write number from partogram
18. **B/P** – write number from partogram
19. **Temperature** – write number from partogram
20. **Position Change** – Indicate (with capital letter) either **B**ed, **C**hair, **T**ub, **A**mbulating, **R**epositioned for non-reassuring FH
21. **Anxiety/pain reduction measures –** provided to promote maternal comfort and continued fetal oxygenation; indicated in the notes; please indicate with a check mark if used
22. **Supportive care –** physical, emotional,information; available from the notes; indicate which of these three was provided
23. **Oxygen –** indicate with a check mark if used
24. **D/C oxygen –** indicate with a check mark when D/c
25. **Epidural -** indicate with a check mark when given
26. **Narcotic –** indicate with a check mark when given and what was given
27. **2nd stage not pushing –** indicate when fully dilated
28. **2nd stage pushing –** indicate when pushing started; if started to push and stopped, please indicate time when stopped and time when resumed

Appendix D
Clinical Decision Making – Fetal Health Surveillance in Labour
Adapted from the Ottawa Hospital Maternal Newborn Program



Further Interventions

Consider the total clinical picture determining the situation's urgency, and act accordingly

•Continue auscultating with next few contractions, unless FHR is clearly not recovering or is ominous
•Consider additional fetal health surveillance measure, if available:
- electronic fetal monitoring to clarify pattern interpretation
- fetal scalp sampling
•Notify primary care provider
•Consider delivery of problem does not resolve
•Perform umbilical arterial gas sampling at birth

Adapted from: Feinstein NF, Sprague, A & Trepanier MJ. (2000). Fetal heart rate auscultation. AWHONN. Sprague, A. (1995). Auscultation of FHR – Decision-tree, PPPESO.

Appendix E

Labor and Delivery Nurses' Attitudes Toward Intermittent Fetal Monitoring

Deborah S. Walker, DNSc, CNM, FNP, FACNM
University of Michigan School of Nursing
Ann Arbor, MI

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.Most of the women you care for in labor ask you as a nurse about using intermittent fetal monitoring.	1	2	3	4	5
2.Continuous electronic fetal monitoring should be the standard of care for the labor of essentially healthy women.	1	2	3	4	5
3. As a nurse, I am willing to intermittently monitor essentially healthy women in labor.	1	2	3	4	5
4. Women want to be continuously monitored in labor.	1	2	3	4	5
5. This hospital provides clear guidelines for the use of intermittent fetal monitoring.	1	2	3	4	5
6.Essentially healthy women have the right to choose the method of fetal monitoring used in their labor.	1	2	3	4	5
7. This hospital's current approach to fetal monitoring is adequate.	1	2	3	4	5
8. Research on continuous fetal monitoring demonstrates an increase in maternal and neonatal morbidity without an increase in benefits to women and infants.	1	2	3	4	5
9. Women expect to be continuously monitored in labor.	1	2	3	4	5
10. The labor nurse has sufficient time available to provide intermittent fetal monitoring.	1	2	3	4	5
11.Nurse to patient ratio is a problem in providing intermittent fetal monitoring.	1	2	3	4	5
12.I feel my input affects my hospital unit policy changes.	1	2	3	4	5
13. Our doctors/nurse-midwives are willing to order intermittent fetal monitoring for essentially healthy women in labor.	1	2	3	4	5
14. There are few barriers to implementation of intermittent fetal monitoring.	1	2	3	4	5
15. Intermittent fetal monitoring would impact the nursing care I give to the essentially healthy women in labor.	1	2	3	4	5
16. At this hospital, it would be easy to implement intermittent fetal monitoring for essentially healthy women in labor.	1	2	3	4	5
17. Intermittent fetal monitoring should be the standard of care for all essentially healthy women in labor.	1	2	3	4	5

Appendix F
LABOR EXPERIENCE QUESTIONNAIRE

Part 1:

Below are statements which women have used to describe their experiences during labor and delivery. Some women disagree with the statements and others agree with them, depending on their experiences. Think about your recent labor and delivery experience. Then indicate whether you AGREE or DISAGREE or are NEUTRAL with respect to each statement by circling the number in the one column which best describes your feelings and beliefs.

	Strongly disagree	Moderately disagree	Slightly disagree	Neutral	Slightly agree	Moderately agree	Strongly agree
1. I understand the hospital procedures and routines I experienced during labor.	1	2	3	4	5	6	7
2. I felt free to ask questions.	1	2	3	4	5	6	7
3. The doctor was accepting of my behavior during labor.	1	2	3	4	5	6	7
4. I wish the nurse had been with me more during labor.	1	2	3	4	5	6	7
5. I was satisfied with the communication I had with my nurse.	1	2	3	4	5	6	7
6. I understood the purpose of measuring my contractions.	1	2	3	4	5	6	7
7. I was treated with respect during labor.	1	2	3	4	5	6	7

8. I was satisfied with the care I got from my doctor during labor.	1	2	3	4	5	6	7
9. My baby's heartbeat was measured in the best possible way.	1	2	3	4	5	6	7
10. The information I got about my baby's heartbeat was reassuring.	1	2	3	4	5	6	7
11. The medicine and/or anesthesia I received relieved my pain.	1	2	3	4	5	6	7
12. The information I received about my bay's heartbeat was not useful to me.	1	2	3	4	5	6	7
13. My concerns and beliefs about my pregnancy and labor were ignored.	1	2	3	4	5	6	7
14. I was dissatisfied with the care I got from my nurse during labor.	1	2	3	4	5	6	7
15. My support person (husband, partner) did not get enough information about my labor.	1	2	3	4	5	6	7
16. I was uncomfortable when my baby's heartbeat was being measured.	1	2	3	4	5	6	7
17. I was able to move about in bed as much as I wanted during labor.	1	2	3	4	5	6	7

18. I had to wait too long for medicine and/or anesthesia.	1	2	3	4	5	6	7
19. The nurse was not accepting of my behavior during labor.	1	2	3	4	5	6	7
20. I wish the doctor had been with me more during labor.	1	2	3	4	5	6	7
21. I was satisfied with the communication I had with my baby's heartbeat.	1	2	3	4	5	6	7
22. I did not understand the purpose of measuring my baby's heartbeat.	1	2	3	4	5	6	7
23.I had no sense of privacy during labor.	1	2	3	4	5	6	7
24. My contractions were measured in the best possible way.	1	2	3	4	5	6	7
25. I received lots of helpful information about my contractions (such as when they were peaking, when they ended).	1	2	3	4	5	6	7
26. I need more time alone.	1	2	3	4	5	6	7
27. I wanted to be touched more during labor (such as holding my hand, rubbing my back)	1	2	3	4	5	6	7

28. The nurse helped my support person to be involved.	1	2	3	4	5	6	7
29. My support person got lot's of helpful information about how my baby was doing.	1	2	3	4	5	6	7
30. I was comfortable when my contractions were being measured.	1	2	3	4	5	6	7
31. I was afraid during labor because I didn't have enough information about what was happening.	1	2	3	4	5	6	7
32. The nurse seemed knowledgeable about how to measure my baby's heartbeat.	1	2	3	4	5	6	7
33. My support person helped make me comfortable.	1	2	3	4	5	6	7
34. The nurse seemed knowledgeable about how to measure my contractions.	1	2	3	4	5	6	7
35. The doctor was incompetent.	1	2	3	4	5	6	7
36. The nurse helped make me comfortable.	1	2	3	4	5	6	7
37. My movements were restricted by the way my contractions were measured.	1	2	3	4	5	6	7
38. The doctor seemed knowledgeable.	1	2	3	4	5	6	7

39. My movements were restricted by the way my baby's heartbeat was measured.	1	2	3	4	5	6	7
40. I couldn't concentrate during my contractions.	1	2	3	4	5	6	7
41. The doctor relied on me for information about my labor.	1	2	3	4	5	6	7
42. The nurse was competent.	1	2	3	4	5	6	7
43. The nurse didn't rely on me for information about my labor.	1	2	3	4	5	6	7
44. I didn't get enough information about how my labor was progressing.	1	2	3	4	5	6	7
45. I am dissatisfied with how my labor progress was monitored.	1	2	3	4	5	6	7
46. The equipment in my room was distracting.	1	2	3	4	5	6	7
47. I had enough information on how my baby was doing.	1	2	3	4	5	6	7
48. I am dissatisfied with how my baby's condition was monitored.	1	2	3	4	5	6	7
49. The noise in my room was distracting.	1	2	3	4	5	6	7

50. In general, considering the circumstances, my labor experience was positive.	1	2	3	4	5	6	7
51. My special requests and wishes were carried out.	1	2	3	4	5	6	7
52. I participated in making decisions during my labor and delivery.	1	2	3	4	5	6	7
53. I felt I was treated as an individual.	1	2	3	4	5	6	7

*Source: M.Killien, KK.Shy, G.Hartley

Appendix G

AL Nurse Form – FHS Enablers & Inhibitors

Nurse ID ——————

Date & Time ——————

A variety of reasons may be provided that indicates a nurse's ability to avoid CEFM during labor and birth. Please circle the appropriate number for each rationale offered. Should the AL nurse provide additional rationale, please report and identify as either an enabler or an inhibitor. **More than one additional rationale is possible – please report as many as possible.**

ENABLER	**INHIBITOR**
1. Reassuring FHR – FHR 110 – 160 bpm - Accelerations	1. Non-reassuring FHR – FHR < 110 bpm - FHR > 160 bpm - Changing FHR - Decelerations
2. Patient preference	2. Meconium
3**. a)Obstetrician** **b)Resident** **c)Family Physician** **d)Anaesthetist**	3. Oxytocin
4. Epidural	4. Patient preference
5. Pushing / 2nd stage	5. **a)Obstetrician** **b)Resident** **c)Family Physician** **d)Anaesthetist**
6. Doppler available	6. Epidural
7. Unit busy	7. Pushing / 2nd stage
8. Supportive nurses (working with)	8. Doppler not available
9. Prefer to auscultate	9. Unit busy
10. Unit policy **clear**	10. Non-supportive nurses (working with)
11. Husband supportive	11. Don't like to auscultate
12. Family supportive	12. Unit policy **not clear**
13. Legality	13. Husband not supportive
14. **Ambulation**	14. Family not supportive
	15. Legality
	16. Spiral electrode
	17. **Ambulation**

Appendix H

FHS Patient Demographics – Labor & Delivery

Patient No ———————————

Date & Time———————————

1. Dilation upon admission to Birth Unit	
2. Time active labor began	
3. Time narcotics received	
4. Time epidural received	
5. Time fully dilated	
6. Time started pushing	
7. Time delivery	
8. Delivery method	1. Spontaneous vaginal[1] 2. Forceps – low[2] 3. Forceps – mid[3] 4. Cesarean birth[4]
9. Infant apgars – 1 minute - 5 minutes	
10. Admission to SCN	1.Yes Time
	2. No

11. Was there fetal distress / fetal asphyxia / hypoxic acidemia charted as indicated for necessitating vacuum extraction / forceps / cesarean section to effect delivery?

1. **Yes**
2. **No**

Appendix I

Information Form - Patient

STUDY TITLE: **The Effects of Action Learning (AL) on Nurses' Use of Fetal Health Surveillance (FHS) Auscultation Guideline with Low Risk Laboring Women– The FHS Trial**

PRINCIPAL INVESTIGATOR: Erna Snelgrove-Clarke, RN, PhD(candidate) at the School of Nursing, McGill University & Staff Nurse, Birth Unit IWK Health Centre

CO INVESTIGATORS: Judith Ritchie, RN, PhD, Nursing Research, MUHC & McGill University
Celeste Johnston, RN, PhD, School of Nursing, McGill University
David Young, MD, FRCPS, Obstetrics & Gynecology, Dalhousie University
Barbara Davies, RN, PhD, School of Nursing, University of Ottawa
Rejean Landry, PhD, Management, Laval University
Susan French, RN, PhD, School of Nursing, McGill University
Gordon Flowerdew, PhD, CH&E, Dalhousie University

SPONSOR: **Knowledge Transfer Fund – IWK Women's & Maternal Program**
ARCASN Research Seed Grant Award

INTRODUCTION:

You are being invited to participate in the research study named above. It is important that you understand the purpose of the study, how it may affect you, the risks and benefits of taking part and what you will be asked to do, before you decide if you want to take part. This information form is to help you decide if it is in your best interest to take part in this study. You do not have to take part in this study. Taking part is entirely voluntary (your choice). If you have any question that this form does not answer, the research nurse or Principal Investigator will be happy to give you further information.

PURPOSE OF THE STUDY:

Fetal Heart Surveillance refers to the monitoring of your baby's heart-beat during labor. All women have their infant's heart rate monitored during labor. The method of monitoring – continuous or periodic, however, depends upon the risk status of you and your baby.

The purpose of the FHS Trial is to find out if Action Learning is an appropriate strategy for increasing nurses' use of a clinical practice guideline concerning fetal heart

surveillance among low-risk laboring women. We are also interested in determining laboring women's satisfaction with their labor and birth experience.

STUDY DESIGN:

You are being invited to take part in this trial of Fetal Heart Surveillance because of your low-risk status upon admission to the Birth Unit.

The strategy in this study for encouraging listening to the infant's heart rate during labor is called Action Learning. The nurse providing your care during labor and delivery was from one of the two following groups:
(1) Usual Care
(2) Action Learning
The FHS trial is being conducted because we do not know if this strategy – Action Learning - will encourage listening to the baby's heart rate during labor.

Usual Care is currently a mixture of continuous external fetal monitoring and intermittent fetal monitoring by auscultation or electronically. Staff nurses are encouraged to follow hospital policies and guidelines for FHS during labor.

Action Learning is being implemented as a strategy to encourage the listening of the infant's heart rate during labor, as indicted by the policies and procedures. This includes the use of periodic auscultation (using hand-held doppler ultrasound instrument or periodic use of an external ultrasound transducer of an electronic monitor) immediately after a contraction for one minute every 15 to 30 minutes in active labor and every 5 minutes in the active portion of second stage). In an Action Learning Set there is an opportunity for nurses to work on real issues and take the time to reflect and learn from their own experiences.

All Birth Unit nurses have received the same education for fetal health surveillance. The only difference in the two groups of nurses is that those in the Action Learning Group will have the opportunity to meet regularly and discuss the various methods they use for listening to the baby's heart rate

The nursing and medical care you receive in all other respects will not be different as a result of your participation in the FHS Trial.

If you agree to take part in the study, you will be asked to complete a questionnaire during your hospital postpartum stay. It takes about 5 – 7 minutes to complete and it concerns your perception of your labor and birth experience. As well, completion of this questionnaire also means you are giving permission for the research nurse to collect information from your hospital record, about medical aspects of your labor, birth, and your baby's health.

POTENTIAL HARM:

There are no known risks associated with participating in this study.

POTENTIAL BENEFITS:

Some women may benefit from participation. Women who have taken part in other studies of medical and nursing care during pregnancy and birth have frequently stated that they appreciate an opportunity to tell researchers of their experience.

ALTERNATIVES TO THE STUDY:

Before deciding to enroll in this study, you should know that you do not have to take part in the study. Whether or not you decide to participate, usual nursing and medical care will be provided to you during your postpartum stay.

WITHDRAWAL FROM PARTICIPATION

Participation in the study is entirely voluntary (your choice). You may decide not to enroll or you may withdraw from the study at any time. This will not affect your care by your doctor or nurse at the IWK Health Centre in any way. You participation in the study may be ended if in the opinion of the study staff it is not safe or reasonable for you to continue. If the study is changed in any way that could affect your decision to continue to participate, you will be told about the changes.

COSTS AND REIMBURSEMENT

Participation in this study will not result in any expenses to you. The questionnaire will be administered during your hospital stay at a time that is convenient for you.

CONFIDENTIALITY

Any information that is learned about you will be kept private. Study staff will have access to your study and medical records. In addition, the records may be shown to personnel of Research Services Office of the IWK Health Centre and the regulatory authorities in Canada and the United States. Published results will not contain any information that could identify you. Study records will be stored in a locked area and will be kept for 10 years past the age of majority as required by the IWK Research Ethics Board.

RESEARCH RIGHTS

Your completion of this questionnaire will show that you have understood to your satisfaction the information about this research study.

You have the right to ask questions about this study at any time. If you have any questions at any time during or after the study about these legal rights or about research in general and you would like an independent opinion, you may contact the Research Office of the IWK Health Centre at 470-8765, Monday to Friday between 9am and 5pm.

CONTACT PERSON

The research nurse carries a pager at all times. Her name is Una Dewtie. If you have any questions or concerns following your enrollment, you may call the IWK Health Centre at 470-8888 and ask for her to be paged. You may also contact the Principal Investigator at 494-2490.

Appendix J

Use of IA during portions of an episode of care

Study Group	Yes, n(%)	No, n(%)	Chi Square	df	p	OR	CI
	Admission to Epidural						
AL, N = 91	48 (52.7)	43 (47.3)					
UC, N = 111	51 (45.9)	60 (54.1)					
Total, N = 202	99	103	0.93	1	0.34	1.54	(0.84-2.83)
	Post Epidural to Delivery						
AL, N = 90	27 (30.0)	63 (70.0)					
UC, N = 110	28 (25.5)	82 (74.5)					
Total, N = 200	55	145	0.51	1	0.47	1.54	(0.84-2.83)
	Admission to Non-Reassuring FH						
AL, N = 41	11 (26.8)	30 (73.2)					
UC, N = 48	13 (27.1)	35 (72.9)					
Total, N = 89	24	65	0.00	1	0.98	1.54	(0.84-2.83)
	Post Non-Reassuring FH to Delivery						
AL, N = 41	32 (78.0)	9 (22.0)					
UC, N = 46	35 (76.1)	11 (23.9)					
Total, N = 87	67	20	0.47	1	0.83	1.54	(0.84-2.83)
	Post Epidural to Augmentation						
AL, N = 37	17 (45.9)	20 (54.1)					
UC, N = 49	17 (34.7)	32 (65.3)					
Total, N = 86	34	52	1.12	1	0.29	1.54	(0.84-2.83)
	Admission to Augmentation						
AL, N = 39	9 (22.5)	30 (76.9)					
UC, N = 59	10 (16.9)	49 (83.1)					
Total, N = 98	19	79	0.56	1	0.45	1.54	(0.84-2.83)

AL = action learning; IA = intermittent auscultation; UC = usual care