Abstract of dissertation entitled

“An evidence-based guideline of lateral birthing position for women during second stage of labour in reducing perineal trauma”

Submitted by

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Perineal trauma is inevitable during vaginal childbirth. Blood loss and pain resulted from perineal trauma are unavoidable. Moreover, pelvic floor muscles will be weakened by genital tract lacerations. A modifiable factor to improve perineal outcomes is the delivery position. In Hong Kong, the obstetric units under the Hospital Authority (HA) commonly use either lithotomy or semi-recumbent birthing position. In my local setting of an obstetric ward under HA, only traditional birthing position was being used, and there had been no evidence-based guideline on birth positioning. Therefore, this dissertation aimed to evaluate the current evidence of using lateral birthing position to reduce the rate of perineal trauma, and translate the evidence in the local setting.
A systematic review of literature was conducted in August, 2013. The electronic databases: Pubmed, CINAHL and Medline were searched, and three randomized controlled trials were identified. Extracted data were collated in a table of evidence and critically appraised by the SIGN Methodological Checklists. After data synthesis, there was adequate evidence supporting that lateral birthing position increased the rate of intact perineum, and reduced the rate of episiotomy, instrumental delivery and suturing of perineum trauma more than traditional birthing position at the second stage of labor.

An evidence-based guideline of lateral birthing position for women during second stage of labor in reducing perineal trauma was established. Lateral birthing position is transferable and feasible in the local setting because the clinical context and the characteristics of the women in the local setting are similar to those who have been reported in the reviewed studies. Clinical training program will be provided to midwives to learn new skills on the management of lateral birthing position. The estimated total cost saved by adopting the new innovation was HKD$98,000 per year.

The stakeholders include the Chief of Service (COS), the Department Operational Manager (DOM), the consultants, ward manager, patients, frontline midwives and obstetricians. A pilot study plan will be conducted for 4 months to try out the intervention in the local setting. The plan includes training the trainers,
implementation of the new methods and reviewing of the guideline. Implementation of the protocol will be lasted for 6 months, followed by a month of evaluation. Data will be collected and the unanticipated problems will be identified at the pilot test, and will be used for modification of the innovated guideline.

Evaluation of the innovation will take 6 months to be completed. The primary outcome is the status of the perineum. The secondary outcomes are the use of episiotomy, require of perineal wound suturing and the perineal pain level. Other outcomes are the satisfaction of the healthcare providers and the cost of running the system. The policy for adopting the new innovation will be based on the outcome measures. It is expected that the rate of perineal trauma will be decreased.
An evidence-based guideline of lateral birthing position for women
during second stage of labour in reducing perineal trauma

By

Lam Sze Lok Sharon

A dissertation submitted in partial fulfillment of the requirement
for the Master of Nursing
at The University of Hong Kong

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Declaration

I declare that this dissertation represents my own work, except where due acknowledgment is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualifications.

Signed

Lam Sze Lok Sharon
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CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

Vaginal delivery usually causes damage to the pelvic floor, its muscles and ligaments. Perineal trauma is a common complication resulting from childbirth. The causes of perineal trauma are multifactorial and some components are beyond the control of obstetricians and midwives (Soong & Barnes, 2005). However, a modifiable factor to improve perineal outcomes is the position for delivery.

According to Royal College of Obstetricians and Gynaecologists (2010), perineal trauma can be classified into 4 levels by seriousness of injury, which are perineal skin, perineal muscles, anal sphincter complex, and anal epithelium. It can be caused by spontaneous tears, episiotomy, or both. Throughout history, the lithotomy and semi-recumbent positions are widely used worldwide. They are regarded as traditional birthing positions.

Blood loss and pain resulted from perineal trauma are unavoidable. Pelvic floor muscles can be weakened by genital tract lacerations. Perineal trauma further affects the urinary, bowel, and sexual activity of women after birth (Albers, Sedler, Bedrick, Teaf, & Peralta, 2005). Perineal trauma may lead to immediate incontinence and prolapse of pelvic organs after delivery or even a few years later. Perineal pain
resulted from perineal trauma mostly affect women in the postpartum period, with the degree of postnatal morbidity directly related to the extent of perineal trauma (Albers et al., 2005).

Nevertheless, some modifiable factors during a vaginal delivery can be identified and prevented in an attempt to maintain the functional integrity of the pelvic floor. Studies found that the degree of perineal trauma relates to different birth positions (Gupta, Hofmeyr, & Shehmar, 2012; Shorten & Donsante, 2002). There has been empirical evidence showing that the traditional position resulted in a higher rate of perineum trauma. There is a need to determine a better way to minimize the degree of genital tract lacerations with vaginal delivery.

1.2 AFFIRMING NEEDS

1.2.1 Local setting and current practice

Among the obstetric units of Hospital Authority in Hong Kong, only 2 hospitals have adopted different birth positions during delivery which include lithotomy, dorsal recumbent, side-lying, sitting, squatting, kneeling, all-four and standing (Appendix I). In my work place, lithotomy and semi-recumbent birthing positions are being used. Episiotomy is still routinely applied for all nulliparous women, and selectively in multiparous women. Protection of perineum is done by traditional based management techniques and special maneuvers during delivery. Currently, traditional birthing
positions like lithotomy and semi-recumbent positions are more widely used in contemporary obstetric practice because of the easy access to the women’s abdomen and perineum, and for continuous fetal heart monitoring at the labor ward of Hospital Authority.

1.2.2 Clinical issue

Between 1 January and 31 March 2003, episiotomy was performed in 85% of normal vaginal deliveries in the public hospitals of Hong Kong (Lam, Wong & Pun, 2006). At the postnatal ward at my workplace, around 80% of the women reported perineal pain with pain score rated from 2 to 4 out of 10. Pain was reported by most of the women after delivery due to perineal trauma. They complained fear of urinating and difficulty in walking. Approximately 30% of the women required oral analgesic at the first 3 days after delivery. Some studies found that 22% of new mothers have reported perineal pain at 8 weeks after birth, while some of them may persist for a year or more (Albers et al., 2005).

Trauma to the genital tract is a significant health issue because it may lead to both short term and long term morbidity. The short term health problems are blood loss, laceration required suturing, and pain (Albers et al., 2006; Shorten et al., 2002). Long term health problems include protracted pain, dyspareunia, infection, urinary incontinence, fecal incontinence, and the establishment of breastfeeding. Perineal
trauma was the highest reporting complication of labor and birth and it is strongly associated with perineal pain (Albers et al., 2006). During vaginal delivery, perineal tear is one of the most common complications. To be more serious, this may lead to obstetric anal sphincter injuries. Multiparas underwent more perineal lacerations, whereas more episiotomies were performed in primiparas (Meyvis, Rompaey, & Goormans et al., 2012). In fact, perineal laceration associates with significant morbidity such as flatus incontinence, faecal incontinence, faecal urgency and psychological impacts. Therefore, there is a need to explore a better birthing position to ensure comfort during the whole delivery process and promote optimal postpartum health.

1.2.3 Potential innovation

To date, there were no evidence-based guidelines for using a particular birth position during delivery. Different positions have their own physiological benefits. The study of lateral birthing position in comparison to lithotomy or semi-recumbent birthing position contributes to midwifery knowledge generally. Giving birth in supine position is more preferable than upright due to less perineal trauma (Eason, 1999). Therefore, supine positions are usually used during delivery. Among all supine positions, studies from Albers et al. (1996) found that lithotomy position increased lacerations, but using lateral birth positioning was protective for the
perineum and reduced the need for suturing. Walker et al. (2012) suggested that postural changes during passive phase of the second stage of labor with epidural anesthesia and the use of modified lateral Gasquet position during active pushing period would reduce the rate of instrumental delivery, increase the intact perineum rate and decrease episiotomy rate. The lateral position is likely to provide maximum benefits and less harm to most women and their babies compared to upright positions (Downe, Gerrett, & Renfrew, 2004). Lateral position is preferable to lithotomy position in terms of validated potential benefits.

1.3 OBJECTIVES AND SIGNIFICANCE

The objectives of this dissertation are:

1. To identify and appraise the recent evidence in using lateral birthing position at the second stage of labor in reducing perineal trauma.

2. To develop an evidence-based guideline for using lateral position during delivery to reduce perineal trauma.

3. To assess the transferability and feasibility of proceeding lateral birthing position at labor ward settings in Hong Kong.

4. To develop implementation strategies and an evaluation plan for lateral birthing position guideline at local settings.

Lateral birthing position, if supported by sufficient evidence, may increase the
rate of intact perineum compared to traditional birthing positions. Furthermore, the
rates of episiotomy, tears requiring suturing and instrumental birth may also be
reduced (Walker et al., 2012; Downe et al., 2004; Brément et al., 2007). The need of
promoting perineal integrity for laboring women is an important and essential task for
nurses. A safe birth and non-traumatic delivery form the basis of midwifery care.
CHAPTER 2 CRITICAL APPRAISAL

2.1 SEARCH AND APPRAISAL STRATEGIES

2.1.1 Identification of studies

A search strategy was established to identify the relevant studies. The electronic databases searched were: Pubmed, CINAHL, and Medline. They were searched by using the keywords: “lateral position”, “side lying position”, “birth position”, “perineal trauma”, “perineal outcome”, and “episiotomy”. After the keyword search, all titles and abstracts were first screened. By further screening the full texts, eligible articles were identified. The reference lists of the selected articles were also reviewed to identify additional studies.

2.1.2 Inclusion and exclusion criteria

The inclusion criteria include:

I. Randomized controlled trials.

II. The types of participants are pregnant women at the second stage of labor irrespective of any anesthesia being used.

III. The types of intervention are either lateral or side lying position during second stage of labor compared with commonly used birthing positions including supine, semi-recumbent position and lithotomy position.
IV. The main results focused on perineal outcome in terms of intact perineum, any perineal trauma, perineal tears or episiotomy.

The exclusion criteria include:

I. Woman at the first stage of labor

II. Woman who gave birth with the aid of birth cushion or birth chair

III. Other uncommonly used birth positions in Hong Kong such as kneeling, squatting, standing, and all-four.

2.1.3 Data extraction

Study designs with high level of evidences with appropriate interventions and study outcomes were included. Data were presented in a table of evidence according to the Scottish Intercollegiate Guidelines Network (SIGN) (Appendix II). The table of evidence included study characteristics, intervention group, control group, outcome measures and the effect size. Outcome measures were further measured by the rate of intact perineum, episiotomy, and perineal tears required suturing and instrumental birth.

2.1.4 Appraisal strategies

To assess the quality of studies conducted according to their designs, the methodological checklist developed by Scottish Intercollegiate Guidelines Network (SIGN) was used as appraisal strategies (Appendix III). Referring to methodology
coding system, studies were rated according to the fulfillment of the criteria on the checklists. If all or most the criteria have been fulfilled, where they have not been fulfilled the conclusions of the study or the review are thought very unlikely to change, the study is rated as “+++”. If some of the criteria have been fulfilled, and those criteria that have not been fulfilled or did not described adequately are thought unlikely to change the conclusion, the study is rated as “+”. If there are few or no criteria fulfilled, and the conclusion of the study are thought likely or very likely to change, it is rated as “-“.

2.2 RESULTS

2.2.1 Search history

After the keyword search on August, 2013, 108 citations were identified in Pubmed, 90 from CINAHL, and 78 from Medline. After scanning the title, a total of 21 studies were found to be potentially relevant. Further review of their abstracts identified 8 studies. By reading through the full text of the articles, 3 articles were confirmed to be eligible to our review. These include one study that was published in French, and was translated into English by Google Translate. Furthermore, the references lists of the selected studies identified no additional studies. Details of the search results are presented in Appendix IV.

2.2.2 Study characteristics
The extracted data from the selected studies are presented in the table of evidence (Appendix II). The maternal age ranged from 21.5 to 36 years old. The gestational age ranged from 37.7 to 41.5 weeks. By calculation, the body mass index ranged from 23.8 to 32.6 kg/m$^2$. Two of the studies included both nulliparous and multiparous, while Downe et al. (2004) targeted on nulliparous only. In general, there were no significant differences in age, gestational age, body mass index, gestational weight gain, labor induction and parity between lateral birthing position and traditional mode of birth. However, one study by Brément et al. (2012) had not described the demographic characteristics of the participants in details.

The controlled trials were conducted between 1994 and 2012 in the hospital from different areas. The length of follow up ranged from 8 months to 1 year, but one study did not mention about it (Walker et al., 2012). The studies were from France, Spain and Midlands. All the women in the studies were at full term of gestation and having a single fetus with cephalic presentation at vaginal delivery. The intervention groups of all studies adopted lateral birthing position. The control groups had traditional birthing positions, lithotomy (Walker et al., 2012), supported sitting which is similar to lithotomy (Downe et al., 2004) and supine (Brément et al., 2007). Epidural analgesia was used in two studies (Walker et al., 2012; Downe et al., 2004).

**2.2.3 Methodological quality assessment**
By using the SIGN methodological checklist, all three RCTs were rated as “1+”. They were high quality RCTs. Most criteria in the SIGN methodological checklist were met. Considering the internal validity, all the extracted studies were able to address the focused guideline question appropriately and clearly. The participants were allocated to the intervention group and control group by randomization. Adequate concealment was done, Walker et al (2012) and Downe et al (2004) used a computer to generalize list of random numbers for participant allocation, draw of sealed opaque envelopes by woman was done in Brémenta et al (2007)’s study. Blinding was not feasible in all the studies of lateral birthing position because either the accoucheur or the woman would aware of the birthing position being used. The woman was instructed to lie on side at birth and the accoucheur used the relevant skills for delivery. The treatment group had similar characteristics as the control group which included maternal age, body mass index, gestational age, parity, presentation (Walker et al., 2012; Downe et al., 2004). The study of Brément et al. (2007) did not report any significant differences in the composition of the study groups, only the inclusion and exclusion criteria of the participants were described. All the categorical outcomes were clearly summarized by percentages. The dropped out rate was 1.51 and 13.35% in two RCTs, while Downe et al (2004) did not mention about it. All the subjects were analyzed in the groups using intention to treat to which they were
randomly allocated. Some women changed from lateral to the lithotomy position due to medical or maternal reasons, but results were analyzed according to the group to which they were originally allocated irrespective to the intervention they actually received.

2.3 SUMMARY AND SYNTHESIS

2.3.1 Summary

Three articles were well-conducted RCTs with low risk of bias. They were high quality literatures. According to SIGN, the levels of evidences of the results were high and were rated as “1”. According to SIGN methodology coding system, some of the criteria had been fulfilled. The criterion which had not been fulfilled was unlikely to alter the conclusion. The studies were rated as “+”. Consistent findings on the use of lateral birthing position were found across the 3 studies. All of them showed statistically significant results on preventing perineal trauma. The rate of intact perineum was found to be increased from 9% to 28% (Walker et al., 2012; Brément et al., 2007). The rate of using instrumental delivery was reduced by 23.1% in one study (Walker et al., 2012) and 19% with a relative risk of 0.64 (95% CI 0.40-1.01) in another study (Downe et al., 2004). The use of episiotomy was significantly reduced by 30.4% in one study (Walker et al., 2012) and 18.9% with a relative risk of 0.66 (95% CI 0.44-1.00) (Downe et al., 2004). The rate of suturing for all perineal trauma
was decreased by 8% with a relative risk of 0.75 (95% CI 0.47-1.17) (Downe et al., 2004). However, it was accompanied by an increased duration of the second stage of labor by around 34 minutes (Walker et al., 2012) and the mean blood loss of 111ml (Brément et al., 2007). The rate of postpartum hemorrhage was doubled in the intervention group (Brément et al., 2007). The difference between two groups of the first, second, and third degree perineal tears differed by less than 1.6%, which was non-significant. There was no significant effect on the neonatal outcomes in all three studies.

2.3.2 Synthesis and evidenced-based recommendations

All the studies demonstrated that lateral birthing position had beneficial effects on preventing perineal trauma. The results showed an increasing rate of intact perineum, as well as decreasing rate of episiotomy, instrumental delivery and suturing of perineum trauma. The decrease in the rate of using instrumental delivery was similar among two studies, with effectiveness of 23.1% (Walker et al., 2012) and 19% (Downe et al., 2004). It was also successful in reducing the use of episiotomy by 30.4% (Walker et al., 2012) and 18.9% (Downe et al., 2004). All studies showed a protective effect on occurrence of perineal trauma by using the lateral birthing position.

There was a difference of 19.23% on increasing rate of intact perineum in two
studies (Walker et al, 2012; Brément et al., 2007). The difference was due to the delayed onset of pushing in woman undergoing epidural anesthesia in Walker et al. (2012). It was suggested that the delay may allow immediate descent and rotation of the fetal head before maternal pushing, thus reducing the rate of instrumental birth. The smooth birth process contributed to the increased rate of intact perineum. It was recommended that lateral birthing position has to be used at the second stage of labor for normal vaginal delivery. For woman undergoing epidural analgesia at the passive phase of labor (Walker et al., 2012, Downe et al., 2004), woman was advised to adapt different positions to delay the onset of pushing. She was asked to change from one to another position such as sitting, knelling, hands and knees, in every 20 to 30 minutes at the whole passive phase. She was then instructed to turn to modified lateral Gasquet position throughout the active pushing phase (Walker et al., 2012).

The option of the specific side on which lying woman should be adopted was based on the lying direction of fetal spine in order to allow smooth internal rotation of shoulders. A number of cases were born with hands accompany with shoulders because of choosing the wrong side (Brémenta et al., 2007). However, some studies recommended that the choice between left and right lateral positions should be depended on the comfortless of woman or according to fetal well-being (Walker et al., 2012). Ideally, it was the best to explore the side which the fetal spine lies on and be
the chosen side. More importantly, the fetal well-being should be the first priority in concern.

In Walker et al. (2012) and Brément et al. (2007), the dropped out rate was 1.51 and 13.35\% respectively. This was due to the arrest of descent of fetal head and abnormal fetal heart rate pattern during the second stage of labor. Caesarean section was performed. The time to discontinue the use of lateral birthing position was suggested whenever there was fetal distress or upon maternal request. The change to traditional birthing position allowed easier pushing and descent of fetal head.

Walker et al. (2012) found that there was an increase in the length of second stage of labor of 34 minutes by using lateral birthing position. This may account for the delayed pushing under epidural analgesia resulting in decreased pushing time in the laboring woman. The benefits of reduction in difficult deliveries outweighed the lengthen periods of second stage of labor.

In Brément et al., 2007, an increase of mean blood loss was found. The rate of postpartum hemorrhage of the intervention group demonstrated double than the control group. The challenge would be the ways of blood collection. It was difficult to collect blood with bags including amniotic fluid and urine. Brément et al. (2007) suggested a system with graduated collection, which was however not based on objective visual assessment. The blood collected into a receptacle was being measured
more accurately. In contrary, another study done by Irwin (1978) stated that a decrease in the amount of blood loss was found in lateral birthing position.

Based on the data of the study characteristics (Walker et al., 2012; Downe et al., 2004; Brément et al., 2007), it is proposed that the target group for adopting lateral birthing position should be delivered at term, which is greater than 37 weeks of gestation. Advanced maternal age is not highly recommended. The body mass index will not be a restriction. However, short stature with body height less than 150cm was not advised to have vaginal delivery in an obstetric view. Both nulliparous and multiparous are fit for using lateral position. With reference to the selection criteria, woman with single cephalic presentation, either spontaneous or induced labor are allowed to try the new intervention. Those with complicated pregnancy, preterm delivery, multiple pregnancy, previous cesarean section, fetal growth restriction and lack of information about lateral position are not suitable candidates for lateral birthing.

Overall, lateral birthing position is recommended during the second stage of labor. There has been adequate evidence showing that the rate of intact perineum will be increased by 10%. In addition, it is estimated that there will be a decreased rate of the use of episiotomy by 20%, decreased rate of instrumental delivery by 20%, and decreased rate of perineum trauma with suturing by 10%.
CHAPTER 3 TRANSLATION AND APPLICATION

3.1 IMPLEMENTAION POTENTIAL

3.1.1 Target audience and setting

The proposed innovation is using lateral birthing position to reduce the rate of perineal trauma. The target audience includes women with maternal age 18 or above, gestation between 37 to 42 weeks, uncomplicated pregnancy, singleton, and vaginal delivery with cephalic presentation in second stage of labor (Brément et al., 2007; Walker et al., 2012; Shorten et al., 2002). The target setting is the obstetric department in a local public hospital. According to Polit and Beck (2008), the assessment of the transferability of the findings, feasibility, cost-benefit ratio of innovation are needed for developing evidence-based guideline to the target setting.

3.1.2 Transferability

3.1.2.1 Similarity of Setting and Target Population

The reviewed studies covered adults with mean maternal age ranged from 26.4 to 30.5 years. The mean gestational weeks ranged from 39.25 to 40.2 which were full term delivery. The study group included both nulliparous and multiparous. In the target setting, the maternal age of the recruited women should be aged 18 or above and with gestational weeks at 37 to 42 weeks which are similar to those of women
assessed in the reviewed studies. Moreover, all laboring women in the target setting with a singleton and cephalic presentation, delivered in either spontaneous or induced way, match well with the criteria of the target group.

Lateral birthing position was used at the second stage of labor in the reviewed studies. The settings of the studies were all either in private, public or maternity hospital. The proposed lateral birthing position is transferable to the local setting as the nature of the clinical setting and target group closely resemble to those of studied subjects in the reviewed studies.

3.1.2.2 Philosophy of care

The philosophy of care of the proposed lateral birthing position guideline is to reduce perineal trauma, and hence improve the quality of life at the post natal period. The philosophy of care of the Hospital Authority is to provide the best quality health service to clients. Aligning the same vision and mission of the Hospital Authority in providing quality care in the field of obstetrics, and contribution to perseverance of the specialty by provision of high quality staff training, it is likely that the target hospital will approve the implementation of the proposed innovation.

3.1.2.3 Number of clients who could benefit

There were about 4800 births in the target setting in 2012. As mentioned in section 2.3, the estimated proportion of reducing perineal trauma will be 10-20%.
Therefore, it is estimated that around 480 (4000x10%) to 960 women (4000x20%) will gain the benefits from the new innovation.

3.1.2.4 Time required for implementation and evaluation

The proposed evidence-based guideline will take 14 months to be implemented and evaluated. It is affordable as the implementation of most new practices may take 1 to 1.5 years to plan, implement, review, and modify. In addition, changing a new practice need co-operation from all staff and time is needed for training for all staff. Moreover, according to Lewin’s change theory (Lee, 2006), time may be needed for staff to unfreeze and start the change of the practice in the unfreezing and transitional stage. During the preparation phase, a proposal will be drafted and pending for approval by the Department Operational Manager and Ethics Approval Board which will take around 3 months. A pilot test will be done in order to evaluate the feasibility, time, cost and any adverse effects of the proposed innovation. The targeted number of client to be on trial would be 1 to 2 per day as not all cases are eligible. Therefore, it is estimated the pilot test would be carried out in 4 months. Revision of guideline will be made based on the data collected from pilot test. Another 6 months will be needed for the implementation of the new innovation and 1 month will be needed for final revision. As a result, a total 14 months will be needed for implementation of the innovation as refer to Appendix VII
3.1.3 Feasibility

3.1.3.1 Freedom to carry out the innovation

In addition to giving options for the birthing position of the woman, midwives have the professional knowledge to decide the most suitable birthing position for the women. After the obstetric and medical history of the women has been reviewed to exclude any complicated cases, the midwives will make the decision to advocate lateral birthing position. The best birthing position will be chosen which provides the best outcomes for the woman and the fetus, and depends on the competence of the midwives.

3.1.3.2 Interference of current functions

Midwives will provide information about different options on birthing position which enable the couple to make a desirable choice (Meyvis, Rompaey, & Goormans et al., 2012). Pamphlets and advices will be given to the woman which will take a few minutes of explanation by midwives. Related instructions about the use of lateral position will be told to the woman to avoid ambiguity during the delivery. Concerning the workload, the number of midwives required to conduct the delivery remains unchanged. If suturing of a perineal wound is not required, this will save around 20 minutes for each midwife or obstetrician.

3.1.3.3 Administrative support

The new innovation can gain the support from the administrative level. The
obstetric department of the targeted public hospital does not have evidence-based
guideline for adopting alternative birth position. The administrators encourage
evidence-based practice. A new guideline based on research findings will be
supportive and convincing to make a change. According to the Hospital Authority
Ordinance (2007), HA shall promote, assist and take part in the education and training
of persons involved or to be involved in hospital services or other services relevant to
the health of the public, and research relating to hospital services. The expected
outcome of the evidence-based guideline is to reduce perineal trauma of woman as
well as to maximize their quality of life at the postpartum. It is likely that the HA shall
accept and support the evidence-based guideline to be used in clinical setting.

3.1.3.4 Consensus

It is expected both the midwives and obstetricians will agree with the new
innovation due to the likely improvement of the quality of life of women at the
postpartum and decreasing the workload of staff. Through the reviewed studies, there
are supportive evidences showing positive effects on reducing the perineal trauma and
perineal pain. There is no doubt that the consensus can be obtained from the
administrators.

3.1.3.5 Skills and resources

Time is needed to train the trainers and all staff to carry out the innovation. As
lateral birthing position is being adopted in a few hospitals in Hong Kong only, clinical attachment programs will be provided for nurses to learn new skills from the other hospital. Training includes the ways to support lateral birthing position, the maneuver for delivery and the management in emergency situation. Returned demonstration is necessary as it is an effective strategy when learning a psychomotor skill, as well as to ensure the safety of women at birth when adopting the lateral birthing position. At least two senior staffs will be released from other clinical activities to learn about the implement innovation. They will be responsible for “training-the-trainers” program after they have learnt about the skills and management of conducting delivery in lateral birthing position.

3.1.3.6 Evaluation tools

Finally, evaluation will be performed to assess feasibility and effectiveness of the new innovation. Lateral birthing position guideline will be on trial for six months. The status of the perineum, the degree of tear, and the need of episiotomy will be continuously recorded after delivery. The satisfaction level and feedback from the patients will be collected at the post natal period. In order to assess the satisfaction from the nurses and collect any feedbacks from the new program, questionnaires will be distributed at the end of the trial period. After implementation of the new guideline, there will be a reduced number of perineal trauma and the use of episiotomy. This will
lead to the decrease in the level of postpartum perineal pain of the woman.

3.1.4 Cost-benefit ratio of the innovation

It is necessary to assess the potential benefits and risks of the new innovation comparing to the existing practice. Practically, a good innovation should improve patient’s outcome with a minimum cost. Moreover, the potential benefits should outweigh the existing one. Therefore, the cost and the potential benefits should be considered.

3.1.4.1 Potential risks

Perineal trauma and the use of episiotomy are common if the traditional birthing position is being used. Besides the women will suffer from the complications resulting from perineal trauma, baby care and personal daily activities will be affected. Though lateral birthing position is proved to decrease the incidence of perineal trauma by reducing the rate of episiotomy, some studies stated that lacerations are more common (Hastings-Tolsma, Vincent, & Emeis et al., 2007). Study from Hastings-Tolsma et al (2007) found that nulliparous women with advanced aged are more likely to have laceration, but it can be prevented by using warm moist compresses during the second stage of labor. In addition, there is lack of evidence to support the short and long term health benefits of routine episiotomy (Albers, Anderson, & Cragin et al., 1996).
3.1.4.2 Potential benefits

All the studies showed that lateral birthing position reduced perineal trauma when compared to the traditional one. They include an increased rate of intact perineum, a decreased rate of episiotomy, assisted instrumental delivery and suturing (Walker et al., 2012; Downe et al., 2004; Brément et al., 2007). By adopting the new innovation, the rate of perineal trauma could be reduced by 10 to 20% according to the reviewed studies. It saves time and manpower as the need for suturing is reduced. Apart for perineal pain is decreased, it also will prevent the short and long-term morbidity related to perineal trauma such as bowel, urinary, and sexual function of women at the postpartum period. Protecting the perineum in the second stage of labor may reduce maternal morbidity and simplify postpartum care (Albers et al., 1996).

Women who delivered with an intact perineum recover quicker than those with episiotomies or perineal tear (Lam, Wong & Pun, 2006). The daily activities and baby care are less affected by perineal pain. Women who have been using lateral birthing position reported more positive outcomes and less maternal morbidity at two weeks after the birth of the baby (Downe, Gerrett, & Renfrew, 2004). Those who suffer less perineal pain will be more ready for breastfeeding. Besides providing a good natural source of nutrients to the newborn, breastfeeding helps to promote bonding between the mother and the infant. Since the benefits of implementing the proposed innovation
are expected to outweigh the risks, the proposed innovation should be well publicized and implemented in all hospitals under the Hospital Authority in Hong Kong.

### 3.1.4.3 Cost of the innovation

The cost for setting up the innovation includes the training of 2 senior nurses (HKD$4728) and the production of 4500 pamphlets (HKD$900) about birth positions, which make up a total cost of HKD$5628. The total cost for suturing a perineal wound which includes the staff cost and material cost is HKD$114.2. It is estimated the total number of births in the current hospital per year is 4800. Episiotomy was being performed in 85% of normal vaginal deliveries in Hong Kong in 2003 (Lam, Wong & Pun, 2006). It is estimated the total number of women required suturing of perineal wound is 90%, which includes both perineal trauma caused by episiotomy and perineal tear. By further reducing the chance of perineal trauma by a maximum 20% by the new innovation which required suturing, the estimated cost would be saved by the new innovation compared to the current practice is HKD$97768.8 per year. The summary of the cost of the innovation is attached as Appendix V.

### 3.2 EVIDENCE BASED GUIDELINE

The protocol will be designed for midwives to conduct delivery using lateral birthing position. To develop the evidence based guideline of lateral birthing position in the second stage of labor, the level of evidence of the selected studies and the
grades of recommendations are rated according to the Scottish Intercollegiate Guidelines Network (SIGN, 2011). The evidence based guideline is attached in Appendix VI.
CHAPTER 4 IMPLEMENTATION PLAN

4.1 COMMUNICATION PLAN

4.1.1 Stakeholders

A communication plan is built up to ensure smooth adaptation of the new program. The stakeholders include the Chief of Service (COS), the Department Operational Manager (DOM), the consultants, ward manager, patients, frontline midwives and obstetricians. The COS, DOM and consultants can provide administrative support and resources to the new innovation as being the decision and policy makers. They are responsible for updating the department guidelines and reallocation of resources such as manpower and equipment, which facilitate the setup of the new innovation. Ideally, the new guideline will be carried out after the approval from the COS, then arranging appropriate medical manpower for the new change. The nursing manpower will be arranged by DOM. The consultants will then recommend the new guideline to the staff. There are around 150 frontline staff members in the department, which include 100 midwives and 50 obstetricians. They are responsible for the assessment and conduct of lateral birthing position according to the new guideline. Their feedbacks and recommendations are needed for the review of the guideline.
4.1.2 Communication plan with potential users

A communication team will be formed which include the COS, DOM, ward manager, medical consultant, obstetrician, advanced practiced nurse, midwife, in a total of 7 people. The team is responsible for promoting the new innovation. As the organization structure of Hospital Authority is a top-down hierarchy, the new issues will be firstly discussed with all advanced practiced nurses after a month of setting up the proposal. They will be convinced to support the new innovation according to the affirming needs and the objectives. It will take around two weeks for the discussion and review the plan. With the support of the APNs, the significance of the existing problem, the need of change, and the proposed evidence based guideline will be presented to the ward manager. After persuading the ward manager, the new issue will be raised during general ward meeting. Due to high beneficence and low cost of the new innovation, the DOM, COS and the medical consultants will be interested in the new innovation. The revised version for the new proposal will be submitted to DOM and the medical consultant through the ward manager, then finally to COS and Ethics Approval Board for the approval. Formal meetings will be held biweekly among the communication team to discuss the issue.

There is a clear vision for protecting the perineum during vaginal birth, which helps to reduce perineal pain at the postpartum. The change from using lithotomy to
lateral birthing position is necessary as it will result in a satisfactory rate of intact perineum. Comparing with the use of traditional birthing position, there is good evidence from the reviewed studies which showed that lateral birthing position would increase the rate of intact perineum, decrease the rate of episiotomy and perineal tear. Based on the reviewed studies showing that benefits from lateral birthing position outweighs the traditional lithotomy birthing position, and it saves around ten thousand Hong Kong dollars per year, it is expected that the administrators and medical staffs would be interested in the new innovation.

After the approval of the new innovation, the change will be guided by the advanced practice nurses in the pilot phase. 2 advanced practiced nurses will be sent for a day training lesson for the management of lateral birthing position. They are role models who will be responsible for training the frontline nurses in a month, and dealing with problems. Posters will be hoisted at the labor ward and antenatal ward to remind the staffs and the women of using lateral birthing position. Clear instructions with graphics showing the correct turning and handling of lateral delivery will be included. An introductory lesson about the new innovation will be held by the communication team.

During the sustained stage, the communication team will monitor the progress and the compliance of the innovation. A pilot test will be done to ensure the feasibility
of using the lateral birthing position. Audit forms are used to check the compliance and the correct use of the new methods. Patient outcomes will be measure in terms of the grade of perineal trauma. Frontline nurses and patients will be invited to share the stories about the success and satisfaction about the innovation. Revision of guideline will be made according to the feedbacks from all staffs after the pilot test.

4.2 PILOT TESTING

A pilot study is a small-scale run designed to test the methods to be used in a parent study (Polit & Beck, 2008). The objective of the pilot study plan is to try out the feasibility of implementing the intervention in the local setting and to prevent undertaking of a costly but flawed large scale study. The pilot test of the innovation include train the trainers, implementation of the new methods and review of guideline. The outcome of the pilot test generates strong evidence for the need of changing in nursing practice. It is estimated that it takes a total of 4 months to be completed.

4.2.1 Train the trainers

It will take approximately 3 months for the approval of the new innovation. At the fourth month, the midwives have to attend training sessions for learning the management of lateral birthing position at delivery. Attachment training program will be arranged for 2 advanced practice nurses, they will be going to the other hospital to learn the proper skills for managing lateral birthing position for a day. They will be
responsible to train the other staff for the respective management at the local hospital. There are around 100 midwives need to be trained. Each class will include 20 people, a total of 5 training sessions will be provided. Each staff will go for one training session which will last for 2 hours. Return-demonstration of conducting the delivery will perform during the lesson to ensure the proper and safety use of skills. It is estimated that the training will be completed in a month.

4.2.2 Recruitment of subjects

Implementation will begin at the fifth and the sixth month after the completion of staff training. The recruitment of subjects will be based on the clinical guideline. The target audience includes women with maternal age 18 or above, gestation between 37 to 42 weeks, uncomplicated pregnancy, singleton, and vaginal delivery with cephalic presentation in the second stage of labor. The recruitment of subjects will be done at the time when the woman is admitted to the antenatal ward until the target number of 100 subjects for the pilot test is reached. Each recruited woman will be screened by the advanced practice nurses to ensure the study eligibility before she goes into labor.

4.2.3 Data collection

After delivery, the midwife will check the integrity of the perineum. The degree of perineal tear and any use of episiotomy will be recorded. The women’s characteristics include their maternal age, gestational age, parity, body mass index
will be collected for evaluation. Furthermore, any complications arise during the use of lateral birthing position will be noted. At the postnatal ward, nurses will ask the women about the perineal pain level after delivery, the satisfaction and comments of the new innovation. Questionnaires are ready for the frontline nurses and obstetricians to provide feedbacks and satisfaction level at the end of the sixth month. (Appendix VIII & IX)

4.2.4 Evaluation

Evaluation of the pilot test will begin at the seventh month. Meetings will be held at a biweekly basis among the communication team to report the progress of the new innovation during the pilot phase. At the end of the trial period, all the questionnaires and data collection forms will be collected. The team will discuss and evaluate all the data collected and feedbacks from the ward managers, all the frontline staffs and the women. Results are compared and amended guideline will be made according to the recommendations. Guideline will be reviewed by the communication team before the commencing the evaluation plan.

4.3 EVALUATION PLAN

Evaluation of innovation is an essential to examine the progress and barriers of the innovation. Implementation phase will begin at the eighth month after the pilot testing. All data will be collected and summarized at the beginning of the fourteenth
month. Guideline will be refined and finalized based the outcomes evaluation at the end.

4.3.1 Identifying outcomes

As the aim of the new innovation is to preserve the perineum, the primary outcome is the status of the perineum, whether it keeps intact or tears. The effectiveness of using lateral birthing position can be determined by measuring the proportion of women with intact perineum which includes no laceration or first degree tear not requiring repair after vaginal birth. If tears occurred, it is measured by the degree of perineal tear which ranges from the first to fourth degree. It is classified according to Royal College of Obstetricians and Gynecologists’ guideline which is related to the anatomical structures of the perineum. Inspection of the perineum will be done by the midwife and the result is recorded. The higher the grading represents greater severity of perineal tear.

The secondary outcomes will be measured as followed. Normally, restrictive use of episiotomy will be applied during the new innovation. It is being used as necessary. At the delivery suite, any use of episiotomy and require of perineal wound suturing will be recorded. It is expected that the new innovation is effective in decreasing the rate of using episiotomy and perineal wound suturing. The mode of delivery is noted as it is important to determine any reduced use of instrumental delivery. At the post
natal ward, the perineal pain level will be accessed by numeric pain rating scale. The measure of perineal pain level is a direct measure of the quality of life immediately after giving birth, which may further affect baby care.

Regarding to the healthcare provider outcome, a questionnaire which is answered in a 5 point Likert scale, ranging from 5 (strongly agree) to 1 (strongly disagree) will be completed by the midwives. This is a measure of the satisfaction and competency in performing the new skills. The higher the score reflects more support is gained from the staffs with higher competency.

Cost is the measure of the system outcomes. The set up cost includes the staff cost and the material cost. The total cost used will be calculated by the secretary at the end of each year. The cost of adopting lateral birthing position is expected to far more lower than the cost of using traditional birthing position.

4.3.2 Nature and numbers of the clients involved

Convenience sampling will be used for recruiting the target samples at the eighth month right after the pilot test. The target audience includes women with maternal age 18 or above, gestation between 37 to 42 weeks, uncomplicated pregnancy, singleton, and vaginal delivery with cephalic presentation in the second stage of labor based on the evidence based guideline.

To determine the number of the women to be involved in the implementation
phase based on the identified evaluation studies, a 95% confidence interval for one proportion will be used. With an anticipated rate of 0.2 and margin of error = 0.05, 246 eligible women will be required for the study.

4.3.3 Timing and frequency of taking the measurements

There are different timings in collecting the outcomes. Firstly, the status of perineum, the use of episiotomy, the mode of delivery, and the need of suturing will be noted by the attending midwife immediately after the birth. Secondly, the nurse will ask the woman about the perineal pain level and the satisfactory rate about using the lateral birthing position on day 1 after giving birth at the post natal ward. At the beginning of the fourteenth month (the last month of the implementation phase), all the midwives have to complete the evaluation form about the satisfaction, confidence, and any complications, in handling the lateral birthing position. Informal monthly meeting will be held by the innovation team monthly to review the progress and comments of adopting the new guideline and make recommended changes accordingly. For the system outcomes, the cost of implementing the innovation and resources allocation will be summed up monthly. The total cost of the new program will be evaluated at the end of the innovation period.

4.3.4 Data analysis

All the data collected will be analyzed by using SPSS. Demographic and
quantitative data will be summarized and presented as descriptive statistics. A 95% confidence interval for one proportion will be used to determine the incidence rate of intact perineum, use of episiotomy and instrumental birth, suturing of perineal trauma for women after vaginal delivery with implementation of the new guideline. The expected rate of intact perineum should be increased by 10%. At the same time, there should be a decreased rate of the use of episiotomy by 20%, instrumental delivery by 20%, suturing perineum trauma by 10%. These will be assessed by a z-test. One sample t-test will also be used to test whether the perineal pain score of women can become below 3 at the post delivery. The level of significance of these different the tests was set at 0.05.

A coding structure will be developed to address the barriers of implementing the innovation. Satisfaction and adherence to the innovation of the staffs will be calculated as percentages.

To calculate the total cost of the new innovation, all expenditure used of innovated program will be recorded and enter into a computer by a clerical staff weekly. Evaluation of the cost effectiveness will be done at the end of innovated program.

4.3.5 Basis of adopting the new innovation
The new innovation should prove to be effective before it is being applied in the clinical setting. All outcomes that can meet the stated objectives are essential to determine the effectiveness of the new program.

As one of the objectives of the new innovation is to decrease the rate and severity of perineal trauma, it is considered as effective if the rate of intact perineum could be increased by more than 10%. At the same time, the rate of using episiotomy and instrumental delivery could be decreased by 20%, and the rate of suturing perineum trauma could be decreased by 10%. At the post natal ward, the perineal pain level of the woman after delivery reflects the postpartum morbidity. The new program will consider as effective if more than 80% of the women with perineal pain score below 2. Hence, the women will be more able to perform baby care. Overall, an intact perineum and minimal perineal pain after vaginal birth are considered as positive childbirth experience by providing comfort to the woman during and post-delivery.

For the healthcare providers’ outcome, it is expected more than 85% of staffs will return the completed questionnaire and over 50% frontline staffs will report their satisfaction and competency towards the use of the new guideline. The acceptance of the new innovation will be high if the frontline staffs feeling satisfied about the new issues. For the system outcome, the cost saved by using lateral birthing position should be around HKD$97000 per year comparing to the cost of using the traditional
birthing position. Hence, the new innovation is cost effective to proceed.

    All the results will be reviewed and discussed by the communication team. They will make the final decision of whether or not the innovation is implemented in the long run.
Appendix I – Birth positions at the second stage of labor

FIGURE 1.Operational definitions of maternal positions used in the study. (a) Lithotomy: weight on back with knees bent or up on chest, back elevated less than or equal to 30 degrees with or without stirrups. (b) Dorsal recumbent: weight on back with knees bent, back elevated less than or equal to 30 degrees with or without footrests. (c) Sitting upright: weight on buttocks, back elevated greater than 30 degrees. Includes sitting on a commode. (d) Squatting: weight on feet with knees bent, with or without support. (e) Sidelying: weight on either side with thighs flexed. (f) All-fours: weight on knees supported by hands or elbows. (g) Kneeling: weight on knees with legs flexed. (h) Standing: weight on feet, with or without support. Data from Roberts and Van Lier (16).
## Appendix II – Table of evidence

<table>
<thead>
<tr>
<th>First author, year (Study type, evidence level)</th>
<th>Patient characteristics</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Length of follow up</th>
<th>Outcome measures</th>
<th>Effect size (intervention vs comparison)</th>
</tr>
</thead>
</table>
| Walker et al., 2012 (RCT +) | -Women in a public hospital in Madrid, Spain.  
- mean maternal age = 30.45 years (range: 25-36)  
- mean BMI = 27.6 kg/m^2 (range:23.8-32.6)  
- mean gestational weight gain = 11.95 (range: 7.9-16.1)  
- mean gestational age = 39.25 weeks (range: 37.7-40.6)  
- 241 spontaneous labor & 45 induced labor  
- 114 nulliparous & 82 multiparous  
- effective epidural analgesia | Postural changes and lateral position (n=103) | Early pushing and lithotomy position (n=96) | Not mention | Primary outcomes:  
1. Rate of AVD  
2. Intact perineum  
3. Episiotomy rate | 1. 19.8% vs 42.1% (p<0.001)  
2. 40.3% vs 12.27% (p<0.001)  
3. 21.0% vs 51.4% (p<0.001) |  
Secondary outcomes:  
4. Length of the 2nd stage (minutes) | 4. 85.52±52.1 vs 52.06±36.2 (p<0.001) |
| Down et al., 2004 (RCT +) | -nulliparity  
-maternity unit in the Midlands  
- mean maternal age = 26.4 years (range: 21.5- 30.8)  
- mean height = 163.45cm (range: 156.7-169.9)  
- mean booking body weight= 67.85kg | Lateral position (n=49) | Supported sitting position (n=58) | 1 year | 1. Rate of instrumental birth  
2. Use of episiotomy  
3. Rate of suturing for all perineal trauma | 1. 32.7% vs 51.7%  
RR = 0.64, (95%CI 0.40-1.01)  
2. -44.9% vs 63.8%  
RR = 0.66, (95%CI 0.44-1.00)  
3. 78% vs 86%  
RR = (0.75, 95%CI 0.47-1.17) |
(range: 55.1-85.6)
- last recorded weight prior to labor = 80.65kg (range: 66.8-98.3)
- gestation at onset of labor = 40.2 weeks (range: 38.9-41.5)
- under epidural analgesia

<table>
<thead>
<tr>
<th>Brément et al., 2007 (RCT +)</th>
<th>Giving birth in lateral recumbency (n=225)</th>
<th>Giving birth in supine position (n=262)</th>
<th>8 months</th>
<th>Primary outcome:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Women in maternity hospital in France.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- age &gt;= 18 years old (no mean provided)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &gt;= 36 weeks of gestation (no mean provided)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 162 nulliparous &amp; 325 multiparous</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Giving birth in lateral recumbency (n=225)</td>
<td>Giving birth in supine position (n=262)</td>
<td>8 months</td>
<td>Primary outcome:</td>
<td></td>
</tr>
<tr>
<td>1. Intact perineum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. 1st degree tear</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 2nd degree tear</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. 3rd degree tear</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary outcomes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. mean blood loss (ml)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The rate of postpartum hemorrhage (ml)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 1. 56.9% vs 48.1% (p=0.032) |
| 2. 23.1% vs 23.6% |
| 3. 13.3% vs 14.9% |
| 4. 0.9% vs 1.1% |
| 5. 374 ml vs 263 ml (p<0.001) |
| 6. 20% vs 10.2% (p<0.001) |
### SECTION 1: INTERNAL VALIDITY

<table>
<thead>
<tr>
<th>In a well conducted RCT study…</th>
<th>Does this study do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation.</td>
<td>No</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way.</td>
<td>Yes</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each treatment arm of the study dropped out before the study was completed?</td>
<td>1.51%</td>
</tr>
<tr>
<td>1.9 All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis).</td>
<td>Yes</td>
</tr>
<tr>
<td>1.10 Where the study is carried out at more than one site, results are comparable for all sites.</td>
<td>Does not apply</td>
</tr>
</tbody>
</table>
### SECTION 2: OVERALL ASSESSMENT OF THE STUDY

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Acceptable (+)</th>
<th>Acceptable (+)</th>
<th>Acceptable (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>How well was the study done to minimise bias?</td>
<td>Acceptable (+)</td>
<td>Acceptable (+)</td>
<td>Acceptable (+)</td>
</tr>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes.</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Appendix IV - Search strategy

<table>
<thead>
<tr>
<th>Pubmed</th>
<th>CINAHL</th>
<th>Ovid</th>
</tr>
</thead>
<tbody>
<tr>
<td>108 articles</td>
<td>90 articles</td>
<td>78 articles</td>
</tr>
</tbody>
</table>

Keyword search:
1. Lateral position OR side lying position OR birth position AND
2. Perineal trauma OR perineal outcome OR episiotomy

<table>
<thead>
<tr>
<th>Pubmed</th>
<th>CINAHL</th>
<th>Ovid</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 articles</td>
<td>8 articles</td>
<td>8 articles</td>
</tr>
</tbody>
</table>

After screening the title and abstract

<table>
<thead>
<tr>
<th>Pubmed</th>
<th>CINAHL</th>
<th>Ovid</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 articles</td>
<td>3 articles</td>
<td>2 articles</td>
</tr>
</tbody>
</table>

3 articles
(2 English, 1 french, duplicated articles are eliminated)
Appendix V - Cost of the innovation

(I) Staff cost

<table>
<thead>
<tr>
<th>Salary (HKD) per month</th>
<th>Advanced practiced nurse</th>
<th>Registered nurse</th>
</tr>
</thead>
<tbody>
<tr>
<td>51825</td>
<td>31</td>
<td>21</td>
</tr>
<tr>
<td>32760</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Salary (HKD) per hour</td>
<td>Training</td>
<td>Suturing</td>
</tr>
<tr>
<td>295.5</td>
<td>Training</td>
<td>Suturing</td>
</tr>
<tr>
<td>Working hours</td>
<td>8 hours</td>
<td>20 minutes</td>
</tr>
<tr>
<td>Total salary (HKD)</td>
<td>2364</td>
<td>62</td>
</tr>
</tbody>
</table>

- Quoted from the medium salary point of nursing salary in Hospital Authority Accounting Circular No. 2013-14.
- HGPS – Hospital Authority General Pay Scale
- Total working hours of a nurse per month is 176 hours
- Total salary: (salary per hour) x (number of working hours)

(II) Material cost for suturing

<table>
<thead>
<tr>
<th>Items</th>
<th>Amount</th>
<th>Cost (HKD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suturing set for episiotomy (autoclavable, reused)</td>
<td>1</td>
<td>hidden</td>
</tr>
<tr>
<td>Sterile item added for suturing:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Stitches (2-0 vicryl, 750mm length, J-shaped)</td>
<td>1</td>
<td>36.7/ pack</td>
</tr>
<tr>
<td>- Gauze (23mmx280mm, with tail)</td>
<td>2</td>
<td>4.0/ piece</td>
</tr>
<tr>
<td>Personal Protective Equipment (PPE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Gown</td>
<td>1</td>
<td>3.5/ piece</td>
</tr>
<tr>
<td>- Cap</td>
<td>1</td>
<td>0.3/ piece</td>
</tr>
<tr>
<td>- Surgical mask with eye shield</td>
<td>1</td>
<td>5.3/ piece</td>
</tr>
<tr>
<td>- Surgical gloves (latex, sterile)</td>
<td>1</td>
<td>2.4/ pair</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>52.2</strong></td>
</tr>
</tbody>
</table>

- The cost is extracted from purchasing and supply unit in Hospital Authority in 2013
(III) The total cost of suturing the perineal wound

<table>
<thead>
<tr>
<th>Items</th>
<th>Cost (HKD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary of nurse of suturing</td>
<td>62</td>
</tr>
<tr>
<td>Material cost of suturing</td>
<td>52.2</td>
</tr>
<tr>
<td><strong>Total cost</strong></td>
<td><strong>114.2</strong></td>
</tr>
</tbody>
</table>

(IV) The set up cost for the new innovation

<table>
<thead>
<tr>
<th>Items</th>
<th>Cost (HKD)</th>
<th>Quantity</th>
<th>Total cost (HKD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training of the senior nurse</td>
<td>2364 / person</td>
<td>2</td>
<td>4728</td>
</tr>
<tr>
<td>Printing cost of pamphlets</td>
<td>0.2 / item</td>
<td>4500</td>
<td>900</td>
</tr>
<tr>
<td><strong>Total set up cost</strong></td>
<td></td>
<td></td>
<td><strong>5628</strong></td>
</tr>
</tbody>
</table>

(V) Cost saved for the innovation per year

<table>
<thead>
<tr>
<th>Estimated total number of birth in the current hospital per year</th>
<th>Number of woman</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4800</td>
</tr>
<tr>
<td>Estimated total number of women required suturing of perineal trauma is 90%</td>
<td>4320</td>
</tr>
<tr>
<td>Estimated total number of women required suturing of perineal trauma if further reduced by 20%</td>
<td>3456</td>
</tr>
</tbody>
</table>

- Estimated total number of women required suturing of perineal trauma is 90% = \( 4800 \times 0.9 = 4320 \)
- If the new innovation could further reduce the chance of suturing by 20%, the total number of women require suturing of perineal trauma per year will be: \( 4320 \times (1-0.2) = 3456 \)
<table>
<thead>
<tr>
<th>Items</th>
<th>Cost (HKD$)</th>
<th>Quantity</th>
<th>Cost (HKD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cost of suturing of perineal wound before the innovation</td>
<td>114.2</td>
<td>4320</td>
<td>493344.0</td>
</tr>
<tr>
<td>The cost of suturing of perineal wound after the innovation</td>
<td>114.2</td>
<td>3456</td>
<td>394675.2</td>
</tr>
<tr>
<td>Printing cost of pamphlets</td>
<td>0.2</td>
<td>4500</td>
<td>900</td>
</tr>
<tr>
<td><strong>Total cost saved per year</strong></td>
<td></td>
<td></td>
<td><strong>97768.8</strong></td>
</tr>
</tbody>
</table>

- The estimated cost saved by the new innovation:
  (the cost of suturing of perineal wound before the innovation) – (the cost of suturing of perineal wound after the innovation) – (printing cost of pamphlets)
Appendix VI -

The evidence-based guideline of lateral birthing position at the second stage of labor

Background

Vaginal delivery usually causes damage to the pelvic floor, its muscles and ligaments. While it is true that perineal trauma is a common complication resulting from childbirth, studies have found that the degree of perineal trauma relates to different birth positions (Gupta, Hofmeyr, & Shehmar, 2012; Shorten & Donsante, 2002). There has been empirical evidence showing that the traditional birthing position resulted in a higher rate of perineum trauma (Walker et al., 2012; Downe et al., 2004; Brémenta et al., 2007). In order to maintain the functional integrity of the pelvic floor and improve the postpartum health, there is a need to determine a better way to minimize the degree of genital tract lacerations with vaginal delivery. Lateral birthing position is recommended to use during the second stage of labor. There has been adequate evidence showing that the rate of intact perineum will be increased. In addition, the need of episiotomy, assisted birth, and perineal trauma required suturing will be decreased. (Walker et al., 2012; Downe et al., 2004; Brémenta et al., 2007).

The guideline is developed based on substantial evidence from the literature. The level of evidence of the reviewed studies and the grades of recommendations are based on Scottish Intercollegiate Guidelines Network (SIGN, 2011). The protocol is
designed for midwives to conduct delivery using lateral birthing position at the second stage of labor.

**Objectives**

1. To establish an evidence-based guideline in using lateral birthing position

2. To provide skills and management of conducting delivery in lateral birthing position.

**Target population**

The target audience includes laboring women with maternal age 18 or above, gestation between 37 to 42 weeks, uncomplicated pregnancy, singleton, and vaginal delivery at cephalic presentation in second stage of labor

**Target setting**

The guideline is carried out at the obstetric department of a public hospital

**Evidence-based recommendations**

*Recommendation I:*

*Lateral birthing position should be used at the active pushing phase at the second stage of labor. (Grade of recommendation: A)*

- Lateral birthing position is used at the second stage of labor for normal vaginal delivery (Walker et al., 2012; Downe et al., 2004; Brémenta et al., 2007) (1+, 1+, 1+). For woman undergoing epidural analgesia (Walker et al., 2012, Downe et al.,
2004) (1+, 1+), woman is advised to use different positions such as kneeling, sitting, or all-four in every 20 to 30 minutes so to delay the onset of pushing during the passive phase. This allows maximum rotation and descent of the fetus before active maternal pushing (Downe et al., 2004) (1+). The woman is instructed to turn to modified lateral Gasquet position during the active pushing phase (Walker et al., 2012) (1+).

Recommendation II:

The women should be placed at the horizontal position, then turn aside with the upper leg is being flexed during delivery. (Grade of recommendation: A)

- The upper body is placed in a neutral position without flexion, extension, or rotation of the trunk. The lower leg is remained extended, while the upper leg is flexed on the stirrup placing the foot in a higher position than the knee (Walker et al, 2012) (1+).

Recommendation III:

During labor, the woman is allowed to rest when there is no uterine contraction. (Grade of recommendation: A)

- The woman is asked to relax in the lateral position between pushes (Walker et al., 2012) (1+), that is, they could change to other position when not pushing, and return to the lateral position when they have gained the sensation of uterine
Recommendation IV:

The choice of the lying side should be based on the back of the fetus. If it cannot be determined, it should depend on the maternal comfort or fetal well-being. (Grade of recommendation: A)

- The option of women choosing the lying side will be based from the back of the fetus. This allows smooth rotation of shoulders. A number of babies were born with hands accompany with shoulders because of choosing the wrong side. (Brémenta et al., 2007) (1+). When it cannot be ascertained, the choice of left or right lateral position will be determined by maternal comfort or by fetal well-being (Walker et al., 2012) (1+)

Recommendation V:

The time to terminate lateral birthing position when there is any maternal or fetal complications, or should be upon maternal request. (Grade of recommendation: A)

- Woman is allowed to change to traditional birth positions when there is poor labor progress or fetal distress, or upon maternal request, (Walker et al., 2012) (1+). This facilitates the relief of fetal distress, to allow maternal pushing and descent of fetal head (Downe et al., 2004) (1+).
The birth attendant should be stand facing the woman during delivery. (Grade of recommendation: A)

- The position of the birth attendant is stand on the ventral side of the woman for better communication and observation of the woman. (Brémenta et al., 2007) (1+)
### Appendix VII - Gantt chart of the implementation plan

<table>
<thead>
<tr>
<th>Progress</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating the plan of new innovation</td>
<td>1</td>
</tr>
<tr>
<td>Discussion with APNs, WM, review of the new guideline</td>
<td>X</td>
</tr>
<tr>
<td>Waiting for the approval from DOM</td>
<td>X X X</td>
</tr>
<tr>
<td>Waiting for the approval from Ethics Approval Board</td>
<td>X X X</td>
</tr>
<tr>
<td>Pilot testing: training the trainers</td>
<td>X X</td>
</tr>
<tr>
<td>Pilot testing: implementation</td>
<td>X</td>
</tr>
<tr>
<td>Pilot testing: evaluation of the pilot and review of guideline</td>
<td>X</td>
</tr>
<tr>
<td>Implementation of the protocol</td>
<td>X X X</td>
</tr>
<tr>
<td>Evaluation of patients outcomes, review of protocol</td>
<td>X</td>
</tr>
</tbody>
</table>
Appendix VIII -

Data collection after using lateral birthing position for vaginal delivery

(to be completed by midwife)

**Demographic data**

Maternal age: _____ Gravida: _____ Parity: _____ Maturity: _____

Body weight: _____ Body height: _____

<table>
<thead>
<tr>
<th><strong>Labour</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous onset:</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Induction of labour:</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Perineal tear:</td>
<td>Intact / 1°/ 2°/ 3a° / 3b°/ 4°</td>
</tr>
<tr>
<td>Episiotomy:</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Skin suture:</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Mode of delivery:</td>
<td>Spontaneous vaginal delivery / Instrumental birth</td>
</tr>
<tr>
<td>Delivered by:</td>
<td>Midwife / obstetrician</td>
</tr>
<tr>
<td>Complications:</td>
<td></td>
</tr>
<tr>
<td>Remarks &amp; comments by midwife in charge:</td>
<td></td>
</tr>
<tr>
<td><strong>Postnatal</strong></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Perineal pain score:</td>
<td></td>
</tr>
<tr>
<td>Satisfactory score:</td>
<td></td>
</tr>
<tr>
<td>Use lateral position for the next delivery</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Comments by client:</td>
<td></td>
</tr>
</tbody>
</table>
Appendix IX - Evaluation for lateral birthing position (to be completed by midwives and obstetricians)

Please complete the following, and circle the appropriate answer as indicated.

<table>
<thead>
<tr>
<th>Questions:</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Using lateral birthing position is good for protecting the perineum</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. Using lateral birthing position can reduce the use of episiotomy</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. It is easy to handle lateral birthing position</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. Lateral birthing position will not create workload</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. No complications arise during the use of lateral birthing position</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6. I can follow all the steps and procedures in handling lateral birthing position</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7. I am competent in handling lateral birthing position</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8. I am satisfied with the new innovation</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Please write down any comments /problems /suggestions for improvement:
References


of Nurse-Midwifery, 43(5), 320-325.


