Abstract of thesis entitled

Use of Occlusive Wrap to Prevent Hypothermia in Premature Infants Immediately After Birth

Submitted by

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Hypothermia at birth is strongly associated with mortality and morbidity in preterm infants. Unfortunately, infants are prone to hypothermia immediately after birth. A large proportion of preterm infants, especially those of gestational age at less than 30 weeks, experience different levels of hypothermia. A frequently used possible preventive measure is the application of an occlusive wrap immediately after birth. However, no systematic review on this preventive measure supports its translation into practice. This dissertation aimed to evaluate the current evidence on the application of occlusive warp for preterm infants.

Four electronic databases, Cochrane Library, PubMed, CINAHL, and Medline, were searched. Eight studies met the inclusion criteria of this dissertation. Data were extracted and the quality of the included studies was evaluated by the Scottish Intercollegiate Guidelines Network (SIGN). Six studies were graded as high quality studies and showed that occlusive wrapping significantly prevented the incidence of hypothermia among the preterm infants smaller than 30 weeks.
An evidence-based Superwarm guideline was developed, which was deemed to be transferable to the local setting of neonatal intensive care unit with similar target clients and philosophy of care as with those in the identified studies. Also, the proposed innovation was considered to be feasible after examination of staff competency, resources, and approval methods. The potential benefits to preterm infants, nurses, and also the hospital were high, and risks to the patient were minimal. The estimated set-up cost including manpower and consumable cost was $1,720, and the running cost was also $1,720 per year.

A 12-month implementation program scheduled including communication with stakeholders, training to the frontline nurses, and a pilot of the guideline. Patient outcomes will be measured by admission temperature, temperature one hour after admission, and mortality rate. Healthcare provider outcomes include compliance rate, workload, acceptance of the proposed guideline, job satisfaction, knowledge, and skill enhancement in thermoregulation of the preterm infants. The quality of patient care was also considered in the system outcomes. Guideline effectiveness will be evaluated by the increase in admission temperature, nurse and physician satisfaction, and controlled program expenditure.
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Submitted by

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A dissertation in partial fulfillment of the requirements for

the Degree of Master of Nursing

at the University of Hong Kong.

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Declarations

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

Yau Ching Man

August 2013
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Chapter 1

Introduction

1.1 Background

The body temperature of premature babies can drop precipitously after delivery. Preventing low temperature at birth in premature infants with low birth weight is important in their survival and long term outcome (Watkinson, 2006; Rohana, et al., 2011).

Premature infants are defined as smaller than 37 gestational weeks at birth. Premature infants are delivered in the delivery unit, or in the operation room if caesarean section is needed, and stay in the neonatal intensive care unit (NICU) for further care.

Most premature infants need ventilation or nutritional support after birth. When babies less than 30 weeks of gestation are going to be delivered, staff in the delivery suite or operation room inform the NICU team doctors and nurses, and the NICU team stand by in the delivery unit to provide immediate stabilization or resuscitation.

After preterm babies are delivered, they are dried and wrapped in a pre-warmed towel and cared for in a Resuscitaire under radiant heaters according to the Neonatal Resuscitation Program (NRP) guideline. Stabilized babies are transferred
to NICU with a pre-warmed blanket. However, no radiant heater is provided during their transportation because of the lack of back-up power.

When babies arrive at the NICU, their axillary temperature is taken. Preterm infants may experience different levels of hypothermia immediately after their birth. According to the World Health Organization (WHO), hypothermia occurs when the newborn’s temperature drops below 36.5 °C. A temperature that falls between 36.0 °C to 36.4 °C is qualified as mild hypothermia (cold stress), that between 32.0 °C to 36.0 °C is moderate hypothermia, and that less than 32 °C is severe hypothermia.

Cold stress is more likely to occur during the birth process and during stabilization in the delivery room because infants are delivered from a warm intrauterine environment to a cold delivery room environment. Premature infants are at a high risk of developing hypothermia because of their large surface area to body weight ratio. Knobel et al. (2005) identified that transepidermal water loss was 15 times higher in infants born at 25 weeks of gestation than in full-term infants.

1.2 Affirming the Needs

Laptook et al. and the Neonatal Research Network (2007) conducted a large study among multi-centers in the American Neonatal Research Network for the distribution of admission temperature for extremely premature babies, and found
that 14.3%, 32.6%, and 42.3% had an admission temperature of <35°C, 35 to 35.9°C and 36 to 36.9°C respectively. They also found that the admission temperature was inversely related to mortality rate and late-onset sepsis; in every 1 °C decrease in admission temperature, a 28% and 11% increase in mortality rate and late-onset sepsis is observed, respectively.

In the clinical setting of the author, a NICU of a public sector that provides 10% of NICU bed in Hong Kong, the majority of the patients are premature infants. Over 100 premature infants are delivered in this hospital every year and the incident of hypothermia among premature infants is high. In a clinical study in 2008 and 2009 of the admission temperature among premature infants smaller or equal to 30 weeks, 70% to 90% experienced hypothermia, which was defined as having a temperature lower than 36.5 °C.

The current thermal care guideline is based on NRP, which suggest to dry infants by placing them under a radiant warmer with dry, warmed towels. Despite adherence to this guideline, the incidence of hypothermia among premature infants remains high. Rohana et al. (2011) explained that evaporation of amniotic fluid from the infant’s skin surface is the main mechanism of heat loss during the immediate postnatal period. Obviously, the conventional approach for heat loss prevention is not enough for premature infants. Some NICU nurses have learned
from overseas training to use the wrapping method for premature infants on top of the current guidelines to alleviate the current high incidence of hypothermia. Practices observed by nurses are not consistent in the unit, and different methods are adopted. Infants attended to with the new thermal care methods seem to have a lower incidence of hypothermia, although no formal evaluation study has been carried out.

Adjunct measures have been suggested to prevent or minimize heat loss in the delivery room. Some hospitals in America started to use adjunct measures in premature infants in the immediate neonatal period or right after delivery. One of the most common methods involves wrapping an infant’s wet body from the shoulder downward with an occlusive sheet or bag. The newborn’s head is wiped dry and covered with a cap. Apart from premature infants, such a wrapping method is used in trauma patients before their arrival to the hospital to prevent hypothermia. Thomassen et al. (2011) found that the use of an insulating layer such as a plastic bag is the most efficient wrapping method to prevent heat loss in hypothermic adult patients and suggested that this method be used in the Emergency department.

Three main approaches to reduce hypothermia in infants have been studied in recent years: occlusive wrapping, placing of heated mattresses, and skin-to-skin care. Heated mattresses are not well supported because of some concern that the
temperature of the mattress may be too high, inducing risk of skin burn in such fragile premature infants. Studies mostly focus on occlusive wrapping and skin-to-skin care. Skin-to-skin contact is only applicable to infants who can breathe spontaneously after birth and who do not need urgent intervention. For premature infants with less than or equal to 30 weeks of gestation, most do not fulfill the criteria of skin-to-skin care.

Occlusive wrapping is applicable to most preterm infants and does not interrupt neonatal resuscitation and vital sign monitoring. In the present study, we focus on the role of occlusive wrapping and capping on preventing heat loss in premature infants. An evidence-based guideline for minimizing hypothermia needs to be adopted, as well as a standardized thermal care practice for premature infants immediately after birth. Because NICU nurses can participate in stabilizing premature infants who have been in the delivery unit for less than 30 weeks, the target group of this guideline consisted of premature infants with less than 30 weeks of gestation. Premature infants with more than or equal to 30 weeks of gestation were excluded

1.3 Objectives & Significance

Numerous reports have shown that hypothermia is associated with increased
mortality and morbidities, such that keeping preterm infants warm immediately after birth is critical. Adjunct measures involving the application of occlusive wrap and cap immediately after birth along with the use of a conventional radiant warmer are suggested to effectively reduce heat loss in premature infants. The translation of the most effective method reported in literature into practice lowers the incidence of hypothermia premature NICU infants with less than 30 weeks of gestation and also standardizes the method employed for patient care.

However, no systematic review has been done on the use of occlusive wrap and cap on preterm infants. To translate the most effective method found in literature for reducing the incidence of hypothermia into local thermal regulation practice, the objectives of this dissertation were:

1. To assess current evidence on the effectiveness of occlusive wrap and cap in reducing the risk of hypothermia in preterm infants;
2. To synthesize and critique the current research evidence;
3. To design an evidence-based guideline for reducing hypothermia in preterm infants;
4. To assess the transferability and feasibility of implementing the guideline in a local public hospital in Hong Kong;
5. To devise an implementation plan for assessing the use of the guideline in
the local setting.
2. 1 Search & Appraisal Strategies

2.1.1 Identification of Studies

A PICO framework was adopted to generate the clinical question before conducting a database search. Patient (P) was identified as premature infants; intervention (I) and comparison (C) were identified as occlusive wrapping, and outcome (O) was identified as thermoregulation, heat loss prevention, and hypothermia reduction.

From 01 August 2012 to 20 August 2012, a systematic literature search was performed on four electronic databases: Cochrane Library, PubMed, CINAHL, and Medline. The period of publications search in Medline was from 1946 to week 1 of August 2012, and from year 1970 to 2012 in the other databases. Identical keywords and search strategies were used among these four databases to ensure consistency. Keywords ‘premature infants’ and ‘preterm infants” search for patient; ‘plastic barrier’, ‘occlusive wrap’, ‘plastic wrap’, and ‘polyethylene’ search for intervention; ‘thermoregulation’, ‘prevent heat loss’, and ‘hypothermia’ search for outcomes.

At the preliminary stage of citation obtained from the databases, the titles and abstracts were screened. Studies with titles and abstracts that meet the selection
criteria were identified, and their full texts were retrieved to confirm their eligibility.

No language restriction was applied in the search, but studies other than English and Chinese were not appraised. Details of the search strategies are listed in Appendix 1.

2.1.2 Selection Criteria

Studies that meet all of the following criteria were included:

1. Patients: Premature infants
2. Interventions: Provide occlusive wrapping / cap immediately after birth
3. Studies: Randomized controlled trials (RCTs) or controlled trials
4. Outcome: Admission temperature

Studies that meet any of the following criteria were excluded:

1. Patients: Animal studies, adult patient, term infants
2. Interventions: Exothermic mattress
3. Studies: Systemic review studies

2.1.3 Data Extraction

Extracted data included patient characteristics, intervention/s, comparison, time to remove the wrap or cap, outcome measures, and effect size. All of these data were analyzed and integrated into a table of evidence that is attached in Appendix 2.
2.1.4 Appraisal Strategy

To assess the quality of the studies conducted according to their designs and methodology, a checklist provided by Scottish Intercollegiate guidelines Network (SIGN, 2012) was used. An appraisal checklist was used for controlled trials and the checklist was divided into different sections for individual study assessment. Section 1 is the internal validity and Section 2 is the overall assessment of the study.

Section 1 was used to assess the internal validity of the study, including the clarity of the question, randomization procedure, concealment method, blinding allocation, similarity between groups, difference other than treatment, reliability of outcome, drop-out rate, intention to treat, analysis, and comparability of all sites. Section 2 was used to assess the overall study: bias minimization, methodology and statistical power, and applicability of the result. Then the level of evidence was given after assessing how much criteria can be fulfilled and the source. A ++, +, or – code was given according the SIGN 50 guide. Details of the quality assessment of the studies are illustrated in Appendices 3 and 4.

2.2 Results

2.2.1 Search Results

A total of 189 citations retrieved after a keyword search was conducted from
01 August 2012 to 20 August 2012, of which 34 were duplicated and 42 were potentially relevant; full texts of the relevant studies were retrieved. One of these was in French and was not appraised. The 42 studies were read in detail and further screened by the inclusion and exclusion criteria, and only eight studies were found to be eligible. Some studies did not meet the criteria because no trials were conducted or plastic wrapping was not employed immediately after birth. No other papers were included apart from those found within the four electronic databases.

### 2.2.2 Study Characteristics

**Study type**

Six of the studies (Vohra, et al., 2004; Trevisanuto et al., 2010; Vohra, et al., 1999; Rohana, et al., 2011; Cardona-Torres, et al., 2012; Knobel, et al., 2005) were randomized controlled trials and the other two (Lee et al., 2008; Ibrahim & Yoxall, 2009) were cohort studies.

**Country studied**

In the eight studies, two were conducted in Canada (Vohra et al., 1999; Vohra et al., 2004), two in United States (Knobel et al., 2005; Lee et al., 2008), one in Mexico (Cardona-Torres et al., 2012), one in Italy (Trevisanuto et al., 2009), one in United Kingdom (Ibrahim & Yoxall, 2009), and one in Malaysia (Rohana et al., 2010). All of the eight studies were single-centered.
**Level of evidence**

Four of six RCTs reached a level of evidence of 1+ (Vohra et al., 2004; Trevisanuto et al., 2010; Rohana et al., 2011; Vohra et al., 1999). Cardona-Torres et al. (2012) and Knobel et al. (2005) had a level of evidence of 1-. In the two cohort studies of Lee et al. (2007) and Ibrahim and Yoxall (2009) the level of evidence was 2+ and 2-, respectively.

**2.2.3 Methodological Quality**

The level of evidence allocated to these papers was determined by a series of assessment. The methodological assessment was based on a number of key questions that focused on aspects of the study design that research has shown to significantly influence the validity of the results reported and the conclusions drawn.

**Randomization**

Trevisanuto et al. (2010) and Vohra et al. (2004) assigned infants according to a computer-generated, randomized sequence balanced in blocks of six and four subjects, respectively. The randomized allocation was concealed in double-enclosed, opaque, sealed, and sequentially numbered envelopes. Rohana et al. (2011), Knobel et al. (2005), and Cardona-Torres et al. (2012) used randomization envelopes that were sealed, opaque, and sequentially numbered, whereas Vohra et al. (1999) used double-sealed envelopes instead of single envelopes. The
randomized sequence method specified and double-sealed envelopes performed better randomization.

**Blinding**

In the RCTs, the blinding of assessor was not feasible because the primary outcome was the admission temperature just after the removal of the occlusive wrap, and the removal of occlusive wrap and measurement of admission temperature were performed by the same nurse.

**Missing data**

In Ibrahim and Yoxall (2009), 44.6% and 11.3% infants did not have their admission temperatures measured within the first two hours after delivery in the infant groups before and after program, respectively. Lee et al. (2008) also had 2.9% infants whose admission temperature were not measured within one hour. Subjects whose admission temperatures were not measured within two hours were not included in the study as they may induce potential bias in the collected data. For the other studies, no missing data was recorded because all of the infants continued their treatment in the unit without withdrawal. The intervention risk was also low in these studies and no significant side effects were noted in the previous studies.

**Data collection**

Only Ibrahim and Yoxall (2008) specified that data were collected from three
computer systems, whereas data collection methods were not mentioned in the other studies.

*Sample size calculation*

The demographic characteristics reported in the studies were similar. Both reported the mean birth weight and gestational age. However, not all the studies reported the significant level of differences in data in the results. Three of eight studies (Rohana et al., 2011; Ibrahim & Yoxall, 2009; Lee et al., 2008) provided a p-value of demographic and birth variables. Rohana et al. (2011) and Lee et al. (2008) observed no significant difference in the data between the two groups. Ibrahim & Yoxall (2009) showed a significant difference in the 5 minutes Apgar scores and sex. The remaining five of eight studies (Vohra et al., 1999; Cardona-Torres et al., 2012; Knobel et al., 2005; Vohra et al., 2004; Trevisanuto et al., 2010) did not report the significant level of difference in demographic data.

Three studies performed a power analysis in their studies (Knobel et al., 2005; Rohana et al., 2011 and Vohra et al., 1999). Knobel et al. (2005), indicating that 100 infants would provide 95% power to detect a postulated 30% reduction of hypothermia incidence at 5% significance level. Only 88 infants were recruited out of the 100 infants because the other twelve infants were delivered prior to randomization. The temperature increase in the intervention group had an adjusted
p-value of < 0.0001, which was thought to be significant. Rohana et al. (2011) calculated that at least 41 infants were needed in each group to detect a 50% reduction of hypothermia with 90% power and at 5% significance level. A final number of 50 and 60 infants were recruited in intervention and control group respectively, and the mean baseline temperature was shown to be significantly higher in the intervention group (p-value <0.01). In Vohra et al. (1999), the cumulative power of the study was calculated, and the infants were recruited according to the power analysis. The higher mean rectal temperature in the wrapped group had a p-value of 0.005 that was accepted as significant.

The other four studies did not mention the sample size calculation but reached a significantly higher admission temperature or lower incidence of hypothermia in the intervention group (Lee et al., 2007; Trevisanuto et al., 2012; Cardona-Torres et al., 2012). Ibrahim and Yoxall (2008) had a lower incidence of hypothermia in the intervention group that was insignificant at a p-value of 0.098.

2.3 Summary and Synthesis

2.3.1 Summary of Data

*Patient characteristics*

Seven of the eight studies involved infants with a mean gestational age ranging
from 26 weeks to 30 weeks and a mean body weight ranging from 800 g to 1300 g. Only one study (Cardona-Torres et al., 2012) had patients with a mean age of 35 weeks and a mean body weight greater than 2000 g. All of the patients were cared for in the NICU except one study (Cardona-Torres et al., 2012), which did not mention the location. The sample sizes of the studies were comparatively small, ranging from 55 to 110 in RCTs and 304 to 334 in the cohort studies.

Interventions

The interventions varied among the studies and can be integrated into three types of methods: occlusive wrap, cap, or combined. All the studies placed infants under a radiant warmer as long as possible and only turned off the warmer during the transportation from the delivery suite to NICU. Five studies applied occlusive wrap only (Knobel et al., 2005; Vohra et al., 2004; Trevisanuto et al., 2009; Vohra et al., 1999; Cardona-Torres et al., 2012). All of these five studies placed the infants in polyethylene or polyurethane bag, drying only the head and not the body of the infant. Cardona-Torres et al. (2012) implemented both a dried-body and a non-dried-body intervention. The study of Trevisanuto et al. (2009) was the only paper that implemented a single intervention of placing a polyethylene cap and drying the body, whereas the other three studies had combined methods: Ibrahim et al. (2009) and Rohana et al. (2010) combined both polyethylene bag and woolen hat, whereas
Lee et al. (2008) had an improved program that combined polyethylene wrap, pre-heated mattress, cap, and radiant warmer.

**Comparison**

All studies adopted the NRP guidelines in the control group, placed the infants on a pre-warmed towel, and dried them up under a radiant warmer. Rohana et al. (2010) dried the head and placed a cap on the infants in the control group in addition to following the NRP guidelines.

**Time to remove the wrap/cap and time of follow up**

Rohana et al. (2011) removed the occlusive wrap or cap just before the post-stabilization temperature was measured, whereas Cardona–Torres et al. (2012) removed the wrap two hours after birth. The other six studies (Knobel et al., 2005; Ibrahim & Yoxall., 2009; Trevisanuto et al., 2009; Lee et al., 2008; Vohra et al., 1999; Vohra et al., 2004) removed the occlusive wrap immediately after arrival in NICU and placing in an incubator.

All the studies continued to follow-up on the infants until their discharge or death prior to being discharged.

**Outcome measures**

Six of eight studies (Vohra et al., 1999; Vohra et al., 2004; Knobel et al., 2005; Trevisanuto et al., 2009; Rohana et al., 2011; Lee et al., 2008) used the admission
temperature in NICU as primary outcome. Cardona-Torres et al. (2011) measured the time for the infants to retain a normal temperature of $\geq 36.5 \, ^\circ C$. Half of the studies (Vohra et al., 1999; Vohra et al., 2004; Knobel et al., 2005; Lee et al., 2007) used the axillary temperature for measurement whereas the other half (Trevisanuto et al., 2009; Rohana et al., 2011; Cardona-Torres et al., 2012; Ibrahim et al., 2009) used the rectal temperature.

Vohra et al. (2004), and Rohana et al. (2011) used the temperature one hour after admission as one of the primary outcomes. Knobel et al. (2005) and Lee et al. (2008) included the incidence of hypothermia as one of the primary outcomes, whereas Ibrahim et al. (2009) used the incidence of hypothermia as the single outcome measure. Trevisanuto et al. (2009) used both of the outcomes mentioned above as the primary outcomes. Five of the eight studies used the mortality rate as secondary outcome.

Studies adopted various definitions of hypothermia; two studies (Ibrahim & Yoxall., 2009; Lee et al., 2007) and Trevisanuto et al. (2010) adopted a temperature of $< 36 \, ^\circ C$ and $36.4 \, ^\circ C$, respectively, as the measure for hypothermia. The other five studies adopted the guidelines provided by WHO that a temperature of $\leq 36.4 \, ^\circ C$ qualifies for hypothermia.

Effect sizes
Five of the eight studies (Vohra et al., 2004; Knobel et al., 2005; Trevisanuto et al., 2009; Rohana et al., 2011; Lee et al., 2008) that used the admission temperature as one of the primary outcomes found a significant improvement in admission temperature. Vohra et al. (1999) found a significantly warmer admission temperature in infants smaller than 28 weeks gestation. However, for infants with 28 weeks to 31 weeks of gestation, the warmer admission temperature in the intervention group was not significant. Vohra et al. (2004) and Rohana et al. (2011) showed no significant difference between the intervention and control groups in the temperature one hour after admission, whereas Trevisanuto et al. (2009) showed a significant difference in the temperature one hour after admission.

All the three studies (Knobel et al., 2005; Lee et al., 2008 and Ibrahim & Yoxall, 2009) that investigated the incidence of hypothermia upon admission reported a better admission temperature. However, the reduction of hypothermia was not significant in the study conducted by Ibrahim and Yoxall (2009).

Two studies (Vohra et al., 2004; Trevisanuto et al., 2009) found no significant difference in mortality between the two groups. Rohana et al. (2011) and Knobel et al. (2005) found a difference but it was not significant. Only Vohra et al. (1999) found a significant difference of 15% higher mortality rate in the control group.

2.3.2 Synthesis
The studies focused on preterm infants with lower gestational age because full-term infants were more able to maintain the rectal temperature on their own without a polyethylene bag wrap. These studies showed that the occlusive wrap and cap methods were effective until 30 weeks but their effectiveness was reduced after the infants reached 30 weeks to 36 weeks of gestation. These results can be fit in the local setting because the NICU team only stand by for the delivery of preterm infants with less than 30 weeks of gestation.

The type of polyethylene or polyurethane material or bag used in the studies was not clear. Some of the studies provided the brand name of the plastic bag. Vohra et al. (1999) and Vohra et al. (2004) used a 20 cm × 50 cm polyethylene bag size and provided the company name. Rohana et al. (2011) used polyethylene sheet instead of a bag. Knobel et al. (2005) and Trevisanuto et al. (2009) used a 35 cm × 40 cm sterile transport polyethylene bag. Ibrahim and Yoxall (2009) used a food-grade bag but did not specify the materials, and the two remaining studies (Lee et al., 2007; Cardona-Torres et al., 2011) only mentioned that a polyethylene bag was used. Nevertheless, all the studies showed a similar effectiveness among the different materials used. Watkinson (2006) suggested that a food-standard or sterile polyethylene bag should be used to minimize the transfer of chemicals from the bag to the infant. Polyethylene bag is commonly used than a sheet because the former
can be managed easier and more effectively.

Cardona–Torres et al. (2012) put on the occlusive wrap for two hours, but did not obtain better result than the other studies; thus the wrap was removed immediately upon arriving at NICU and placing the infant in the incubator. The occlusive wrap is only effective when used immediately after birth until the transfer from the delivery unit to the NICU. Prolonged usage does not increase the effectiveness of the occlusive wrap.

The head of preterm infants should not be exposed because the comparatively large surface area of the head is prone to evaporation. Given that three studies (Ibrahim & Yoxall., 2009; Rohana et al., 2011; Trevisanuto et al., 2010) showed significant improvement in both the plastic and cotton wool cap group, a cotton wool cap is more suitable for use in local setting because the CPAP tubing must be secured to the cap during transport and after stabilization in the NICU.

Confounding factors also affect the accuracy of the studies, such as delivery room temperature, gestational age of the infant, and the time of transport from the delivery room to NICU. For the gestational age, Vohra et al. (1999) stated that the admission temperature was 0.04 °C higher with each 100 gram increase in birth weight. Thus, the intervention was stratified by gestational age into small groups to minimize bias. In addition, the delivery room temperature should be kept at minimal
variation and recorded clearly to compare the significant level of the clinical data.

The studies had various requirements in admission temperature measurement. Lee et al. (2007) and Ibrahim and Yoxall (2009) required that admission temperature must be obtained within one and two hours, respectively. In fact, the admission temperature should be obtained as soon as possible upon arrival in the NICU because prolonged period may affect the accuracy of the result. If the body temperature was obtained at half hour or more after arrival, the infant may experience different levels of hypothermia, and then recover. Thus, ideally, admission temperature must be obtained within 15 minutes after arrival at NICU.

Although rectal temperature is a better method for measuring the core body temperature, axillary temperature measurement is used because of some concerns on the danger of perforation or other injury when using rectal thermometers. Fanaroff and Martin (2002) also suggested that axillary temperature measurement is a safer alternative. Moreover, the outcome measures showed that studies had different definitions of hypothermia, which lead to the difficulty in analyzing the effectiveness among different interventions.

This integrated review suggested that sufficient evidence support the fact that using occlusive wrap and cap instead of convention drying have better effect in preventing hypothermia of premature infants immediately after birth. Translate this
practice into clinical setting would be a simple, inexpensive, feasible, and rapid method. However, closely monitoring the temperature is important because this method still has minimal risk in producing mild hyperthermia.
Chapter 3
Translation and Application

3.1 Implementation Potential

In Chapter 2, we identified sufficient evidence that support the utilization of occlusive wraps in reducing the incidence and severity of hypothermia among premature infants. Although this finding supports a change in our clinical practice, success in implementation requires science-driven guidelines, as well as the development of strategies and plans for implementation. Therefore, the implementation potential must be assessed before putting the innovation guidelines into our clinical setting. Implementation potential identifies the supports and barriers that may be encountered during the implementation process. Pilot and Beck (2008) identified three main areas to look into when assessing the implementation potential of an innovative guideline: transferability of the innovation, feasibility of implementation, and cost-benefit ratio.

3.1.1 Transferability of the Findings

Although we found several studies that support effectiveness of the new innovation, this practice still cannot be transferred if it is not compatible with the local setting. The practice environment directly influences the success of research use. Pilot and Beck (2008) suggested that the transferability depends on the types
of client served, personnel adopting the guideline, philosophy of care, and the administrative structure. Thus, a comparison will be carried out between the local setting and the settings identified in the studies.

**Target client served**

The local setting is a NICU in a public sector that provides about 10% of all NICU beds in Hong Kong. The majority of patients admitted to this NICU are premature infants with gestational ages ranging from 23 weeks to 37 weeks, and account for 75% of the occupancy of our NICU. The target groups for this innovative guideline are premature infants smaller than 30 gestational weeks and delivered in the Delivery Suite with NICU nurses on standby.

The target population is similar to those reviewed in other studies. Specifically, except for Cardona–Torres et al. (2012), which recruited infants at 28 to 37 gestational weeks as participants, the other seven included studies (Vohra et al., 1999; Vohra et al., 2004; Knobel et al., 2005; Lee et al., 2008; Trevisanuto et al., 2009; Ibrahim & Yoxall 2009; Rohana et al., 2010) recruited infants with gestational age around 24 to 30 weeks, similar to ours in the target setting.

**Target personnel adopt the guideline**

In our target setting, before the infants with gestational age smaller than 30 weeks are delivered, one NICU nurse is transferred from the NICU to the delivery
suite for assisting in the stabilization. These NICU nurses are our target personnel to adopt to the guideline. These adopters have a minimum of three years experiences in the NICU and have similar background with those nurses considered in the reviewed studies.

*Philosophy of care*

As one of the public hospitals under the management of the Hospital Authority of Hong Kong, we target on continuous quality improvement. To ensure consistency and continuity, we adopted a hospital accreditation program (The Australian Council on Healthcare Standards, ACHS) for improving the quality of our health care. Continuous improvement programs are highlighted, and focus on management and staff should demonstrate how they continually strive to improve the quality of care. Health service should look for ways to improve as an essential part of everyday practice. We are responsible for consistently achieving and maintaining quality care, monitoring outcomes in patient care, and seeking opportunities to improve both the care and its results.

Evidence-based practice is the highlighted frame of training provided by the Nursing Service Division (NSD). HA developed the “Innovative Nursing Practice Sharing Platform”, which encourages nurses to develop innovative evidence-base practice.
Our philosophy of care is in the same pace with the reviewed, which aims at providing evidence-based quality care. Although thermoregulation and increase in admission temperature seems to be a simple nursing care, we must ensure that excellent care is provided, which must be reviewed and updated with evidence supported.

The number of benefit subjects

Over 100 premature infants are admitted to our unit each year, and over 50% of them are less than 30 weeks of gestation. Among these premature infants, nearly 95% of them would benefit from this innovation. The other 5% of premature infants may not benefit from this innovation because they may be delivered before NICU nurses arrive at the delivery suite or they may be born outside the delivery suite.

Duration of implementing and evaluating innovation

In this innovation, implementation takes two months to prepare for staff training, guideline introduction, and material preparation. A pilot study will be performed with a three-month interval. The temperature assessment upon admission and one hour after admission can be collected easily. For the mortality rate, most of the infants will not stay in our unit for longer than 6 months, and we can collect all the data within 6 months after implementation.

We have conducted some quality improvement programs, for example:
Sucrose Administration Program and Oxygen Reduction Program for premature infants to relieve pain and reduction of Retinopathy of Prematurity (ROP). All similar programs have the duration of one to two years. Given that most of the improvement programs are in yearly basis, we can implement the guideline at the beginning of the financial year for half a year, and have the evaluation period for three months. The pilot study and evaluation totally takes one year. Afterward, we can continue the program if positive outcome is obtained and if approved by the management group.

3.1.2 Feasibility

Hogan and Logan (2004) identified several points to be considered when assessing the feasibility of an innovation that may hamper research use. Resistance may be due to nonsupportive caregiver attitudes, lack of skills, lack of resources, poor dissemination strategies, lack of preparation, perceived lack of autonomy, and lack of time to review. We categorized these elements into three parts: human, resources, and methods.

*Human*

Human is the biggest part when assessing feasibility because human can hamper the implementation of the innovation practice. Contrary to resistance, human can also push innovation practice forward if they are willing to implement
with passion. Staff may resist implementation when they do not know how to do, want to do but no time to do, or even do not want to do.

Skill and knowledge deficits are the most direct concerns when considering human-related issue. This issue may be a concern, but may not be a big problem in our setting. Based on the experience of implementing previous quality improvement programs such as Sucrose Administration Program and Oxygen Reduction Program, staff may find difficulties at the start of the new intervention. However, given that our unit provides training sessions in the new guidelines for staff periodically, our staff has the confidence to overcome the problem of skill and knowledge deficits. Moreover, the staff can build up the confidence to implement the guidelines with the support from a nurse consultant.

The training time for adopters to build up skill is also a concern. However, the training time needed in applying occlusive barrier is about 60 minutes, in which explanation and applying techniques are covered. Our department provides 45 minutes of training time twice weekly in the current practice, which includes knowledge-based or skill-based training. Only one or two sessions are needed, and will not interrupt staff function or increase the cost of the guideline.

For those who want to do but think that they have no time to do, this innovation practice require only a very simple action and will not delay other nursing care. The
first action is to place the infant in the polyethylene bag, which takes few seconds, and then temperature is measured, which is a current practice. Another minute in taking the temperature at one hour after admission will not affect much in nursing care, and time wasting would not be a reason for not implementing the guideline.

A minority of nurses may be reluctant to adopt the guideline because of the fear to change from tradition practice. This group of nurses only constitutes a small portion because most of our nurses have experienced changes in our units and an atmosphere of accepting new changes has been established. Moreover, our unit focuses on best practices and welcome positive changes. In fact, most of the nurses have experienced caring for low admission temperature preterm infants, and have started to discuss on how to improve the admission temperature within a small group.

We have the culture to let the adopters know how their input benefits infants after innovative program evaluation. Thus, sharing the rewards and building up satisfaction and confident among adopters and potential adopters is important.

Except for those core members, we also need to hear from and respond to the adopters and potential adopters to let them feel that they are being respected and their voice may influence the guideline directly. Fortunately, we gained support from the clinical leaders and management team for evidence-based practice
implementation.

As Hogan and Logan (2004) suggested, the practice environment directly influences the successful use of the innovation. Our practice environment is dynamic, and thus has both enabling and constraining effects on performance. Therefore, we must try our best to turn constraining force to driving force to enable the implementation.

Resources

When discussing resources, except for manpower, the other concern is the material used in the innovation. Given that every patient are given their individual thermometer from admission until discharge in our setting, the main materials needed in this practice are a 20 cm × 50 cm polyethylene or polyurethane bag and a cotton cap. Food-standard polyethylene bags will be used because transfer of chemicals from the bag would be minimized. Given that no major difference was noted for different brands of plastic bags used in the reviewed studies, we may simply purchase some bags from a supermarket with sufficient supply at low cost.

The cotton cap used for securing the nasal Continuous Positive Airway Pressure (CPAP) tubing in current setting are included in the nasal CPAP set. For those requiring nasal CPAP after birth, an extra cap need not be prepare. For the infants intubated or without ventilator support needed, a new cap is needed, which
can be purchased or hand-made with “Tubifast” bandage. The cost-benefit ratio of
the innovation will be discussed in Section 3.1.3.

To evaluate an innovation project, stakeholders should know why and how the
innovation is worthy of their support. Thus, a measuring tool should be available to
ensure that the evaluation process can be performed smoothly. Given that the
outcome measures are admission axillary temperature and axillary temperature one
hour after admission, they are objective data that can be easily assessed.

Methods

When proposing a new nursing guideline after the nurses have drafted the
guideline, gain the approval from the Department Assistant Consultant in charge
and the Nursing Consultant is essential. We can stop the practice if it has adverse
effect, or showed no benefit or even harmful to the patient after evaluation.
Discontinuing the guideline will also need the approval of Department Assistant
Consultant in charge and the Nursing Consultant. Thus, a guideline must have
evidence-support and must be well planned for its transferability and feasibility
before the set up.

3.1.3 Cost-Benefit Ratio for Implementing Occlusive Wrap

3.1.3.1 Risks

According to Newton and Watkinson (2003), the risk of overheating is a
potential concern when using the occlusive wrap. Mild hyperthermia, regarded as a core temperature greater than 37.5 °C, has associated with wrapping (Vohra, et al, 1999; Vohra et al, 2004). However, the incidence of hyperthermia is smaller than 7%, and the results are not significant.

3.1.3.2 Potential benefits

Given that hypothermia immediately after birth is associated with the increase in mortality and morbidity, Watkinson (2005) clearly stated that reducing the incident of hypothermia is associated with the decrease in the incidence of acid-base abnormalities, respiratory distress, necrotizing enterocolitis, and intraventricular hemorrhage. The occurrence of the above diseases and conditions would deteriorate patient’s condition, prolong hospitalization, and increase mortality. Preventing hypothermia has a chain effect that promotes better outcome of the preterm infants.

When nurses have positive input in translating evidence into practice, and patients have better outcomes, nurses’ confident may be boosted. When nurses gain successful experiences in evidence-based practice, they can share their experience to other nurses, and their job satisfaction also increases with the patient’s outcome.

As discussed previously in Section 3.1.1, hospitals are undergoing accreditation. Hospitals should compare their care and patient outcomes with
internal and external systems, and improvements are made to ensure better practice.

The hospital image can be boosted if the hospital or department has better achievement in the accreditation program.

3.1.3.3 Material costs

The additional materials used in the new guideline include the food-standard polyethylene bag, cotton cap, and the documentation required. For the food-standard polyethylene bag, a jumbo size (~20 cm × 50 cm), even without specific brand, is needed, according to Watkinson (2006). According the department research, ~50% of the infants admitted to our NICU in 2009–2010 that are smaller than 32 weeks require CPAP ventilation. For infants requiring CPAP, the cotton cap is included in the CPAP set and they need to use the cap even in their current condition. Only 50% more of the infants smaller than 30 weeks require cotton cap compared with the current guideline. The cap in this study was counted as single use for individual patient. The total estimated cost related to the materials is about $1,720 per year.

3.1.3.4 Non-material cost of implementing occlusive wrap guideline

The non-material cost mainly include the cost in manpower including briefing, educational session, and workshop. The estimated time for knowledge and skill-based training is 30 minutes. Given that the 56 nursing staff in NICU are adopters
or potential adopters, the sum of the training expense is $8,668.8. However, training sessions have been there are originally scheduled twice weekly, but not included as an additional expense. The guideline is simple and easy to implement, thus, the addition expense on manpower annually the on new guideline is only $1,372 annually. Details are provided in Appendix 5.

3.2 Evidence-Based Practice Guideline

An evidence-based practice guideline of occlusive wrap has been made after assessing the transferability, feasibility, and cost to benefit ratio. The occlusive wrap guideline was named as Superwarm Guideline because it is used to preserve the temperature for premature infants.

Eleven instructions were formed in the Superwarm Guideline. Instruction recommendations were graded according to the Scottish Intercollegiate Guidelines Network (2008), and grades from A to D will be given accordingly. The recommendations are based on the studies mentioned previously (Vohra et al, 2004; Trevisanuto et al, 2010; Vohra et al, 1999; Rohana et al, 2011; Cardona-Torres et al, 2012; Knobel et al, 2005; Lee et al, 2008; Ibrahim & Yoxall, 2009). Given that most of these studies are RCTs with the level of evidence of 1+ and directly related to the target group applied, most of the instructions are graded as A. The grades of
recommendation and Superwarm Guideline are listed in detail in Appendixes 6 and 7, respectively.
Chapter 4
Implementation Plan

4.1 Communication Plan

4.1.1 Stakeholders Analysis

Stakeholders are those who can affect or be affected by the guideline implementation. Stakeholders are the keys towards successful management of the guideline; thus, the first step is identifying the stakeholders and prioritizing them based on their degree of influence. According to their priority, these stakeholders include the administrators and frontline staff (includes doctors and nurses), respectively.

The administrative group has the responsibility to facilitate and enable changes. Thus communicating with the administrative group is essential to obtain their interpretation and ensure their support. The administrators include the management group in our Pediatric Department, such as the Chief of Service (COS), Nursing Consultant (NC), Department of Manager (DOM) and Ward Manager (WM) of NICU.

Another group of stakeholders includes the frontline nurses and doctors because they are responsible for and would potentially be affected by the guideline implementation. Frontline doctors are also concerned because some of the doctors
may think that the act of the plastic bag application may interrupt their medical assessment and treatment.

4.1.2 Communication Process

All nursing guidelines cannot be implemented without the approval of the administrative group. Individual approval seeking will be the first step in the communication process, which would take a month. During the approval seeking, several areas should be covered when presenting the Superwarm Project to all the stakeholders. These areas include the problem of current practice, clear vision of the necessity to translate the evidence-based practice from the literature, proposal of the Superwarm project, transferability and feasibility assessment, and expected accomplishment of the project.

NC is responsible for providing information and guidance in the development of policies and standards of nursing practices for new programs, and also adopts nursing procedures and practices to meet the changing needs of nursing and health programs. An early face-to-face approach to NC will be scheduled. In the meeting, formal written proposal and PowerPoint slides will be presented, and NC will be invited to be the project supervisor. With the preliminary recognition from NC, another face-to-face presentation to WM, DOM, and COS may be conducted in the same manner to gain their approval. The administrative group also includes the
Nursing Officer (NO)/APNs and the doctor in-charge. Head project coordinator will then have the presentation in a weekly-based Clinical Management Team (CMT) meeting, in which all administrative groups will be acknowledged.

The second step of the preparation phase is the project coordinator recruitment. With NC as project supervisor, the project proposer acts as the project head coordinator, and six more RNs will be recruited according to the WM recommendation and the nurse’s own interest. A project team will then be formed, which would include eight staff, and regular project development meetings will be held every other week until full implementation is reached.

The team coordinators will be trained with skillful techniques for the guideline implementation. The project team will be in the same pace with the guideline development, and is responsible for, but not limited to, the guideline preparation, liaison with the administrative group, supervision on the usage of the new guideline, troubleshooting, ensuring consistent use of and compliance among nurses, facilitation of meetings, project evaluation, and project change control.

The fourth to the sixth month will be the pilot phase. The head coordinator will report the progress and the result of the pilot study to the administrative group after comprehensive review of the pilot study at the end of the sixth month. The details of the pilot study will be discussed in the next section. After reporting the details of
the pilot study, the project will progress to the implementation phase.

The project team will monitor the progress of the guideline implementation, and reports will be submitted at the end of the preparation phase, pilot phase, and five months after the full implementation to all the stakeholders by email, upload to the department web site, and verbal presentation in the meetings held in Pediatric department.

To initiate change and gain support from the listed stakeholders, strategic marketing effort for the Superwarm guideline should be made. The promotional activity and collecting and handling feedback are extremely important and last for few months from the preparation phase to the implementation phase. Promotional activities include hanging poster in the hallway, staff rest room, and handovers in every nursing and department meeting. Moreover, project coordinators will disseminate information and provide question and answer medium in the department website and through email.

Aside from the continuous monitoring and serial promotional activities, we should also have some strategies to sustain the change. With support from the program coordinators, regular monitoring and evaluation may help the program to stand. The timelines of the project are summarized in Appendix 8.
4.2 Pilot Testing Plan

Although feasibility assessment was performed in Chapter 3, we still need to detect any unexpected problems or difficulties that may occur during the implementation of the proposed change. Therefore, a pilot test is needed to determine the feasibility of the process and fine-tune or resolve any unexpected difficulties before full implementation.

4.2.1 Preparation

To ensure that the project coordinator is competent, skillful, and qualified to perform training and supervision, an audit by the program supervisor and head coordinator will be conducted before they supervise the nurses to apply the guideline and document the result in the implementation record (Appendix 9).

Moreover, a thirty-minute briefing and educational session will be provided to enhance the knowledge of the frontline nurses on the significance of thermal regulation to premature infants, the evidence support of guideline implementation, and its effectiveness. Another thirty-minute workshop of applying occlusive wrap will be conducted to empower and enhance the skills of the nurses in the guideline implementation. Skill assessment will be performed before the end of the workshop to ensure that the patient free from man-made mistake during the guideline implementation. The in-service training would take about two months to train all
fifty-six target nurses.

4.2.2 Target Patient Enrollment

A sample size of 20 is needed to start this training, which will last for three months. The target sample size is 20 because we have 28 eligible nursing staff in the NICU (excluding 8 project team members and 20 do not have not enough three-year experience in NICU), about 70% of them can participate in this guideline implementation. In addition, 20 samples are the maximum affordable size based on the budget and the manpower arrangement. Using convenience sampling, all newborn premature infants smaller than 30 gestational weeks and delivered in the Delivery Suite with NICU nurses on standby will recruited as sample until 20 samples have been obtained.

4.2.3 Assessment

4.2.3.1 Feasibility of the Superwarm Guideline

The feasibility of the guideline is highly dependent on the acceptance, perception, and satisfaction of the proposed guideline by the frontline NICU nurses and doctors. We can collect related data on the above items at the end of the pilot test through satisfaction survey (Appendixes 10 and 11). In addition, we can also assess whether the actual cost falls into the estimated cost in Chapter 3 and does not exceed the affordable cost.
4.2.3.2 Compliance rate of frontline nurses

The compliance rate can reflect the acceptability of the innovative practice. When low compliance rate is obtained, the proposer and the project team can explore the underlying cause and improve the plan accordingly. The compliance rate can be obtained by concealed audit during the pilot period. The audit will be carried out by the project supervisor or head coordinator to observe and record the thermoregulation process of the frontline NICU nurses during the delivery process without informing them beforehand to assess the compliance rate accurately.

4.2.3.3 Effectiveness of the briefing and education session and workshop for the Superwarm guideline

The comment of the NICU frontline nurses on the briefing and educational session or workshop is very valuable to the development of the guideline to ensure that all the stakeholders have clear vision and understanding on the knowledge and skill of the proposed guideline. The effectiveness of the briefing and educational session or workshop will be evaluated by satisfaction survey (Appendix 10) for the frontline NICU nurses after attending the workshop and will be analyzed at the end of the pilot study.

4.2.3.4 Revisions or adjustment of the proposed guideline

After the pilot test, unexpected difficulties and problems will emerge, and will
be resolved by problem-solving strategies. Valuable comments from stakeholders are the first step to discover the underlying problems. Feedbacks from stakeholders can be collected by email, letters, or verbally. The project team leader and the members are responsible for discussing and deciding any changes that are needed after the pilot test. All the problems encountered during the pilot phase and the problem-solving strategies should be reported to the stakeholders. Moreover, the pilot test results should also be reported after the pilot review.

4.3 Evaluation Plan

According to Mouton (2009), measuring the impact of a program means demonstrating or estimating the accumulated differentiated proximate and emergent effect. We can determine which activities to continue and build upon, and which are those we need to change to improve the effectiveness of the program, through the information collected.

4.3.1 Outcomes

The planned evaluation outcomes include patient outcomes, healthcare provider outcomes, and system outcomes. Patient outcomes include admission temperature, temperature at one hour after admission, and hospital mortality. Temperature is the primary outcome and mortality rate is the secondary outcome.
The data obtained for these two patient outcomes are reliable because they are objective data without personal interpretation.

Healthcare provider outcomes include compliance rate, workload, acceptance of the proposed guideline, job satisfaction, as well as knowledge and skill enhancement in thermoregulation of the preterm infants. Data can be obtained by satisfaction survey (Appendixes 10, 11 and 12) and focus group. Nurses from different seniorities will be recruited as focus group, and the head project coordinator will be the moderator to obtain nurses’ opinion and feedback for the Superwarm guideline.

System outcomes include improvement in the quality of patient care, cost of consumable, increase usage of evidence-based practice, and strengthening the credential process. However, these factors are difficult to measure, and only the quality of patient care can be reflected in the patient outcome.

4.3.2 Nature and Number of Patient and Health Care Providers to be Involved

To evaluate the effectiveness of the program, the patients recruited should be preterm infants smaller than 30 weeks, which is identical with the target patient in the data synthesis of the studies. Project coordinators will follow the cases from their delivery until their transfer out or discharge from the NICU. Convenience
sampling is adopted by sample collection. The sample size calculation was adopted from the online program provided by [http://homepage.cs.uiowa.edu/~rlenth/Power/](http://homepage.cs.uiowa.edu/~rlenth/Power/).

The sample size was calculated by paired t-test to provide 80% power to detect a 0.4 °C change. With reference to Vohra et al. (2004), a high quality RCT, a standard deviation of 0.8 °C of temperature change, was adopted. Based on the above assumptions and one sample t-test measurement, a sample size of 33 is needed, and the process has been is estimated to last for five months based on the act that about 100 eligible preterm infants are delivered in NICU each year.

All nurses attended the workshop, briefing and educational workshop, and administrated the guideline, or all the doctors involved in the delivery process with nurses implementing the guideline will be recruited for as sample for the satisfaction survey. Around 56 nurses (including program coordinators) will be eligible for the nursing satisfaction survey to the workshop and briefing and educational sessions, whereas only 36 have more than three years NICU experience to participate in the newborn resuscitation during delivery. Thus, 36 nurses are eligible for completing the satisfaction survey. A total of 12 residents and 5 associate consultants that are eligible to participate in the delivery process are recruited as sample for completing the doctor satisfaction survey (Appendix 12).

4.3.3 Timing and Frequency of Evaluation
The evaluation will be performed after 5 months of implementation period and plan to have 33 patients recruited. For those discharged before the 5 month implementation period, the implementation and patient outcome data will be collected and analyzed by the project proposer when the subject is discharged. For those who are still in hospitalization period after the implementation period, the primary outcome data (axillary temperature upon arrival to NICU and axillary temperature at one hour after arrival to NICU) will be collected, and the secondary outcome data (mortality rate) will be followed and collected by the project proposer. Half-year patient outcome evaluation will be continued with the program review.

For the health care provider satisfaction evaluation, the survey will be conducted immediately after the training session or delivery process, and data analysis will be conducted the five month implementation phase. Moreover, audits on nursing charts for the nursing compliance should be performed at least half-yearly bases after the full implementation. The cost after has been guideline implemented will also be evaluated in comparison with the budget plan at a half-yearly basis.

4.3.4 Analysis of Data

All the outcome data collected will be analyzed and paired t-test will be used to compare the prospective group and the retrospective group, in which mean \(+\)
standard deviation will be presented. For the healthcare provider outcome, the 5-point Likert scale was used in the satisfaction survey, in which “highly disagree” count as 1 point, whereas “highly agree” count as 5 points. Through the computer system SPSS, one group post-test design with 95% confidence interval will be analyzed.

In the system outcomes, the actual cost will be analyzed by comparing with the estimated cost (Actual cost / Estimated cost ×100%). For those qualitative information, for example, the opinions gained from the focus group, the information can be used for continuous quality improvement of the project.

4.3.5 Basis for Adopting the Guideline

To determinate whether the protocol is effective, the first thing we needed to know is what we want to achieve with this change, as well as why and how we will know that the change has been achieved. The main theme of this innovative practice, aside from those listed in session 1.3, is to translate the evidence to our daily practice to enhance the patient outcome. Through systemic communication and evaluation processes, the protocol can be implemented as intended and evaluated whether the objective has been met or not.

The target of the major patient outcome is to increase the mean admission temperature by more than or equal to 0.4 °C higher after the Superwarm guideline
is implemented. The guideline would have positive impact if the mean axillary temperature at one hour after the admission is 0.4 °C higher and the mortality rate decreased.

For the outcome of healthcare provider, the target is to achieve a 70% satisfaction with the new guideline from the frontline nurses and doctors. In terms of system outcomes, the objective of actual consumable cost should not be more than the estimated cost for 10%, which is equal to not more than HK$2,000/year.

The continuity of the guideline implementation is associated with the outcome and effectiveness of the guideline. The final decision on whether the guideline should be continued will be made by the stakeholders in the project with the reference to the project and evaluation report after one year of implementation and will be discussed in the Clinical Management Team meeting.
Appendices

Appendix 1

Search Strategies

Date of search: 1 August 2012 – 20 August 2012

1. Medline/ OvidSP (1946 to August Week 1 2012)

   1. plastic barrier  24
   2. Occlusive wrap 7
   3. Plastic wrap 62
   4. Polyethylene 56850
   5. Hypothermia 32880
   6. Thermoregulation 4470
   7. Prevent heat loss 39
   8. Premature infants 11743
   9. Preterm infants 12275
   10. (#1 or #2 or #3 or #4) 56940
   11. (#5 or #6 or #7) 36713
   12. (#8 or #9) 22573
   13. (#10 and #11 and #12 and #13)

   Total citations yielded = 17 (1 in French)

   Number of RCT studies meet inclusion criteria= 5 (1 study in French)

   Number of studies other than RCT: 2

2. PubMed (1970/1/1 to 2012/08/20)

   1. plastic barrier 1368
   2. Occlusive wrap 48
   3. Plastic wrap 234
4. Polyethylene  63756
5. Hypothermia  34715
6. Thermoregulation  34057
7. Prevent heat loss  780
8. Premature infants  60025
9. Preterm infants  28280
10. (#1 or #2 or #3 or #4)  65115
11. (#5 or #6 or #7)  65602
12. (#8 or #9)  67327
13. (#10 and #11 and #12)
Total citations yielded = 165 (1 in French)
Number of RCT studies meet inclusion criteria= 7 (1 study in French)
Number of studies other than RCT: 2

3. CINAHL/EBSCOhost (1970/1/1 to 2012/08/20)
   1. plastic barrier  3
   2. Occlusive wrap  9
   3. Plastic wrap  17
   4. Polyethylene  1662
   5. Hypothermia  4516
   6. Thermoregulation  313
   7. Prevent heat loss  22
   8. Premature infants  11783
   9. Preterm infants  966
10. (#1 or #2 or #3 or #4)  469
11. (#5 or #6 or #7)  626
12. (#8 or #9)  1780
13. (#10 and #11 and #12)

Total citations yielded = 3

Number of RCT studies meet inclusion criteria= 1

Number of studies other than RCT: 1

4. Cochrane Library (1970/1/1 to 2012/08/20) search as “Title, abstract and keywords” and limit to “trial”

1. plastic barrier 18
2. Occlusive wrap 14
3. Plastic wrap 20
4. Polyethylene 2207
5. Hypothermia 1387
6. Thermoregulation 217
7. Prevent heat loss 54
8. Premature infants 3733
9. Preterm infants 3014
10. (#1 or #2 or #3 or #4) 2390
11. (#5 or #6 or #7) 1604
12. (#8 or #9) 4873
13. (#10 and #11 and #12) 5

Number of studies meet inclusion criteria= 4
**Appendix 2**  
**Table of Evidence**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Study design</th>
<th>Patient Characteristics</th>
<th>Intervention(s)</th>
<th>Comparison</th>
<th>Time to remove wrap/cap</th>
<th>Outcome measures</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vohra et al. (2004)</td>
<td>RCT 1+</td>
<td>-55 preterm infants</td>
<td>-Wrap from the neck down</td>
<td>Dried whole body completely</td>
<td>Arrived NICU and placed in a single walled incubator</td>
<td>Primary outcomes: 1. Rectal temperature on admission to NICU (immediately after wrap removal )</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Mean GA: 26 ± 1.5 weeks</td>
<td>-Only head dried</td>
<td></td>
<td></td>
<td>Mean rectal temperature at NICU admission:</td>
<td>Mean rectal temperature at NICU admission: Wrap group 36.5± 0.8 °C vs Control group 35.6 ±1.3 °C (P = 0.002)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Mean BW: 858±199 gm</td>
<td></td>
<td></td>
<td></td>
<td>2. Temperature 1 hour later after admission to NICU</td>
<td>Temperature 1 hour later: Wrap group 36.6±0.7 °C vs Control group 36.4±0.8 °C (P= 0.4)</td>
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<tr>
<td></td>
<td></td>
<td>Control group: 825 ± 270 gm</td>
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<td></td>
<td></td>
<td>Secondary outcome: 3. Death</td>
<td>Death rate: Wrap group 7 vs Control group 8 (P= 0.8)</td>
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<tr>
<td>Citation</td>
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<td>Comparison</td>
<td>Time to remove wrap/cap</td>
<td>Outcome measures</td>
<td>Effect size</td>
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<tr>
<td>Trevisanuto et al. (2010)</td>
<td>RCT 1+</td>
<td>- 96 preterm infants</td>
<td><strong>Cap group</strong>: Infant head covered with a pre-warmed polyethylene cap and only the body was dried. <strong>Wrap group</strong>: Only infant head dried, infants put into the pre-warmed polyethylene bag while still wet, up to their necks</td>
<td>Arrived NICU and placed in a double walled incubator</td>
<td>Primary outcomes: 1. Axillary temperature on admission to the NICU (immediately after cap and wrap removal)</td>
<td>Mean rectal temperature at NICU admission: Cap group 36.1 ± 0.8 ℃ vs Wrap group 35.8 ± 0.9 ℃ vs Control group 35.3 ± 0.8 ℃ (P = 0.0008)</td>
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<tr>
<td></td>
<td></td>
<td>- <em>Mean GA</em>: 26.1 ± 1.4 weeks</td>
<td><strong>Cap group</strong>: 834 ± 246 gm <strong>Wrap group</strong>: 800 ± 223 gm <strong>Control group</strong>: 813 ± 225 gm</td>
<td></td>
<td>Secondary outcomes: 3. Mortality before hospital discharge</td>
<td>Temperature 1 hour later: Cap group 36.5 ± 0.7 ℃ vs Wrap group 36.2 ± 0.5 ℃ vs Control group 35.7 ± 0.7 ℃ (P = 0.0003)</td>
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<td></td>
<td>- <em>Mean BW</em>: 25.8 ± 1.5 weeks</td>
<td><strong>Cap group</strong>: 26.3 ± 1.0 weeks <strong>Wrap group</strong>: 25.8 ± 1.5 weeks <strong>Control group</strong>: 26.3 ± 1.0 weeks</td>
<td></td>
<td></td>
<td>Secondary outcomes: 3. Mortality before hospital discharge</td>
<td>Mortality before discharge: Cap group 9% vs Wrap group 6% vs Control group 6%</td>
</tr>
<tr>
<td>Citation</td>
<td>Study design</td>
<td>Patient Characteristics</td>
<td>Intervention(s)</td>
<td>Comparison</td>
<td>Time to remove wrap/cap</td>
<td>Outcome measures</td>
<td>Effect size</td>
</tr>
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</tr>
<tr>
<td>Vohra et al. (1999)</td>
<td>RCT 1+</td>
<td>-59 preterm infants</td>
<td>Mean BW:</td>
<td></td>
<td></td>
<td>NICU admission</td>
<td>Primary outcome: 1. Rectal temperature on admission to NICU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>818 gm</td>
<td>&lt;28 weeks:</td>
<td></td>
<td></td>
<td>2. Death rate</td>
<td>Secondary outcome 2. Death rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28-31 weeks:</td>
<td>1258 gm</td>
<td></td>
<td></td>
<td></td>
<td>Death rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean GA:</td>
<td>&lt;28 weeks</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wrap: 26.1±1.4 weeks</td>
<td></td>
<td>Control: 25.7±1.5 weeks</td>
<td></td>
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<tr>
<td></td>
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<td>28-31 weeks:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Wrap: 29.6±1.1 weeks</td>
<td></td>
<td>Control: 29.4±1.5 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citation</td>
<td>Study design</td>
<td>Patient Characteristics</td>
<td>Intervention(s)</td>
<td>Comparison</td>
<td>Time to remove wrap</td>
<td>Outcome measures</td>
<td>Effect size</td>
</tr>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Rohana et al. (2011)</td>
<td>RCT</td>
<td>110 preterm infants</td>
<td>Mean BW: Wrap group: 1277 ± 462 gm Control group: 1328 ± 459 gm Mean GA: Wrap group: 29.7wk ± 2.9 wk Control group: 29.8wk ± 2.7 wk</td>
<td>-Fold the pre-warm polyethylene sheet loosely over infant from neck down, without drying the body - Dry and cover infant head with a cap</td>
<td>Dry under radiant warmer with dry, warmed towels - Use a cap cover infant head after infant was dried</td>
<td>Before post-stabilization temperature was measured</td>
<td>Primary outcomes: 1. Axillary temp on arrival to NICU 2. Post-stabilization temp</td>
</tr>
<tr>
<td>Cardona-Torres et al (2012)</td>
<td>RCT</td>
<td>90 preterm infants</td>
<td>Mean BW: 2000 gm± 400gm Mean GA: 35wk ±2.6wk</td>
<td>A. Dried with pre-warmed towel then wrapped in a polyethylene bag B. Put the infant in the polyethylene bag without body drying, only dry the head</td>
<td>-Dried with a sterile preheated towel and wrap with another towel -Under radiant warmer</td>
<td>Until 2 hours after birth</td>
<td>Time to reach normal temperature ≥36.5°C</td>
</tr>
<tr>
<td>Citation</td>
<td>Study design</td>
<td>Patient Characteristics</td>
<td>Intervention(s)</td>
<td>Comparison</td>
<td>Outcome measures</td>
<td>Effect size</td>
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</tr>
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</tr>
<tr>
<td>Knobel et al. (2005)</td>
<td>RCT</td>
<td>88 preterm infants</td>
<td><strong>Mean BW:</strong>&lt;br&gt;Wrap group: 918gm ± 259 gm&lt;br&gt;Control group: 850gm ± 253gm</td>
<td>- Dried up with warm towel under radiant warmer&lt;br&gt;- Cover with warm blankets when transferred to NICU</td>
<td>On arrival to NICU and placed under radiant warmers</td>
<td>1. Wrap group 44% vs control group 70% (p&lt;0.01)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean GA:</td>
<td><strong>Wrap group:</strong> 26.5wk ± 1.4 wk&lt;br&gt;Control group: 26.1wk ± 1.4 wk</td>
<td>- Place infants from neck down inside the pre-warmed polyurethane bag immediately after birth without drying&lt;br&gt;- Head and face are dried&lt;br&gt;- Cover with warm blankets when transferred to NICU&lt;br&gt;- Place under radiant warmer</td>
<td>Primary outcomes:&lt;br&gt;1. Rate of hypothermia (temp &lt;36.4°C)&lt;br&gt;2. Mean admission rectal temp</td>
<td>2. Wrap group 36.5°C vs control group 36°C (p&lt;0.003)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Secondary outcome:&lt;br&gt;3. Mortality</td>
<td>3. Wrap group 10% vs control group 13% (not significant)</td>
<td></td>
</tr>
<tr>
<td>Citation</td>
<td>Study design</td>
<td>Patient Characteristics</td>
<td>Intervention(s)</td>
<td>Comparison</td>
<td>Time to remove wrap</td>
<td>Outcome measures</td>
<td>Effect size</td>
</tr>
<tr>
<td>--------------------------</td>
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<td>---------------------------------------------------------------------------------</td>
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<td>----------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Lee, Ho, & Phine (2008)  | Cohort study 2+ | - 304 preterm infants  | Use of radiant warmer, polyethylene wraps, caps, chemical warming mattresses and warm blankets | Warming newborn infants under radiant heater while drying with a warm towel | On arrival to NICU | 1. Mean rectal temperature on admission to NICU (within 1 hour upon admission)  
2. Incidence of hypothermia on admission to NICU | 1. *Mean temperature*  
   Before Program 35.4°C vs After Program 36.2°C  
2. *Temp <35°C*  
   Before Program 23 vs After Program 5  
3. *Temp 35-<36°C*  
   Before Program 53 vs After Program 27  
4. *Temp >36°C*  
   Before Program 24 vs After Program 68 (P<0.0001) |
| Ibrahim & Yoxall (2009)  | Cohort study 2- | - 334 preterm infants  | - Place infant in a polyethylene bag from neck down without drying at birth under a pre-heated radiant warmer  
- Head was covered with a knitted woolen hat | Place newborn infants under radiant heater while drying with a warm towel | On arrival to NICU | 1. Axillary temperature on admission (First two hour temperature after delivery as admission temperature) <36°C | Infants <28 weeks:  
   Before program 29.3% vs After program 24.8%  
Infant 28-30 weeks:  
   Before program 19.4% vs After program 3.9% (P=0.098) |

BW – Body weight; GA – Gestational age; gm – gram; vs - versus
Appendix 3

Levels of evidence (Adopted from Scottish Intercollegiate Guidelines Network)

<table>
<thead>
<tr>
<th>Level</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1++</td>
<td>High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1+</td>
<td>Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1-</td>
<td>Meta-analyses, systematic reviews, or RCTs with a high risk of bias</td>
</tr>
<tr>
<td>2++</td>
<td>High quality systemic reviews of case control or cohort or studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal</td>
</tr>
<tr>
<td>2+</td>
<td>Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal</td>
</tr>
<tr>
<td>2-</td>
<td>Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal</td>
</tr>
<tr>
<td>3</td>
<td>Non-analytic studies, e.g. case reports, case series</td>
</tr>
<tr>
<td>4</td>
<td>Expert opinion</td>
</tr>
</tbody>
</table>
## Appendix 4

### Quality assessment of the Randomized Controlled Trial

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Adequately addressed</td>
<td>Well-covered</td>
<td>Well-covered</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td>Poorly addressed</td>
<td>Well-covered</td>
</tr>
<tr>
<td>1.8 What percentage of the individuals or clusters recruited into each</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

60
<table>
<thead>
<tr>
<th>treatment arm of the study dropped out before the study was completed?</th>
<th>Well-covered</th>
<th>Well-covered</th>
<th>Well-covered</th>
<th>Well-covered</th>
<th>Well-covered</th>
<th>Well-covered</th>
</tr>
</thead>
<tbody>
<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>Poorly addressed</td>
<td>Poorly addressed</td>
<td>Poorly addressed</td>
<td>Poorly addressed</td>
<td>Poorly addressed</td>
<td>Poorly addressed</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></td>
<td></td>
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</tr>
</tbody>
</table>

**Section 2: Overall assessment of the study**

<table>
<thead>
<tr>
<th>2.1 How well was the study done to minimize bias? Code ++, + or -</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>-</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2 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, the outcome measures are objective and the overall effect can be certain was due to the study intervention</td>
<td>Yes, the outcome measures are objective and the overall effect can be certain was due to the study intervention</td>
<td>Yes, the outcome measures are objective and the overall effect can be certain was due to the study intervention</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>2.3 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>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Level of Evidence</strong></td>
<td>1+</td>
<td>1+</td>
<td>1+</td>
<td>1+</td>
<td>1-</td>
<td>1-</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>Section 1: Internal validity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question.</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Selection of subjects</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1.2 The two groups being studied are selected from source populations that are comparable in all respects other than the factor under investigation.</td>
<td>Well-covered</td>
<td>Adequately addressed</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1.3 The study indicates how many of the people asked to take part did so, in each of the groups being studied.</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1.4 The likelihood that some eligible subjects might have the outcome at the time of enrolment is assessed and taken into account in the analysis.</td>
<td>Well-covered</td>
<td>Poorly addressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5 What percentage of individuals or clusters recruited into each arm of the study dropped out before the study was completed.</td>
<td>2.9% were not documented the admission temperature</td>
<td>44.6% &amp;11.3% in Period 1 &amp; Period 2 was not documented the admission temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.6 Comparison is made between full participants and those lost to follow up, by exposure status.</td>
<td>Poorly addressed</td>
<td>Poorly addressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment</td>
<td>1.7 The outcomes are clearly defined.</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>------------------------------------------------</td>
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</tr>
<tr>
<td>1.8 The assessment of outcome is made blind to exposure status.</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.9 Where blinding was not possible, there is some recognition that knowledge of exposure status could have influenced the assessment of outcome.</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1.10 The measure of assessment of exposure is reliable.</td>
<td>Well-covered</td>
<td>Well-covered</td>
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</tr>
<tr>
<td>1.11 Evidence from other sources is used to demonstrate that the method of outcome assessment is valid and reliable.</td>
<td>Well-covered</td>
<td>Well-covered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.12 Exposure level or prognostic factor is assessed more than once.</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Confounding                       | 1.13 The main potential confounders are identified and taken into account in the design and analysis. | Well-covered | Adequately addressed |

<p>| Statistical Analysis             | 1.14 Have confidence intervals been provided? | Yes | No |</p>
<table>
<thead>
<tr>
<th>Section 2: Overall assessment of the study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 How well was the study done to minimise the risk of bias or confounding, and to establish a causal relationship between exposure and effect?</td>
</tr>
<tr>
<td><strong>Code</strong>: ++, +, or –</td>
</tr>
<tr>
<td>+</td>
</tr>
<tr>
<td>2.2 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>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>2.3 Are the results of this study directly applicable to the patient group targeted in this guideline?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>2.4 Summarize the authors conclusions. Add any comments on your own assessment of the study, and the extent to which it answers your questions.</td>
</tr>
<tr>
<td>Bias minimize as much as possible noted in the studies</td>
</tr>
<tr>
<td><strong>Level of evidence</strong></td>
</tr>
</tbody>
</table>
Appendix 5: Expenditure of implementing Superwarm Guideline in NICU

Items in Table 1 & Table 2 are calculated according to following:

- There are total 56 clinical staffs in target NICU.
- A mid-point is adapted in calculating the wage of a RN because RNs may have different wage depends on their experience. According to Hospital Authority General Pay Scale, RNs have the Pay Scale from point 13 to point 25 and the mid-point is point 18. The basic salary of a point 18 RN is $27,245.
- Median wage per RN per minute
  \[ = \frac{27,245}{(44 \text{ hours} \times 4 \text{ weeks} \times 60 \text{ minutes})} \]
  \[ = \frac{27,245}{10,560} \]
  \[ = 2.58 \]
- Estimated 95 preterm infants <30 weeks a year and the guideline can be applied

<p>| Table 1. Expenditure of holding briefing, educational session and a workshop |
|---------------------------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th><strong>Items</strong></th>
<th><strong>Calculation</strong></th>
<th><strong>Amount (HKD$)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Manpower cost of a RN attending 30 minutes briefing and educational session (Knowledge-based)</td>
<td>$2.58 x 30 mins</td>
<td>$77.4 (1)</td>
</tr>
<tr>
<td>Manpower cost of a RN attending 30 minutes workshop of applying occlusive wrap (Skill-based)</td>
<td>$2.58 x 30 mins</td>
<td>$77.4 (2)</td>
</tr>
<tr>
<td>Total manpower cost for a RN (Item 3)</td>
<td>Item3 = (1) + (2)</td>
<td>$77.4+ $77.4</td>
</tr>
<tr>
<td>Estimated manpower cost of training a RN on knowledge and skill input for the guideline</td>
<td>= ($2.58x30) + ($2.58x30)</td>
<td>= $154.8</td>
</tr>
<tr>
<td>Item 4</td>
<td>Item 3 x 56 staffs</td>
<td>HKD $154.8 x 56</td>
</tr>
<tr>
<td>Total manpower cost for a NICU on knowledge and skill input for the guideline</td>
<td></td>
<td>= HKD $8,668.8</td>
</tr>
</tbody>
</table>
Table 2. Expenditure of annual nursing manpower cost on performing Superwarm Guideline comparing to current guideline per year

<table>
<thead>
<tr>
<th>Items</th>
<th>Calculation</th>
<th>Amount (HKD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated cost to put a preterm infant in a polyethylene bag</td>
<td>$2.58 x 0.2 minutes x 95</td>
<td>$49.02 (1)</td>
</tr>
<tr>
<td>Estimated cost to put a cap on the head of a preterm infant</td>
<td>$2.58 x 0.2 minutes x 95</td>
<td>$49.02 (2)</td>
</tr>
<tr>
<td>Estimated cost to measure the admission temperature</td>
<td>No change in practice when comparing Superwarm Guideline to current practice</td>
<td></td>
</tr>
<tr>
<td>Estimated cost to remove the wrap</td>
<td>$2.58 x 0.2 minutes x 95</td>
<td>$49.02 (3)</td>
</tr>
<tr>
<td>Estimated cost to measure the temperature 1 hour after admission</td>
<td>$2.58 x 1 minutes x 95</td>
<td>$245.1 (4)</td>
</tr>
<tr>
<td>Estimated cost for documentation</td>
<td>$2.58 x 5 minutes x 95</td>
<td>$1,225.5 (5)</td>
</tr>
<tr>
<td>Estimated cost for dry up the infant in current practice</td>
<td>$2.58 x 1 minutes x 95</td>
<td>$245.1 (6)</td>
</tr>
<tr>
<td>Estimated total annual nursing manpower cost on performing Superwarm guideline</td>
<td>(1) + (2) + (3) + (4) + (5) − (6)</td>
<td>$1,372.56</td>
</tr>
</tbody>
</table>
Table 3. Annual cost of consumable on running Superwarm Guideline per year

<table>
<thead>
<tr>
<th>Items</th>
<th>Calculation</th>
<th>Amount (HKD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food-standard polyethylene bag (Jumbo)</td>
<td>$3 \times 95</td>
<td>$285 (1)</td>
</tr>
<tr>
<td>Cotton cap*</td>
<td>$30 \times (95/2)</td>
<td>$1,425 (2)</td>
</tr>
<tr>
<td>Documentation record</td>
<td>$0.1 \times 95</td>
<td>$9.5 (3)</td>
</tr>
<tr>
<td>Estimated annual cost of consumable on Superwarm Guideline</td>
<td>$(1)+(2)+(3)</td>
<td>$1,719.5</td>
</tr>
</tbody>
</table>

* According department research, ~50% of the infants smaller than 30 weeks admitted to our NICU requiring CPAP ventilation in 2009-2010. For those infants requiring CPAP ventilation, the cotton cap is included in the CPAP set and they need to use the cap even in current condition. Only 50% more of infants smaller than 30 weeks require cotton cap when compare to current guideline. The Cap here counted as Single use for individual patient.
### Appendix 6

#### Grades of Recommendations (Adopted from SIGN, 2008)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>At least one meta-analysis, systemic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+</td>
</tr>
</tbody>
</table>
Appendix 7

XXX Public Hospital

Department of Paediatrics and Adolescent Medicine

Practice Guideline: Use of polyethylene Bag of the Premature Infants

Immediate after Birth (Superwarm Guideline)

Author: Yau Ching Man, Advance Practice Nurse

For use in: Neonatal Intensive Care Unit (NICU)

Date of Adaption: July 2013

Review Due: January 2014

Approved by:

<table>
<thead>
<tr>
<th>Associate Consultant</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signed:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nurse Consultant</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signed:</td>
</tr>
</tbody>
</table>
XXX Public Hospital
Department of Paediatrics and Adolescent Medicine

Practice Guideline: Use of polyethylene Bag of the Premature Infants Immediate after Birth

Goal: To minimize heat loss during routine postnatal stabilization or resuscitation in preterm infants < 32 weeks’ gestation to ensure optimal temperature on admission to the neonatal unit.

Background: Cold stress is more likely during the birth process and during stabilization in the delivery room because the infant is delivered from the warm intrauterine environment to the cold environment of the delivery room. Premature infants are at high risk to develop hypothermia because of the large surface area to body weight ratios. Knobel, Vohra and Lehmann (2005) identified transpeidermal water loss is 15 times higher in infants born at 25 weeks gestational age than in term infants.

Intended users: NICU nurses

Target Population: Preterm infants < 32 weeks’ gestation

Exclusion Population:

1. Infants have major congenital anomalies that were not covered by skin, e.g. gastroschisis, meningomyelocele, omphalocele.

2. Infants’ delivery was not attended by the neonatal team.

Equipment: Clear ~20 x 50cm size food-standard polyethylene bag; Cotton hat; Digital
Thermometer; Resuscitaire

**Instruction:**

- Attend the delivery of a preterm infant smaller than 32 weeks after Obstetrician assessment.

- Place a food-standard polyethylene bag and towels on the resuscitaire to warm.

- Do not dry the infant at delivery.

- Place the infant into the polyethylene bag from the shoulder down and leave the face free.

- Put a cotton hat on the infant to minimize heat loss.

- Transfer the infant in the polyethylene bag and covered with a pre-warm towel inside the resuscitaire after stabilization.

- On arrival to the NICU, place the infant in a closed incubator or under a radiant warmer.

- Measure the infants’ axillary admission temperature using a digital thermometer.

- Remove the occlusive wrap.

- Measure post-stabilization temperature 1 hour after admission.

- Document the implementation details and the outcome measures in the Superwarm Guideline record.
Instructions with supporting evidence

Eleven evidence-based instructions were set up in Superwarm Guideline. According to these instructions, nurses can perform assessment, planning, implementation and evaluation with evidence supported.

Instruction 1

• **Description:** Attend the delivery of a preterm infant smaller than 32 weeks after Obstetrician assessment.

• **Grade of Instruction:** A

• **Evidence:** Applying occlusive wrapping prevents heat loss at delivery in preterm infants smaller than 28 to 32 weeks is associated with lower incidence of hypothermia. (Vohra et al, 1999; Rohana et al, 2011; Vohra et al, 2004; Knobel et al, 2005; Ibrahim & Yoxall, 2009; Trevisanuto et al., 2010)

Instruction 2:

• **Description:** Place a food-standard polyethylene bag, cap and towels on the resuscitaire to warm.

• **Grade of Instruction:** A

• **Evidence:** Polyethylene bag and towels should be placed on the resuscitation table under the radiant warmer before a study infant was born (Vohra et al, 2004; Knobel
et al, 2005; Vohra et al, 1999). Additional item of cap should also be placed on the resuscitation table are supported in studies with the intervention of apply cap (Rohana et al, 2011, Ibrahim & Yoxall, 2009; Trevisanuto et al, 2010)

**Instruction 3**

- **Description:** Dry the infant head but **Do not** dry the infant body at delivery.

- **Grade of Instruction:** A

- **Evidence:** It is suggested that do not dry up the infant and only the head should be dried according Neonatal Resuscitation Program (NRP) guideline (Vohra et al, 2004; Rohana et al, 2011; Knobel et al, 2005; Ibrahim & Yoxall, 2009; Trevisanuto et al, 2010; Vohra et al, 1999).

**Instruction 4**

- **Description:** Place the infant into the polyethylene bag from the shoulder down and leave the face free.

- **Grade of Instruction:** A

- **Evidence:** Infants should be placed into the polyethylene bag while still wet, from the shoulder down. Leave the face free for respiratory support or self ventilation (Vohra et al, 2004; Rohana et al, 2011; Knobel et al, 2005; Ibrahim & Yoxall, 2009; Trevisanuto et al., 2010; Vohra et al, 1999).
Instruction 5

- **Description:** Put a cotton hat on the infant to minimize heat loss.

- **Grade of Instruction:** A

- **Evidence:** Four studies supported that a hat should be put on the infant to minimize heat loss (Rohana et al, 2011; Knobel et al, 2005; Ibrahim & Yoxall, 2009; Trevisanuto et al, 2010). For the material of the hat, Knobel et al (2005) and Rohana et al (2011) suggested to use cotton cap to minimize heat loss.

Instruction 6

- **Description:** Transfer the infant in the polyethylene bag and covered with a pre-warm towel inside the pre-heated resuscitaire after stabilization.

- **Grade of Instruction:** A

- **Evidence:** Transfer the infant in the polyethylene bag and covered with a pre-warm towel inside the pre-heated resuscitaire for maintain effective thermoregulation and reduce heat loss during transportation time (Vohra et al, 1999; Vohra et al, 2004; Rohana et al, 2011; Knobel et al, 2005; Ibrahim & Yoxall, 2009; Trevisanuto et al, 2010)

Instruction 7
• **Description:** On arrival to the NICU, place the infant in a closed incubator or under a radiant warmer.

• **Grade of Instruction:** A

• **Evidence:** As a general policy in local NICU setting, infants requiring ventilator support will be nursed in a resuscitaire with radiant warmer. For those infants with no ventilator support needed, they will be transferred and nurse in an incubator. It is recommended that infants should be placed in close incubator or resuscitair under radiant warmer immediately after arrival to NICU (Vohra et al, 1999; Vohra et al, 2004; Knobel et al, 2005; Ibrahim & Yoxall, 2009; Trevisanuto et al, 2010).

**Instruction 8**

• **Description:** Measure the infants’ axillary admission temperature using a digital thermometer.

• **Grade of Instruction:** A

• **Evidence:** The digital axillary thermometer should be placed outside the wrap and only the probe placed inside the polyethylene bag to reduce heat loss induced by taking temperature. Also, axillary thermometer is suggested instead of rectal thermometer because no significant different noted in these two route. However, rectal temperature measurement may put infants in a higher traumatic risk (Rohana
Instruction 9

- **Description**: Remove the occlusive wrap.
- **Grade of Instruction**: A
- **Evidence**: It is recommended to remove the occlusive wrap after radiant warmer or incubator available (Vohra et al, 2004; Rohana et al, 2011; Knobel et al, 2005).

Instruction 10

- **Description**: Measure post-stabilization temperature 1 hour after admission.
- **Grade of Instruction**: A
- **Evidence**: Two studies supported to measure post-stabilization temperature 1 hour after admission to measure any delay in heat loss (Vohra et al, 2004; Rohana et al, 2011)

Instruction 11

- **Description**: Document the implementation details and the outcome measures in the Superwarm Guideline record.
- **Grade of Instruction**: A
• **Evidence:** Intervention given and outcome measures should be recorded program evaluation, systematic analysis can be done according to those recorded data (Vohra et al, 2004; Rohana et al, 2011; Knobel et al, 2005; Ibrahim & Yoxall, 2009; Trevisanuto et al, 2010; Trevisanuto et al, 2010; Vohra et al, 1999)
## Appendix 8

### Project Calendar

<table>
<thead>
<tr>
<th>Planned Task</th>
<th>Preparation Phase</th>
<th>Pilot Phase</th>
<th>Implementation Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jan</td>
<td>Feb</td>
<td>Mar</td>
</tr>
<tr>
<td>Seeking approval</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project coordinator recruitment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project development meeting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promotional activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-service training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot test review</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pilot test report</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully implementation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collect and handle feedback</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation-staff satisfactory survey</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project report</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation report</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


## Appendix 9: Superwarm Guideline Implementation Record

### Department of Paediatrics and Adolescent Medicine

#### Superwarm Guideline Implementation Record

Please attach this Superwarm Guideline Record Sheet to the patient chart till transfer out or discharge.

<table>
<thead>
<tr>
<th>Patient Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational weeks:</td>
</tr>
<tr>
<td>Birth Weight:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient’s Gum Label</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Delivery Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date &amp; Time of Delivery:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Superwarm Guideline Applied:</th>
<th>Y / N</th>
</tr>
</thead>
</table>

If No, it is because:
- Delivered before neonatal team arrived
- Congenital anomalies
- Skin lesion
- Others, please specify:

<table>
<thead>
<tr>
<th>Name of NICU Nurse Apply Occlusive Wrap:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Intervention Given</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyethylene Bag (Size: 20x50cm):</td>
</tr>
<tr>
<td>Cotton Cap:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission Temperature:</td>
</tr>
</tbody>
</table>

Remove polyethylene bag after admission temperature taken: Y / N

<table>
<thead>
<tr>
<th>Temperature 1 hour after admission:</th>
</tr>
</thead>
<tbody>
<tr>
<td>℃</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discharge Code:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home / Transfer out / Death / Others, pls specify:</td>
</tr>
</tbody>
</table>

Please fill in the highlighted parts and circle the appropriate item if option provided.
Appendix 10: Nurse Satisfaction Survey (A)

Department of Paediatrics and Adolescent Medicine

Staff Satisfaction Survey for the Superwarm Guideline Briefing and Educational Session and Workshop

To review the effectiveness of Superwarm Guideline briefing & educational session and workshop, please indicate how satisfied you are when you involved in the briefing and educational session and/or workshop (Fill in the related table of briefing and education session/workshop if you only attended one of them). Please circle the appropriate number to describe your satisfaction rate in the Likert Scale (1 = Highly Disagree, 2 = Slightly Disagree, 3 = Neutral, 4 = Slightly Agree, 5 = Highly Agree).

A. Briefing and Educational Session

<table>
<thead>
<tr>
<th>Item</th>
<th>Highly Disagree</th>
<th>Slightly Disagree</th>
<th>Neutral</th>
<th>Slightly Agree</th>
<th>Highly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The content of the briefing &amp; educational session is clear.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2 The content of the briefing session is easy to understand.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3 Coverage of subject is appropriate.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4 Duration of the course is appropriate.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5 In general, I find the briefing session is useful to enrich my theoretical knowledge.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

B. Workshop

<table>
<thead>
<tr>
<th>Item</th>
<th>Highly Disagree</th>
<th>Slightly Disagree</th>
<th>Neutral</th>
<th>Slightly Agree</th>
<th>Highly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Demonstration of technique is appropriated.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2 The instructions given by the trainers are clear.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3 Your technique and skill in related field enriched.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4 The trainers are expertise in the related field.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5 Duration of the course is appropriate.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6 In general, I find the workshop is useful.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

General comments on the briefing and education session/workshop:

________________________________________________________________________

Personal Data:

Rank: □WM □NO □APN □RN

Post-registration experience: ________ years

Nursing experience in present unit: ________ years

Thank you for your comments
Appendix 11: Nurse Satisfaction Survey (B)

Department of Paediatrics and Adolescent Medicine

Nurse Satisfaction Survey for the Superwarm Guideline Implementation

To review the effectiveness of Superwarm Guideline, please indicate how satisfied you are when you involved in the implementation of the guideline. Please circle the appropriate number to describe your satisfaction rate in the Likert Scale (1 = Highly Disagree, 2 = Slightly Disagree, 3 = Neutral, 4 = Slightly Agree, 5 = Highly Agree).

**Guideline implementation**

<table>
<thead>
<tr>
<th>Item</th>
<th>Highly Disagree</th>
<th>Slightly Disagree</th>
<th>Neutral</th>
<th>Slightly Agree</th>
<th>Highly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 You understand why apply the Superwarm Guideline.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2 You find the guideline is beneficial to preterm infants.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3 You find the guideline is easy to implement.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4 Implementing the guideline will not increase your workload.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5 Other colleagues in the delivery room support your action.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6 Your implementation will not make inconvenient to the doctors or midwives in the delivery room.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7 In general, you are satisfied with the implementation of Superwarm guideline in your workplace</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

General comments on the Guideline:

__________________________________________________________

Personal Data:

Rank: □ WM □ NO □ APN □ RN

Post-registration experience: ________ years

Nursing experience in present unit: ________ years

*Thank you for your comments*
Appendix 12: Doctor Satisfaction Survey

Department of Paediatrics and Adolescent Medicine

Doctor Satisfaction Survey for the Superwarm Guideline Implementation

To review the effectiveness of Superwarm Guideline, please indicate how satisfied you are when you involved in the delivery process with a nurse implementation Superwarm Guideline. Please circle the appropriate number to describe your satisfaction rate in the Likert Scale (1 = Highly Disagree, 2 = Slightly Disagree, 3 = Neutral, 4 = Slightly Agree, 5 = Highly Agree).

<table>
<thead>
<tr>
<th>Item</th>
<th>Highly Disagree</th>
<th>Slightly Disagree</th>
<th>Neutral</th>
<th>Slightly Agree</th>
<th>Highly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 You understand why apply the Superwarm Guideline.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2 You find the guideline is beneficial to preterm infants.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3 The nurse is skillful when she put the infant into the plastic bag.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4 Put the preterm infant in the plastic bag will not make inconvenient to you during the stabilize/resuscitation process.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5 In general, you are satisfied with the implementation of Superwarm guideline in your workplace</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

General comments on the Guideline:

________________________________________________________________________

Gestational weeks of the preterm infants: _______ weeks

Personal Data:
Rank: ☐ SMO ☐ AC ☐ MO
Post-registration experience: _______ years
Medical experience in present unit: _______ years

Thank you for your comments
Reference


