
ANTENATAL BREAST EXPRESSION

Dr. Christina Raimondi MD CCFP

Dr. Katherine Kearns MD CCFP

OBJECTIVES:

- 1) What is antenatal breast expression (ABE)
- 2) Discuss potential benefits and harms of ABE
- 3) Discuss some historical research in ABE
- 4) Discuss the current evidence for antenatal breast expression in the context of diabetes during pregnancy
- 5) Critically review a recent (2017) RCT looking at safety of antenatal breast expression in low risk diabetic women
- 6) Discuss prospects for future research



ANTENATAL BREAST EXPRESSION

- Colostrum is made in women as early as 16 weeks gestation
 - Breast expression can be done via hand expression or pumping
 - There is disagreement on how frequently to express and when it should be started
 - Concern that hand expressing or pumping antenatally may confer some risks such as early labour and neonatal harm
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ABE POTENTIAL BENEFITS



- Having Colostrum on hand for supplementation to the neonate at risk of hypoglycaemia
 - Colostrum's benefits compared to artificial milk in the above context (GI flora, immune protection, better glucose stability)
 - Protection against supplementing, as early supplementation has been associated with early weaning
 - Increasing mom's confidence in her breastfeeding abilities
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ABE POTENTIAL HARM



- Potential of inducing contractions with nipple stimulation
 - Potential of early labour and early birth with ABE
 - Potential of neonatal harm including NICU admission because of early birth
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SOME HISTORY

- Antenatal Breast Expression: a critical review of the literature. Chapman 2013
 - In this review, it was discussed that the practice of Antenatal Breast Expression has been studied for 4 reasons:
 - 1) as a form of breast preparation prior to birth
 - 2) as a method of inducting labour
 - 3) expressing and discarding colostrum while pregnant to speed up lactogenesis 2 post delivery
 - 4) for the collection and storage of colostrum as a means of preventing neonatal hypoglycaemia
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1946-1983

- Research dating back to 1946 studied ABE as a form of “breast preparation” Dr. Waller 1946 and later Dr. Blaikley et al 1953 from Britain concluded ABE resulted in increased milk production, increased exclusive rates of breastfeeding at 6 mo, and, decreased engorgement and nipple injury
 - A 3rd Swedish study Ingelman-Sundberg (1958) contradicted the 1st two studies. It was a larger sample and concluded no difference in breastfeeding rates (at discharge) and increased rates of mastitis in the ABE group
 - 1970’s two small studies showed no benefit to nipple trauma or infant weight gain, no increase in bf rates at 6mo postpartum and increased engorgement
 - 1983 a UK survey (Mundy) was the last report published specifically for the preparation of breasts, results showing that only 13% of pregnant women practiced this
 - 1990’s “Breast Preparation” in the antenatal period was no longer recommended after further studies around other forms of breast prep also showed no benefit to lactating mothers
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1986-1993

- Studies using nipple stimulation to induce a contraction “stress test” of fetuses as a means to ripen cx and augment labour. Studies showed possible cx changes but nipple stimulation had no significant effect on induction, duration of labour or fetal outcome
 - DiLieto et al 1989 hypothesized that nipple stimulation at term might help ripen the cervix for induction. 60 term women randomized to nipple stimulation 45 min 3x a day x3 days. Concluded significant changes in bishop scores (cervical changes) with nipple stimulation
 - Stein et al (1990) - randomized prospective study evaluating effect of augmented labour with breast pump vs. oxytocin infusion. No differences in length of labour
 - Curtis et al (1999) - no difference in labour time or fetal outcome when using nipple stimulation vs. oxytocin infusion for induction. 65% needed to be switched to oxytocin IV
 - Mashini et al (1987) 25% (45 women) did not achieve adequate contraction patterns after 15 stim-rest cycles totalling 110 min. Three women had uterine hyper stimulation
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MORE RECENTLY

- (Singh 2009) an RTC of women (without diabetes) antenatally expressing to test the hypothesis that the practice would reduce breastfeeding “failures” after birth. 2.2% of the 90 women in the non-ABE group took longer than 72 hours for “full lactation”. All of the 90 women in the ABE group achieved full lactation in 72 hours.
 - More studies looking at ABE to help achieve “full lactation” from India
 - Studies specific to diabetic women looking at using ABE to collect colostrum for use in the newborn period
 - DAME study 2017 - an RCT on this subject!!
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THE CONTEXT OF DIABETES

- Increasing incidence of DM2, GDM
 - Canadian Institute for Health Information reports 40/1000 GDM in 2005 and 54/1000 GDM in 2013 (lowered diagnostic thresholds, increasing number of women of reproductive age who are obese)
 - Infants of GDM mom's are at higher risk of neonatal **hypoglycaemia**, admission to NICU, not being exclusively breastfed, and shorter duration of breastfeeding. They are also at increased risk of later developing DM2 themselves, with greater risk if not breastfed
 - Moms with diabetes who don't breastfeed are at an increased risk for progression to DM2, with GDM being the strongest population predictive factor for DM2
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HYPOGLYCAEMIA

- Academy of Breastfeeding Medicine Hypoglycaemic Protocol 2014
- Definition : The incidence of “hypoglycaemia” varies with the definition. Many authors have suggested numeric definitions of hypoglycaemia, usually between 1.7–2.8 mmol/L, and varying by postnatal age. **There is no scientific justification for the value of (2.6 mmol/L) adopted by some clinicians**

Transient hypoglycaemia in the first hours after birth is common, occurring in almost all mammalian newborns. In healthy, term human infants, even if early enteral feeding is withheld, this phenomenon is self-limited, without clinical signs, and considered to be part of adaptation to postnatal life, as glucose levels spontaneously rise within the first 24 hours after birth

No studies have shown that treating transiently low blood glucose levels results in better short-term or long-term outcomes compared with no treatment, and in fact there is no evidence at all that hypoglycaemic infants with no clinical signs benefit from treatment

Increases in neurodevelopmental abnormalities have been found in infants who have hypoglycaemia associated with abnormal clinical signs, especially those with severe, persistent hyperinsulinemic hypoglycaemia

ABM HYPOGLYCAEMIC PROTOCOL 2014

Table 2. Operational Thresholds for Treatment of Plasma Glucose Levels

Infant with clinical signs and < 2.5 mmol/L:

Clinical interventions to increase blood glucose concentration

Infants with very low glucose concentration (1.1-1.4 mmol/L):

Clinical intervention - IV glucose infusion to raise plasma glucose levels to > 2.5 mmol/L

Infants with risk factors:

Initiate glucose monitoring as soon as possible after birth, within 2–3 hours after birth and before feeding, or at any time there are abnormal signs. If plasma glucose concentration is < 2.0 mmol/L, close surveillance should be maintained.

Intervention is recommended if plasma glucose remains below this level, does not increase after a feed, or if abnormal clinical signs develop.

NEWBORNS AT RISK OF HYPOGLYCAEMIA ?



- Maternal factors
 - Breast hypoplasia
 - Breast surgery
 - Metabolic - PCOS, DMI, DM2
GDM (delayed lactogenesis 2)

NEWBORNS AT RISK OF HYPOGLYCAEMIA?



- Infant factors :
 - poor tone (Down's)
 - oral issues (cleft lip/palate)
 - preterm
 - small for gestational age
 - large for gestational age
 - infant of Diabetic mom (hyperinsulinemia)
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Academy of Breastfeeding Medicine Hypoglycaemia Protocol 2014

Table 3. At-Risk Infants for Whom Routine Monitoring of Blood Glucose Is Indicated

- 1) Small for gestational age: < 10th percentile for weight commonly cited in the United States; < 2nd percentile cited in the United Kingdom as above this considered small normal
 - 2) Babies with clinically evident wasting of fat and muscle bulk
 - 3) Large for gestational age: > 90th percentile for weight and macrosomic appearance
 - 4) Discordant twin: weight 10% < larger twin
 - 5) All infants of diabetic mothers, especially if poorly controlled**
 - 6) Low birth weight (< 2,500 g)
 - 7) Prematurity (< 35 weeks, or late preterm infants with clinical signs or extremely poor feeding)
 - 8) Perinatal stress: severe acidosis or hypoxic-ischemia
 - 9) Cold stress
 - 10) Polycythemia (venous Hct > 70%)/hyperviscosity
 - 11) Erythroblastosis fetalis
 - 12) Beckwith–Wiedemann’s syndrome
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ABM PROTOCOL HYPOGLYCAEMIA 2014

Table 4. Clinical Manifestations of Possible Hypoglycaemia

Irritability

Tremors

Jitteriness

Exaggerated Moro reflex

High-pitched cry

Seizures or myoclonic jerks

Lethargy, listlessness, limpness, hypotonia

Coma

Cyanosis, apnea or irregular breathing, tachypnea

Hypothermia, temperature instability

Vasomotor instability

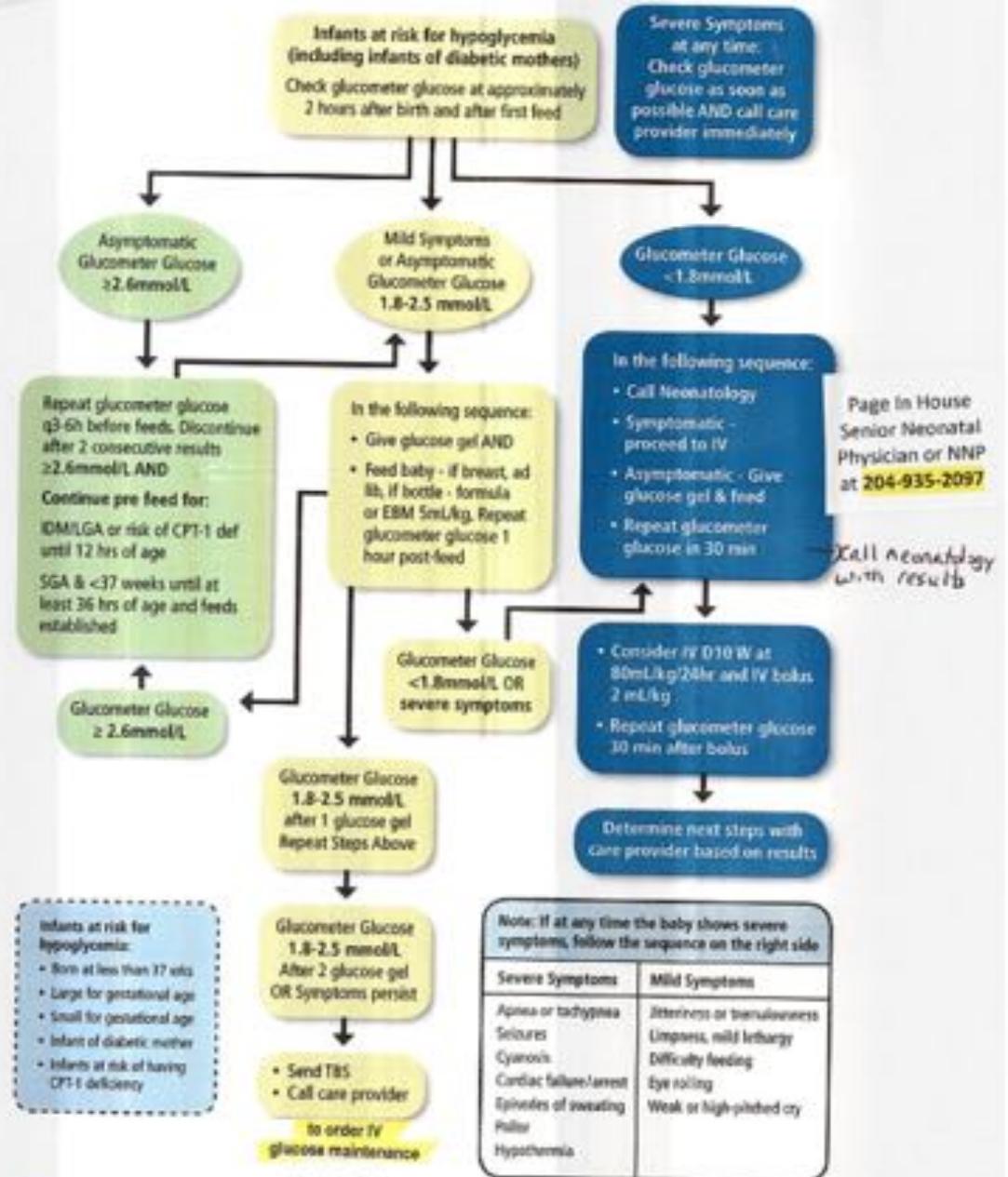
Poor suck or refusal to feed

ABM HYPOGLYCAEMIC PROTOCOL 2014

- **ABM recommendations:**
 - Routine screening and supplementation are not necessary and may harm the normal establishment of breastfeeding
 - Current evidence does not support a specific blood concentration of glucose that correlates with signs or that can predict permanent neurologic damage in any given infant
 - At-risk infants should be screened, followed up as needed, and treated with supplementation or IV glucose if there are clinical signs, or if suggested thresholds at your location are reached
 - Bedside screening is helpful, but not always accurate, and should be confirmed with laboratory glucose measurement
 - Hypoglycaemic encephalopathy and poor long-term outcome are extremely unlikely in infants with no clinical signs and are more likely in infants who manifest clinical signs and/or with persistent or repeated episodes of severe hypoglycaemia
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WRHA Protocol Algorithm

Algorithm Hypoglycemia Screening and Management in Newborns ≥ 35 wks



EVIDENCE FOR ABE IN DIABETES

- Prior to now - two small studies (below), no RCTs, questions about safety limit studies
- (Forster et al 2011) prospective non randomized pilot study of 43 women. It suggested antenatal colostrum expression was feasible. 30% women expressed higher confidence, 30% found ABE difficult, and there was an increase in admissions to special care nurseries
- (Soltani et al 2012) a retrospective survey study of women looking at acceptability risks and benefits of ABE to collect colostrum in diabetic women. 35/94 women recalled being advised to express antenatally, however only 16/94 did. The study found an association with earlier delivery and admission of newborns to special care nurseries. Results did not reach statistical significance
- A Cochrane review 2014 concluded there was “no high level systematic evidence” to suggest this practice was safe or effective
- Academy of Breastfeeding Medicine Protocol for hypoglycaemia (2014)

Recent reports of mothers with diabetes expressing and freezing colostrum prenatally (beginning at 34–36 weeks of gestation), to have it available after birth, to avoid artificial feedings should their infant become hypoglycaemic, are mixed (in terms of association with earlier births), and currently this procedure is not widely recommended.

- Despite this, the practice of recommending breast expression in late pregnancy, to provide colostrum for the immediate post birth period (in infants at risk for hypoglycaemia when mothers milk is not yet sufficient) is growing
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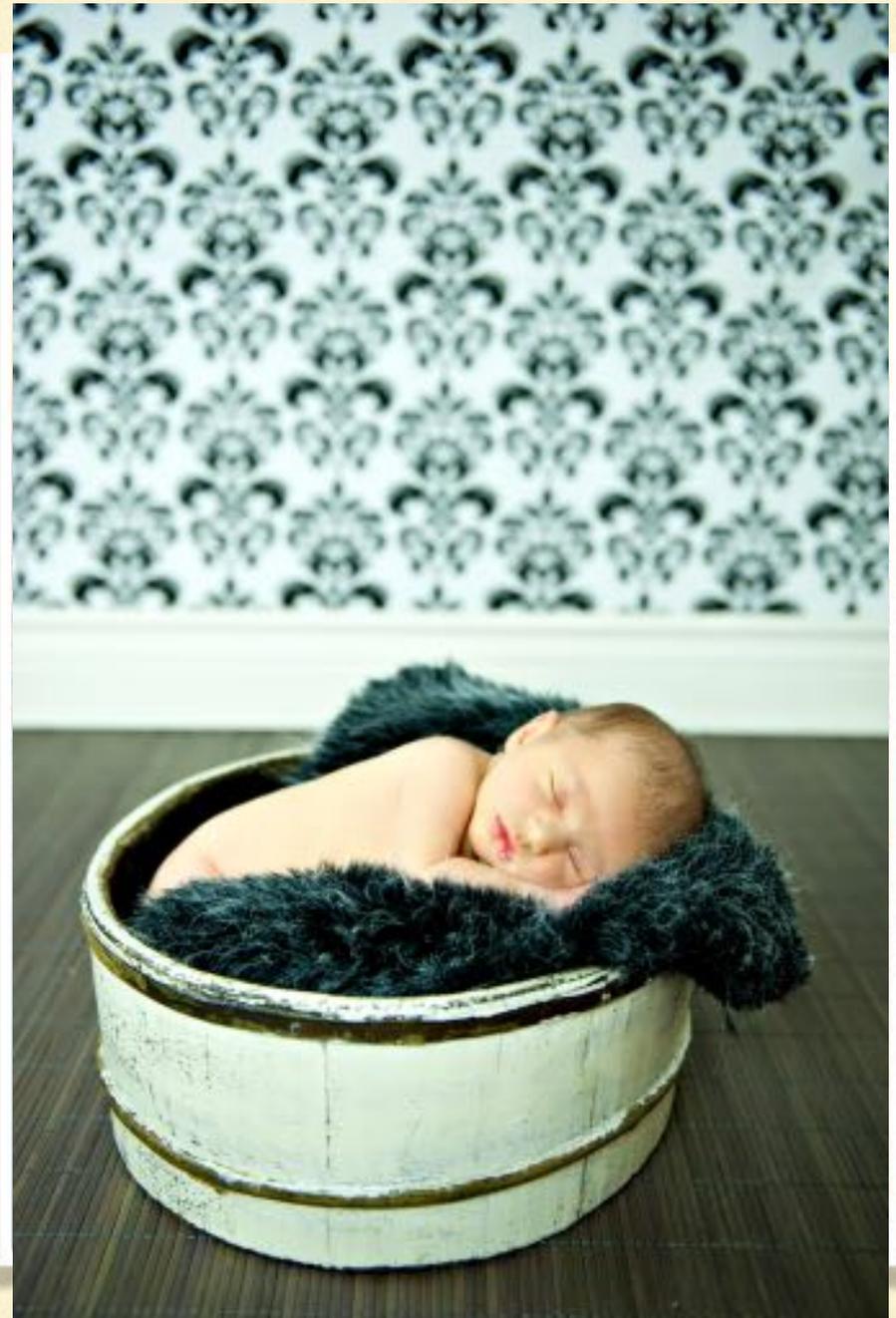
2017 - THE DAME STUDY

- DAME Study - Diabetes and Antenatal Milk Expression. Authors Forster et al, published in the Lancet in June, 2017. An unblinded, randomized controlled trial at six hospitals in Victoria, Australia from 2011-2015
 - 635 women with preexisting DMI, DM2 or GDM, with a singleton pregnancy, at 34-37 week gestation expressing interest in breastfeeding (most were GDM, more than half were primips and half were overt DM2 or obese)
 - **Excluded:** non cephalic fetus, known fetal anomaly, polyhydramnios, abnormal marker of fetal wellbeing, suspicion of fetal compromise (IUGR, documented macrosomia with estimated wt >95%ile), hx antepartum hemorrhage/ placenta previa, hx >1 lower segment c/s, hx any classic or unknown incision site c/s, HTN with proteinuria, serious maternal obstetrical, mental health, or medical issues
 - Randomly assigned to two groups:
 - 1) Antenatal Milk Expressing (hand expressing) at 36 weeks gestation 2x a day, for no more than 10 minutes each time, until labour
 - 2) Standard care
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METHODS

Neonatal Hypoglycaemia was defined as : $<2.6\text{mmol/L}$, measured before feeds, using glucose oxidase method on blood gas analyzer

Existing guidelines and protocols for management of hypoglycaemia were followed at each site



DAME STUDY - ABE SAFETY

- Primary outcome: safety - the number of infants admitted to NICU
 - results show no difference in NICU admissions between the two groups
 - expressing group 46/317 (15%)
 - standard care 44/315 (14%)
 - secondary outcome : Mean gestational age at birth did not differ between groups
 - expressing group 38.6 wks
 - standard care 38.7 wks
 - **first RCT to show evidence of safety**
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DAME STUDY - ABE BENEFIT

- Greater proportion of infants, whose mothers did ABE, were exclusively breastfed at 24 hours (ABE 217/317 **69%** / standard 189/315 **60%**) and through their hospital stay (up to 7 days)
 - No difference in breastfeeding rates at 3 months
 - exclusive BF at 3mo ABE group :169/284 (**60%**) stand group :156/286 (**55%**)
 - any BF at 3mo ABE group: 235/284 (**83%**) stand group: 233/286 (**82%**)
 - No difference in other neonatal outcomes - birth weight, apgars, time until 3 consecutive glc readings >2.6 mmol/L, length of hospital stay, reasons for NICU admissions (most commonly hypoglycaemia, infection and respiratory distress)
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EXPRESSING GROUP



- EXPRESSING FREQUENCY
 - 19/316 women didn't express at all
 - 25/316 women expressed 2-5 times only
 - 80/316 women expressed 6-19 times
 - 134/316 women >20 times
 - 49/316 expressed, but unclear how many times
 - 9/316 unknown if expressed or not
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EXPRESSING GROUP



- Avg. number of expressing episodes = 20
 - Avg. total volume expressed each time = 5.5ml
 - Avg. maternal blood glucose post expressing = 5.6 of which 17/317 women had hypoglycaemia post expressing (0 had hypoglycaemia in standard care group)
 - Abdominal pain after expressing 10/317
 - 3/317 had “fetal compromise associated with expressing” described as reduced fetal movements of no significant sequelae
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DAME STUDY - LIMITATIONS

- Limited to women with diabetes (either DMI, DM2 or GDM)
 - 93% of women in the DAME study were GDM, so less applicable to pre-existing DM2, DMI
 - No comment about diabetes control in the study population, but population was limited to women without conditions associated with poor control (macrosomia, polyhydramnios)
 - Limited to low risk pregnancies
 - Limited to singleton pregnancies
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FUTURE STUDIES?

- Suggestions from Academy of Breastfeeding Medicine (ABM protocol Hypoglycaemia 2014)
 - 1. Well-planned, well-controlled studies are needed, that look at plasma glucose concentrations, clinical signs, and long-term sequelae to determine what levels of blood glucose are the minimum safe levels.
 - 2. The development and implementation of more reliable bedside testing methods would increase the efficiency of diagnosis and treatment of significant glucose abnormalities.
 - 3. Studies to determine a clearer understanding of the role of other glucose-sparing fuels and the methods to measure them in a clinically meaningful way and time frame are required to aid in understanding which babies are truly at risk of neurologic sequelae and thus must be treated.
 - 4. For those infants who do become hypoglycaemic, research into how much enteral glucose, and in what form, is necessary to raise blood glucose to acceptable levels is important for clinical management.
 - **5. More randomized controlled studies of prenatal colostrum expression and storage for mothers with infants at risk of hypoglycaemia are important to determine if this is a practical and safe treatment modality.
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FUTURE STUDIES

- OTHER IDEAS?

SUMMARY

- The practice of antenatal breast expression has been going on for a long time, though the reason for it has continued to change
 - Though there are minimal research studies (even less of high quality), the results are often conflicting
 - There is agreement about the potential benefit of ABE, especially in the context of diabetes in pregnancy
 - The DAME study is reassuring in regards to the safety of ABE in the context of diabetes in pregnancy
 - There is definitely more research that needs to be done
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QUESTIONS?

CLINICAL EXPERIENCES?

RESOURCES

[Advising women with diabetes in pregnancy to express breastmilk in late pregnancy \(Diabetes and Antenatal Milk Expressing \[DAME\]: a multicentre, unblinded, randomised controlled trial\)](#)

Forster, Della A ; Moorhead, Anita M ; Jacobs, Susan E ; Davis, Peter G ; Walker, Susan P ; Moegan, Kerri M ; Opie, Gillian F ; Donath, Susan M ; Gold, Lisa ; Mcnamara, Catharine ; Aylward, Amanda ; East, Christine ; Ford, Rachael ; Amir, Lisa H
The Lancet, 3-9 June 2017, Vol.389(10085), pp.2204-2213 [Peer Reviewed Journal]

Antenatal Milk Expression for women with diabetes in pregnancy

Berens, Pamela

The Lancet, 3-9 June 2017, Vol.389(10085), pp.2167-2168 [Peer Reviewed Journal]

[Antenatal breast milk expression by women with diabetes for improving infant outcomes](#)

East, Christine E ; Dolan, Willie J ; Forster, Della A

The Cochrane database of systematic reviews, 2014(7), pp.CD010408 [Peer Reviewed Journal]

[Antenatal breast milk expression by women with diabetes for improving infant outcomes](#)

East, Christine E ; Dolan, Willie J ; Forster, Della A

Cochrane Database of Systematic Reviews, 2013

[Effect of Antenatal Breast Milk Expression at Term Pregnancy to Improve Post Natal Lactational Performance](#)

Lamba, Sunita ; Chopra, Simmy ; Negi, Mamta

The Journal of Obstetrics and Gynecology of India, 2016, Vol.66(1), pp.30-34 [Peer Reviewed Journal]

[Antenatal breast milk expression and storage by women with diabetes in pregnancy for improving infant outcomes](#)

East, Christine ; Mockler, Joanne C. ; Dolan, Willie ; Forster, Della

Women and Birth, October 2013, Vol.26, pp.S26-S26 [Peer Reviewed Journal]

[Antenatal breast expression in women with diabetes: outcomes from a retrospective cohort study](#)

Soltani, Hora ; Scott, Alexandra

International Breastfeeding Journal, 2012, Vol.7 [Peer Reviewed Journal]

[Antenatal breast expression: A critical review of the literature](#)

Chapman, Tegan ; Pincombe, Jan ; Harris, Mary

Midwifery [Peer Reviewed Journal]

[Safety and efficacy of antenatal milk expressing for women with diabetes in pregnancy: protocol for a randomised controlled trial](#)

Forster, Della A ; Jacobs, Susan ; Amir, Lisa H ; Davis, Peter ; Walker, Susan P ; Moegan, Kerri ; Opie, Gillian ; Donath, Susan M ; Moorhead, Anita M ; Ford, Rachael ; Mcnamara, Catharine ; Aylward, Amanda ; Gold, Lisa
BMJ Open, 2014, Vol.4(10) [Peer Reviewed Journal]

Academy of Breastfeeding Medicine Hypoglycemic protocol 2014

WRHA newborn hypoglycemia protocol



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