WORKSHEET for Evidence-Based Review of Science for Cord Clamping

Worksheet author(s)
Nalini Singhal
Dianne L. Atkins

Date Submitted for review: Feb. 2009
December 2009, Final Revision March 6th 2010

Clinical question.
In neonates (P), does delayed cord clamping cord (I) versus standard management (C), improve outcome (O)

Is this question addressing an intervention/therapy, prognosis or diagnosis? Intervention
State if this is a proposed new topic or revision of existing worksheet: Revision

Conflict of interest specific to this question
Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet? No

Search strategy (including electronic databases searched).
OVID: Keywords used: Cord clamping, Placental transfusion, Neonatal transition, Umbilical cord, Maternal-fetal exchange. Limit to neonate.
EMBASE; Placenta, transfusion, umbilical cord clamping.
COCHRANE; Umbilical Cord
Endnode: Placenta and blood transfusion.

State inclusion and exclusion criteria
Inclusion-human, neonate, newborn, preterm , term, infant. Systematic reviews.
Exclusion-male, cord clamping of cervical cord, animal and milking of the cord, nuchal cord
Commentaries and reviews were looked at but excluded from the work sheet.
Worksheet was done for 2005 so only reviewing 2004-2009
Articles before 2005 are included in the evidence grid. (Total 23)

Number of articles/sources meeting criteria for further review:
78 articles from which 6 were non English. 1 Spanish systematic review, 1Portugese study, 1 Dutch review, 1 Danish review, 1 Danish study and 1 Swedish care program.
Spanish systematic review translated by coauthor and Danish study not translated
Of the remaining 72 after excluding commentaries and reviews 21 articles are reviewed including the Portuguese article.
Of these 21 articles, 15 are studies and 6 are systematic reviews. (P=Preterm in the summary evidence)
# Summary of evidence

## Evidence Supporting Clinical Question

<table>
<thead>
<tr>
<th>Good</th>
<th>Evidence Supporting Clinical Question</th>
<th>Fair</th>
<th>Evidence Supporting Clinical Question</th>
<th>Poor</th>
<th>Evidence Supporting Clinical Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hutton 2007(E)</td>
<td>Mc Donald 07(E)</td>
<td>Ceriani 2006(E)</td>
<td>Zaramella 2007(E)</td>
<td>Ultee (P) 2008(E)</td>
<td></td>
</tr>
<tr>
<td>Rabe(P) 2004(E)</td>
<td></td>
<td>Emhamed 2004(E)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mercer(P) 2006(E)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rabe(P)2008(E)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>vanRheenen04(E)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

A = Return of spontaneous circulation  
B = Survival of event  
P = PRETERM  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint  
*Italics* = Animal studies
### Evidence Neutral to Clinical question

<table>
<thead>
<tr>
<th>Good</th>
<th>vanRheenen 2007(E)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fair</td>
<td>Jahazi 2008(E)</td>
<td>Kugelman(P) 2007(E)</td>
<td>Wiberg 2008(E)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>vanRheenen 2006(E)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Level of evidence**

A = Return of spontaneous circulation  
B = Survival of event  
P=PRETERM  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint  
Italics = Animal studies

### Evidence Opposing Clinical Question

<table>
<thead>
<tr>
<th>Good</th>
<th>McDonald 2007(E)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Level of evidence**

A = Return of spontaneous circulation  
B = Survival of event  
P=PRETERM  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint  
Italics = Animal studies
### Evidence Supporting Clinical Question
Combined Grid including articles is 2004 worksheet

|------|------------------|---------------|----------------|-----------------|----------------|------------------|------------|------------|

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

### Evidence Neutral to Clinical question
Combined Grid including articles is 2004 worksheet

<table>
<thead>
<tr>
<th>Good</th>
<th>vanRheenen 2007(E)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

A = Return of spontaneous circulation  C = Survival to hospital discharge  E = Other endpoint
**REVIEWER’S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:**

Trials included in this review are since the last worksheet of 2004.
There are variations between definition of delayed cord clamping (DCC) versus early cord clamping (ECC), location of the infant in relation to the placenta, management of third stage of labor and definition of prematurity. The varied outcomes measured are blood volume, cerebral oxygenation, and hematocrit at 1 hour of age up to hemoglobin at 6 months, bilirubin levels, and iron status up to 6 months, blood pressure, cardiac function, IVH, BPD and late on set sepsis.

9 studies were in term infants and 6 in preterm infants. Table of studies is attached.
3 Reviews are for term infants
2 reviews for preterm infants
1 Review for low birth weight infants.
Mercer 2006 and McDonald 2007 appear twice in the tables of evidence because they showed neutral and supporting (Mercer) and supporting and opposing evidence (McDonald).

**PRETERM**

Resuscitation can be done before clamping the cord (Aladangady 2006 pg. 93 - 98).
There is higher blood volume (Aladangady 2006 pg. 93 - 98), blood pressure (Kugelman 2007 pg. 307 - 315), RBC volume (Strauss 2008 pg. 658 - 665) and hemoglobin (Ultee 2008 pg. F20-3) in the delayed clamping cord (DCC) group. There was a decreased use of pressors. There is indirect evidence that the delayed cord clamping group were likely to have a smoother transition as their cardiovascular system was more stable.

DCC group had fewer transfusions (Rabe 2004 CD003248, Aladangady 2006 pg. 93 - 98, Mercer 2006 pg. 1235 - 1242, Baenziger 2007 pg. 455 - 459, Kugelman 2007 pg. 307 - 315, Rabe 2008 pg. 138 - 144). Even though the hematocrits were higher (Strauss 2008 pg. 658 - 665) they did not lead to fewer transfusions.

Preterms had higher bilirubin levels, polycythemia and some studies received more phototherapy however there was no correlation between phototherapy and polycythemia.

There are reports of less IVH (Mercer 2006 pg. 1235 - 1242, Rabe 2008 pg.. 138 - 144) in DCC group.
There are no reports of increased need for exchange transfusion for polycythemia or hyperbilirubinemia, respiratory distress or poor neurodevelopmental outcome from polycythemia.

**TERM**

Major focus of studies has been prevention of iron deficiency anemia.
There are reports of higher hemoglobin/hematocrit ranging from soon after birth to 4-6 months following birth (Ceriani 2006 e779-86, Chaparro 2007 pg. 506 - 512, Emhamed 2004 pg. 218 - 222, vanRheenen 2006 pg. 157 - 167). Higher ferritin levels and breast feeding rates in DCC group. (Venancio 2008 Suppl 2:S323-31).

Meta-analysis show benefits in hematological indices (McDonald 2008 CD004074) and more clinical jaundice (vanRheenan 2004 pg. 3 - 16, McDonald 2008 CD004074). There is increased use of phototherapy (McDonald 2008 CD004074) however the studies used in the meta-analysis did not define indications for phototherapy. There are no correlations between polycythemia, increased levels of bilirubin and use of phototherapy.

Neonates at increased risk of iron deficiency anemia benefit from increase in hematocrit, hemoglobin and ferritin.
One study documents increased hemoglobin and ferritin levels at 6 months, another reports increase at 4 months and similar levels at 6 months. (Venancio 2008 Suppl 2:S323-31).

There is an increase in need for phototherapy. No significant differences in bilirubin levels, even though there are reports of increased bilirubin levels. The study that reports increased need for phototherapy reports similar mean bilirubin levels in the 2 groups.

None of the studies report an increased risk of clinically significant polycythemia.

Overall the definitions of delayed cord clamping vary from 30 seconds to when the cord stops pulsating.
None of the studies report harmful effects of delayed cord clamping. Even though modest all the studies report benefits of delaying cord clamping.
There is no study examining the benefits of early cord clamping.
Delayed cord clamping used to be the historical norm till the 20th century. The practice of change to early cord clamping coincides with the establishment of the specialty of obstetrics.
There is increasing evidence that delayed cord clamping for 60 seconds is likely to be of benefit in both the preterm and term infant.

Acknowledgements:

SUMMARY OF STUDIES

<table>
<thead>
<tr>
<th>Study</th>
<th>Randomization</th>
<th>DCC/ECC definition</th>
<th>Outcome</th>
<th>Term/Preterm</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aladangady UK</td>
<td>Yes Stratified gest. DCC=23 ECC=23</td>
<td>DCC 30-90s ? location of infant</td>
<td>Blood volume</td>
<td>Preterm 24 to 326/7 weeks.</td>
<td>Blood volume greater in vaginal and total group. Not significantly change in C/S. Some babies resuscitated before cord clamped.</td>
</tr>
<tr>
<td>2. Baenziger Switzerland</td>
<td>Yes DCC=15 ECC=24</td>
<td>DCC 60-90secs. Infant at least 15 cm below placenta</td>
<td>Cerebral oxygenation</td>
<td>Preterm 24-32 completed weeks</td>
<td>Part of a larger study. Cerebral blood volume similar at 4 hours. Mean regional tissue oxygenation higher at 4 and 24hrs. Hct. higher 4, 24 and 72 hrs similar at 36 weeks.</td>
</tr>
<tr>
<td>3. Ceriani Argentina.</td>
<td>Yes DCC 3 min.=92 DCC 1 min.=91 ECC=93</td>
<td>DCC 60 seconds and 180 seconds ECC within 15 seconds</td>
<td>Venous Hematocrit and clinical</td>
<td>Term</td>
<td>Hematocrit higher in DCC was not statistically significant. Less number of babies had anemia in DCC. Breast feeding and Clinical outcomes similar.</td>
</tr>
<tr>
<td>4. Chaparro Mexico</td>
<td>Yes DCC=139 ECC=127</td>
<td>DCC 120 seconds ECC 10 seconds</td>
<td>Iron and lead status</td>
<td>Term</td>
<td>Part of another trial. Blood lead concentration higher in ECC</td>
</tr>
<tr>
<td>5. Chaparro Mexico</td>
<td>Yes DCC=237 Ecc=239</td>
<td>DCC 120 seconds ECC 10 seconds</td>
<td>Hematologic and Iron status at 6 months</td>
<td>Term</td>
<td>25% lost to follow up DCC group higher MCV, ferritin and total body iron</td>
</tr>
<tr>
<td>6. Emhamed Libya</td>
<td>No Continuously randomized?? DCC=57 ECC=45</td>
<td>DCC cord stopped pulsating ECC 10seconds</td>
<td>Hematologic effects 24 hours</td>
<td>Term</td>
<td>DCC mean 215 seconds Higher hemoglobin DCC No difference in need for</td>
</tr>
<tr>
<td>No.</td>
<td>Author</td>
<td>Country</td>
<td>Included</td>
<td>DCC</td>
<td>ECC</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>---------</td>
<td>----------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>7.</td>
<td>Jahazi</td>
<td>Iran</td>
<td>Yes</td>
<td>34</td>
<td>30</td>
</tr>
<tr>
<td>8.</td>
<td>Kugelman</td>
<td>Israel</td>
<td>Yes</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>9.</td>
<td>Mercer</td>
<td>USA</td>
<td>Yes</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>10.</td>
<td>Strauss</td>
<td>USA</td>
<td>Yes</td>
<td>45</td>
<td>60</td>
</tr>
<tr>
<td>11.</td>
<td>Ultee</td>
<td>Netherlands</td>
<td>Yes</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Study Location</td>
<td>Methodology</td>
<td>Findings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>van Rheenen, Zambia</td>
<td>Yes, DCC=46, ECC=45</td>
<td>DCC Cord stopped pulsation (mean 305s) ECC 20 seconds. Hematologic status in malaria-infected area. Complications Term Preterm, C/S need for resuscitation. Even though the hemoglobin levels were similar at 4 months more infants in the ECC group were anemic. (P=0.05) At 6 months no difference. No adverse events.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venancio, Brazil</td>
<td>Alternate weeks, DCC=164, ECC=161</td>
<td>DCC=60 seconds, ECC=Immediate Anemia 3 months. Term Resuscitation excluded. 69% follow up data. Higher ferritin levels and more breast feeding trend.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiberg, Sweden</td>
<td>No, N=70</td>
<td>Only DCC Samples taken every 45 seconds. Cord arterial and venous blood gas and lactate. 36-42 weeks Excluded neonates needing resuscitation. Found a significant decrease in pH and increase in lactate from 0 to 90 seconds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zarmella, Italy</td>
<td>No case control, DCC=11, ECC=11</td>
<td>DCC-240 seconds, ECC-30 seconds Mothers arms. Cardiac function. Term Only healthy. Larger left ventricular diameter at end of systole. No change in peripheral perfusion or oxygen metabolism.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Citation List**


COMMENTS: Randomized, PRETERM end point blood volume. No significant difference in the cesarean section group. Even though a small sample they did not demonstrate a difference in blood volume between 60s and 90s cord clamping. Some infants received ventilation before the cord was clamped.
LOE 1, Supportive, fair

**COMMENTS:** Randomized controlled trial PRETERM infants with the neonatologist blinded to the group allocation. End point cerebral oxygenation. Part of a larger study on effects of placento fetal transfusion. Not sure why there are 15 infants in the experimental group and 24 in the control group. Hct higher in the experimental group as was 56 compared to 49 at 24 hours. There was no difference at 36 weeks. BP was higher at 4 hours in experimental group no difference at 24 and 72 hours. even though they showed better cerebral oxygenation at 24 hours this effect did not persist. Difficult to extrapolate if this would lead to better neurologic outcomes.

LOE 1, Supportive, fair


LOE 2 Fair Supportive


**COMMENTS:** Randomized, TERM not clear if the neonatologist knew the assignment or not. End point hematocrit. All neonates not breathing spontaneously at 10 secs. Were excluded. Primary outcome was Hct at 6 hours. Secondary outcomes were Hct at 24 to 48 hours and neonatal morbidity including bilirubin. Polycythemia defined as Hct>65 was significantly in the 3 min. clamping group. Surprisingly they did not find a difference in the bilirubin levels in the 3 groups. No difference in other morbidities, however this was a very low morbidity group. Even though there were no differences in mean Hct between the groups significantly more 8.9% versus 1.15 % and 0 % had anemia defined as Hct <45% at 6 hours.

LOE 1, Supportive, fair


**COMMENTS:** A retrospective analysis of a prospective randomized trial. TERM infants. Inclusion criteria were availability of blood sample to carry out the blood lead and Iron outcome measure. Demographic data on the mother infant dyad not included, it is said to be the same. Looking at the previous study numbers the infants not included in this study were equally distributed in the. ECC and DCC groups. They did multiple regressions controlling for maternal exposure to lead, placental lead levels and breast feeding. Overall they did demonstrate that ECC lead to higher lead levels at 6 months of age. Multiple analyses were done controlling for few things at a time. However they did analysis showing 23% of total effect of DCC on the infant lead status could be explained by increase in iron stores.

LOE 2, Supportive, fair

**COMMENTS:** Randomized study with end point iron status at 6 months in TERM neonates. Retrospectively obtained history of maternal intake of iron during pregnancy. Randomization was done at the time of admission for delivery. Large study. Very little difference in the Hct. ECC .595 and DCC .620. Do not provide information on the number infants with Hct.>65. No difference in the 2 groups in bilirubin levels. ECC group consumed iron fortified foods at 2 months and DCC group received more iron supplements at 4 months. Their conclusions regarding prevention of iron deficiency before 6 months with DCC for 2 minutes is reasonable.

LOE 1, Supportive, Good


LOE3 Neutral-Poor


**COMMENTS:** Randomized, TERM infants, end point Hct. at 24 hours. DCC group was till cord stopped pulsating mean 214 second. Infants were placed on the mothers abdomen.5.3% infants in DCC had polycythemia Hct.>65 however there was no difference in bilirubin in the 2 groups. All the infants needing resuscitation were excluded from the analysis. No follow up information is provided.

LOE 1, Supportive, fair


LOE 1 Supportive Poor


LOE 1 Supportive Good


LOE 1 Fair Supportive


**COMMENTS:** A well done systematic review of randomized and non randomized controlled studies till 2006 in TERM infants. End point was not predefined. Exclusive preterm and LBW studies were excluded. Even though the relative risk of Hct.>65 was (3.44) higher in the DCC group none of these infants were symptomatic and did not have increased levels of bilirubin.

LOE 1, Supportive, Good

LOE 1 Supportive –fair


COMMENTS: Randomized, TERM infants, end point hematocrit at 18 hours. Early group had the cord clamped at 30s and late at 3 minutes. Neonate held at the level of the introitus. No difference in the Hct. in the 2 groups. No difference in polycythemia.
LOE 1, Neutral, fair


LOE 1 Supportive -Poor


LOE 3 Neutral Poor


COMMENTS: Prospective, masked, randomized, PRETERM neonates, end point initial blood pressure cuff or central and initial hematocrit. DCC was 30 to 45 seconds. There was a difference in the mean BP in infants <1500gm 36 mm Hg versus 43 mmHg. This was a subset analysis. No significant difference in the whole group. Hct. was initially similar but was higher in the DCC at 24 hours.
LOE 1, Neutral, fair


LOE 3 Neutral, Fair


COMMENTS: Studies included TERM neonates till 2006. Early cord clamping defined as within 60 seconds and delayed as 2 minutes. Clinical jaundice was more likely to occur in DCC group.
LOE 1, Opposing, Good

LOE 2 Neutral Poor


COMMENTS: Randomized, PRETERM, end point BPD. DCC was 30 to 45 seconds. No comment on the resuscitation of these infants. Authors did not demonstrate a difference in BPD, however their secondary analysis showed a difference in IVH and late onset sepsis.

LOE 1, Neutral, fair


LOE 3 Neutral Fair


LOE 3 Fair Neutral


LOE3 Fair Neutral


LOE 2 Fair Supportive


LOE 2 Supportive Good


LOE 1 Poor Supportive


LOE 1 Supportive Fair

COMMENTS: Systematic meta analysis PRETERM trials till 2004. Overall there is less need for transfusions and decrease in IVH. No difference in jaundice.
LOE 1, Supportive, Good


COMMENTS: Authors repeated the Cochrane review. Included 3 more studies in the analysis 2 that were reported before their initial analysis and one before 2004. Conclusions were no different.
LOE 1, Supportive, fair


COMMENTS: Randomized. PRETERM. DCC was 1 minute. End point RBC volumes. Secondary end points hemodynamic status, clinical condition, need for RBC transfusion. Randomization was stratified into 30-36 weeks GA and < 30 weeks GA. Was powered to detect a 50% decrease in RBC transfusions. Uniform transfusion guidelines are said to be followed. They lost 26 of the 27 infants < 30 weeks GA due to unsatisfactory collection of placental blood (18) and insufficient volume for transfusion (7). They report the 30-36 weeks infants. 8% in the ECC and 4 % of infants in the DCC received blood transfusion. This was not statistically significant. More infants in DCC (73%) versus (53%) p=0.03 required phototherapy. Hematocrits were higher in the DCC till day 28. They report no difference in IVH but not all the babies in the 30-36 weeks had cranial ultrasounds so that comment cannot be interpreted.
LOE 1, Supportive, Poor


COMMENTS: Randomized. PRETERM. End point hemoglobin and ferritin levels. There was no difference in the ferritin levels. Hb./Hct were significantly higher at 1 hour and 10 weeks of age. No difference in bilirubin levels and no increase in polycythemia. Very small numbers.
LOE 1, Supportive, Poor


LOE 2 Poor Supportive

COMMENTS: Reasonable systematic review. TERM. However there were only 2 studies with a total of 46 babies in the ECC group and 73 in DCC group for inclusion for anemia in developing countries. These had different timings of cord clamping stopping of cord pulsations and after placenta in the vagina. In the developed countries analysis they just report the hematocrit. They report increase in bilirubin but no increase in use of phototherapy.
LOE 1, Supportive, Fair


COMMENTS: Randomized. TERM. End point 6 months hemoglobin levels. Specificaly state they did the trial in malaria zone. Even though the hemoglobin levels were similar in the 2 groups at 4 months the number of inftats with Hb<10.3 their cut off for anemia were 21% DCC and 41% ECC group. At 6 months there were no differences. However the there is evidence in the literature that early iron deficiency anemia may have an impact on neurodevelopmental outcome.
LOE 1, Neutral, Good


COMMENTS: An attempt at a systematic review of the effect of DCC in low birth weight infants. Authors use appropriate methods however they did not find any articles other than indirect evidence and reporting on SGA infants in 3 studies. 2 of these studies they assumed had SGA infants and 1 study reported 36% SGA infants. No specific conclusions can be made about this subset of SGA infants that may be increased risk of polycythemia.
LOE 1, Neutral, Poor


COMMENTS: This prospective cohort study examined the effect of delayed (> 1 min) vs. immediate cord clamping on hemoglobin and ferritin levels in infants at 3 months of age. Article published in Portugese. Above is a translated abstract. Uncomplicated vaginal deliveries at term (325 mother-infant pairs, 164 delayed clamping and 161 early clamping) were studies in Sao Paulo, Brazil between April 2006 and March 2007. Early clamping was routine in the Municipal Hospital of Campo Limpo.
LOE 2, Supportive, Good


COMMENTS: Observational study of effect of timing of cord clamping on venous blood gases and lactate concentrations. There seems to be no clinical relevance of the decrease in pH with a combined metabolic respiratory acidosis over 90 seconds. Most pronounced effect was at 45 seconds. Venous PO2 peaked at 45 seconds.
LOE 4, Neutral, fair

LOE 3 – Neutral Poor


COMMENTS: Case control. TERM. DCC 4 minutes. End point limb perfusion and hemodynamics. Physiologic evaluation was done at a mean of 72 hours of age. Hct was measured at 3 days of age. Do not provide information on the number of infants out of 11 who had hct. >65. Bilirubin levels were 8.1(138) and 7.9(136). Authors claim that increase in LVD greater filling of the left ventricle with no change in blood flow may help extrauterine adaptation. However there is no evidence presented for improved extrauterine adaptation. No difference in bilirubin levels increased hematocrit in DCC. LOE 2, Supportive, fair