Clinical question.

In neonates at the limits of viability or anomalies associated with lethal outcomes (P) does the non initiation (I) versus initiation (C) of resuscitation result in an outcome that is ethically justified (O)

Is this question addressing an intervention/therapy, prognosis or diagnosis? Intervention/therapy

State if this is a proposed new topic or revision of existing worksheet: Revision of an existing worksheet

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).

Using the same search strategy as in 2005

Terms searched (all mapped to subject (MeSH) headings where appropriate):
Ethics, neonat$ (as last time)
Cardiopulmonary resuscitation, outcome, neonat$ (as last time)
Premature
Baby
Preterm
Pre-term
Stop$
Cease
Discontinue
Noninitiate
Non-initiate
Malformation

1. MEDLINE; "limit of viability".ti,ab; 54 results.
2. MEDLINE; "extreme prematurity".ti,ab; 300 results.
3. MEDLINE; exp INFANT, PREMATURE/ OR exp INFANT, VERY LOW BIRTH WEIGHT/ OR exp GESTATIONAL AGE/; 83116 results.
4. MEDLINE; 1 OR 2 OR 3; 84797 results.
5. MEDLINE; "lethal congenital anomalies".ti,ab; 35 results.
6. MEDLINE; "congenital anomalies".ti,ab; 7324 results.
7. MEDLINE; exp CONGENITAL ABNORMALITIES/ OR exp CHROMOSOME ABERRATIONS/; 459334 results.
8. MEDLINE; 4 OR 5 OR 6 OR 7; 538176 results.
9. MEDLINE; "non initiation".ti,ab; 16 results.
10. MEDLINE; "noninitiation".ti,ab; 10 results.
11. MEDLINE; "non-initiation".ti,ab; 16 results.
12. MEDLINE; 9 OR 10 OR 11; 26 results.
13. MEDLINE; resuscitation.ti,ab; 28173 results.
14. MEDLINE; exp RESUSCITATION/; 58271 results.
15. MEDLINE; 13 OR 14; 70032 results.
16. MEDLINE; ethic*.ti,ab; 58043 results.
17. MEDLINE; exp ETHICS/; 117807 results.
18. MEDLINE; "ethically justif*".ti,ab; 289 results.
19. MEDLINE; 16 OR 17 OR 18; 139473 results.
20. MEDLINE; 12 OR 15; 68950 results.
21. MEDLINE; 8 AND 19 AND 20; 137 results.
22. MEDLINE; 21 [Limit to: Publication Year 1978-2008 and Humans and (Age Groups Newborn Infant birth to 1 month)]; 115 results.

Also:
<table>
<thead>
<tr>
<th>Using words:</th>
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<tr>
<td>Withhold* resuscitat* limited by human and age group newborn infant</td>
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<tr>
<td>Resuscitat* and trisomy</td>
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<tr>
<td>Resuscitat* and anencephal*</td>
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Hand search of Pediatrics and Archives of Diseases in Childhood back to Jan 2005 and references from lists in other articles used.

<table>
<thead>
<tr>
<th>State inclusion and exclusion criteria</th>
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<tbody>
<tr>
<td>Animal studies, case reports, abstract only studies and none peer-reviewed studies were excluded.</td>
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| Number of articles/sources meeting criteria for further review: 37 |
## Summary of evidence

### Evidence Supporting Clinical Question

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**Level of evidence**

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

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**Level of evidence**

A = Return of spontaneous circulation  
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C = Survival to hospital discharge  
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*Italics* = Animal studies

### Evidence Opposing Clinical Question

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</table>

**Level of evidence**

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

*Italics* = Animal studies
REVIEWER'S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:

There is new evidence of note since the last review in 2005 in the form of some large cohort studies and some (at face value) improvement in outcomes of the most preterm babies (Itabashi, 2009, 445; The EXPRESS Group, 2009, 2225) (see table below).

Once again there are some very significant concerns regarding how gestational age is assessed (or indeed whether it is at all or whether only birthweight is described) and what data are being presented (alive at the onset of labour, liveborn or admitted to a neonatal unit). This makes meaningful comparisons so much more difficult. There is a cross European attempt to standardise data (Draper, 2009, 10.1136/adc.2008.148213) but this needs to be extended worldwide to allow us to make valid comparisons of survival and longer term outcome figures.

It may be that using other data (especially sex if known, exposure to antenatal steroids, whether singleton or multiple and birthweight?estimated fetal weight) that we may be able to give a more "individualised" estimate of favourable outcome (Tyson, 2008, 1672).

There are very little new data on the resuscitation of babies with lethal conditions such as trisomies 13 and anencephaly, but an interesting new article on attitudes of neonatologists towards trisomy 18 (McGraw, 2008, 1106).

<table>
<thead>
<tr>
<th>Study (gestational weeks)</th>
<th>22</th>
<th>23</th>
<th>24</th>
<th>Babies included</th>
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<tbody>
<tr>
<td>The EXPRESS Group 2004-2007 Sweden</td>
<td>26</td>
<td>65</td>
<td>73</td>
<td>Admitted to NICU, alive at 1 year</td>
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<td></td>
<td>10</td>
<td>53</td>
<td>67</td>
<td>Liveborn, alive at 1 year</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>29</td>
<td>50</td>
<td>Alive at the onset of labour, alive at 1 year</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Excluded TOP and babies born outside Sweden)</td>
</tr>
<tr>
<td>Itabashi et al 2005 Japan</td>
<td>34</td>
<td>54</td>
<td>77</td>
<td>Admitted to NICU, survived to discharge</td>
</tr>
<tr>
<td>Field et al 2000-2005 UK</td>
<td>0</td>
<td>18</td>
<td>41</td>
<td>Admitted to NICU</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>9</td>
<td>36</td>
<td>Liveborn</td>
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<tr>
<td></td>
<td>0</td>
<td>7</td>
<td>32</td>
<td>Alive at the onset of labour</td>
</tr>
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<td>Tyson et al 1998-2003 USA</td>
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<td>17</td>
<td>34</td>
<td>Liveborn</td>
</tr>
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<td>Vanhaesebrouck et al (Epibel) 1999-2000 Belgium</td>
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<td>35</td>
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<td></td>
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<td>6</td>
<td>29</td>
<td>Liveborn</td>
</tr>
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<td>0</td>
<td>1</td>
<td>19</td>
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</tr>
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<td>Draper et al 1998-2001 UK</td>
<td>7</td>
<td>15</td>
<td>29</td>
<td>Alive at the onset of labour, excludes lethal malformations</td>
</tr>
<tr>
<td>Markestad et al 1999-2000 Norway</td>
<td>0</td>
<td>16</td>
<td>44</td>
<td>All deliveries</td>
</tr>
<tr>
<td>Tommiska et al 1999-2000 Finland</td>
<td>0</td>
<td>24</td>
<td>47</td>
<td>All deliveries</td>
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<tr>
<td></td>
<td>0</td>
<td>11</td>
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</tr>
<tr>
<td>Field et al 1994-1999 UK</td>
<td>0</td>
<td>17</td>
<td>24</td>
<td>Admitted to NICU</td>
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<td>Liveborn</td>
</tr>
<tr>
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<td>0</td>
<td>7</td>
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<td>Larroque et al (Epipage) 1997 France</td>
<td>0</td>
<td>0</td>
<td>48</td>
<td>Admitted to NICU</td>
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<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>31</td>
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</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>Alive at the onset of labour</td>
</tr>
<tr>
<td>Stoelhorst et al 1996-1997</td>
<td>NA</td>
<td>NA</td>
<td>42</td>
<td>Admitted to NICU</td>
</tr>
<tr>
<td>Royal Womens Hospital 1994-1997 Australia</td>
<td>NA</td>
<td>38</td>
<td>59</td>
<td>Excludes death in labour and lethal malformations</td>
</tr>
<tr>
<td>Aus/NZ Neonatal Network 1994-1997</td>
<td>3</td>
<td>25</td>
<td>46</td>
<td>Admitted to NICU, lethal malformations excluded</td>
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<td>Victoria 1994-1997 Australia</td>
<td>3</td>
<td>25</td>
<td>46</td>
<td>Liveborn</td>
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<tr>
<td>Epicure 1995 UK</td>
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<td>Liveborn</td>
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<tr>
<td>El-Matwally et al 1993-1997 USA</td>
<td>2</td>
<td>34</td>
<td>49</td>
<td>All deliveries (? Lethal malformations)</td>
</tr>
</tbody>
</table>

Summary table of survival data by gestational age
Acknowledgements: Catherine Richmond, Librarian at James Cook University Hospital for her help in formulating the search strategy.

Citation List

LOE: 4 Fair Retrospective cohort Supportive

Comments: Study population now 12 years ago. Resuscitation decisions made in the DR by neonatologist (but presumably not the same one for all). No clear policy on resuscitation at <24 weeks so presumably some variability between neonatologists. However study has included stillbirths so survival figures should be more accurate. Infant intubated only if vigorous or responded to bag-mask ventilation. High DR loss at 23 weeks but this is perhaps not too unusual at this gestation. All data based on gestational age and not on birth weight. Whilst assessment of gestational age based on obstetrical estimate is not always accurate pragmatically GA is more important as fetal weight estimation is even more inaccurate and awaiting birthweight means it is difficult to provide accurate information parentally.

LOE 5 Fair Survey of physicians Neutral

Comment: An interesting study which went some way to teasing out the effect of parental attitude on the way that decisions to withhold or withdraw care are made.

LOE 5 Small retrospective cohort, not directly answering this question

Comment: An interesting multicentre study, though with relatively small numbers, looking at what had been discussed during discussion about delivery room resuscitation in babies who were either extremely preterm or known to have lethal congenital abnormalities. Identified that there may be significant differences in recollection of what was discussed between parents and physicians, and indeed sometimes what had been decided. Sometimes values that parents found most important may not have been addressed at all or fully. The authors wondered whether physicians could be trained to address effectively parents values.

LOE 3 Good Prospective cohort Supportive
Comment: This is the largest population based study reported with robust data collection and a complete picture. Whilst still only level 3 it gives compelling evidence about poor survival at <24 weeks and especially at <500g but also admits that survival figures for the US are higher. This study’s results and any local data are now routinely used in counselling parents of threshold viable babies in the UK.


**LOE 4 Fair Retrospective cohort Supportive**

Comment: Studied role of parent preference in the resuscitation of threshold viability infants. They were influential in deciding what resuscitation would be offered. Death was delayed 2-3 days by not knowing parental preferences. Physician’s prognosis was fairly accurate (no babies survived with an estimated survival <10% and 40% survived where the estimated survival was 10-40%). The authors stressed the role of withdrawal as a very acceptable option. However holding discussions with the parents, developing a preliminary plan, and obtaining permission from the parents prior to delivery is optimal.


Comment: There must be a worldwide push to standardise data collection if we are ever to be able to meaningfully compare survival and outcome data. The Europeans have started to lead the way, and it is imperative that the process includes as many other countries as possible. If there are genuine differences between countries we need to try to understand why these happen, and to try to match the best figures in all countries.


**LOE 3 Good Prospective cohort study Supportive**

COMMENT: A well designed study looking at differences across 10 European countries. At this time the authors have not sought to determine or describe what those differences may be due to. Obviously when read in conjunction with the results from the Swedish EXPRESS Group it shows that there results are certainly not representative of Europe as a whole, and indeed there are significant differences between centres within the US.


**LOE 4 Fair Retrospective cohort Supportive**

Comment: No information about DR resuscitation. Relatively poor 23 week survival against reports from the US and especially as cohort is NICU admissions and not stillbirths+livebirths. This does support other data that increased survival is not necessarily associated with increased numbers of infants with severe cerebral palsy.

LOE 5 Fair Systematic review Supportive

Comment: An interesting analysis that underlines the importance of collecting data on all pregnancies at each gestation so as to provide more accurate figures with which to counsel parents


LOE:4 Fair Retrospective cohort Supportive

Comment: Data are now quite dated, but numbers are large and 12 tertiary academic centers are represented. Again data is liveborns admitted to NICU only so survival figures may well be significant overestimates. No information is available on newborns < 500 g birth weight. The study emphasizes the importance of gender in estimating survival. 80% of mothers were not treated with steroids, which is much higher than what we would expect today. The population was 55% black, 31% white and 11% Hispanic and would be certainly unrepresentative of the population of most European countries.

LOE 3 Good Prospective cohort study. Supportive

Comment: A high quality study from a well established database in the Trent region of the UK which is well recognized for the adequacy and completeness of its data collection. The data was collected to answer questions raised by a Parliamentary Select Committee. The figures are described by gestation (almost invariably derived from 1st trimester ultrasound scan) and are available for babies admitted to NICU, liveborn or alive at the onset of labour. The 2005 figures were at 22 weeks 0% for all, at 23 18%, 9% and 7% respectively, and at 24 weeks 41%, 36% and 32% respectively. The authors noted that there was little evidence overall of any improvement between these 2 epochs for babies of 22 or 23 weeks but a statistically significant improvement at 24 weeks. The completeness of this data I would argue make it most useful for counseling parents at the onset of extreme preterm labour.


LOE 4 Fair Retrospective cohort Supportive

Comment: These data are amongst the largest in number. Data is included from community and tertiary academic centres and may reflect actual practice better than a study from a single academic tertiary centre. The only outcome measures were survival to discharge and incidence and severity of IVH. No information on long term neurodevelopmental outcome is included. It is not apparent from the paper to what extent DR decisions were made about CPR in the 401-500 and 501-750 g groups. Mortality was higher if the infant did not receive CPR. The definition of CPR here is also problematic since there is no indication of how many infants were intubated but did not require CPR, what percentage of these ELBW infants was intubated and responded and what percentage was not intubated, i.e. not resuscitated or did not require intubation. The authors also felt that decisions regarding which newborns were selected for aggressive resuscitation may have had a larger impact on the results than the effectiveness of CPR. This paper tries to respond to earlier reports of CPR being "futile".
One could conclude that the data did not support CPR as a therapy that gave a superior result over no CPR. If it is not superior to intubation and mechanical ventilation as far as survival and severe IVH, physicians may not have an obligation to offer the treatment. Many would argue (Wyckoff 2000) that good quality ventilation is the most important therapy: in the UK this need not initially be by intubation but by mask/T-piece system (Newborn Life Support Course).

LOE 4 Fair Retrospective cohort Neutral

Comment: This is fairly complete data from a very recent epoch (2005). The survival figures quoted (34% at 22 weeks, 54% at 23 weeks, 77% at 24 weeks, 42% at <500g, 75% at 500-699g and 92% at 700-999g) look superficially excellent, even exciting, and exceed other reported data. However, these results are only for the highly selected group of babies who are alive and admitted to the neonatal unit. These figures will be significantly higher than those for liveborn babies or babies alive at the onset of labour (the latter arguably being the most important figure when counselling parents antenatally).

Janvier A and Barrington KJ  Advocating for the very preterm infant  Pediatrics, 2006, 118(1), 429-430
LOE N/A Letter to editor

Included as it gives a different approach to counseling than used by many institutions worldwide, the authors asking for counselling to be more individualised but also in a way which is fairer when compared to other high mortality/morbidity groups (such as a 50 year old neonatologist who may have had an extensive haemorrhagic stroke). The authors are parents of a baby born at <25 weeks and were worried that in (many?) institutions they may have been advised not to push for active resuscitation. The letter was in response to the article by Kaempf et al (qv)

Janvier A, Leblanc I, Barrington KJ  The best-interest standard is not applied for neonatal resuscitation decisions. Pediatrics, 2008, 121(5), 963-969
LOE 5 Hypothetical questionnaire Fair Opposed

Comment: A very interesting study again using hypothetical cases which looks at the effect of prognosis in neonatal, paediatric and adult populations. Response rate was quite good and results did appear to show decisions about best interest being made not directly related to survival rates or disability. Such decisions could be further affected by parental wishes (especially not to resuscitate), but much more commonly in the newborn group.

LOE 5 Supportive Physician Questionnaire Fair

Comment: An article from a single centre in Oregon describing how a local guideline was developed to use when undertaking periviability counselling in the hospital. The suggested guideline was very similar to the 2005 ILCOR guidelines and were gestational age specific sand phrased in terms such as majority of medical staff members do not recommend NICU. NICU care may be declined and comfort care provided or NICU care may be chosen by mother/family after review of probable and potential clinical outcomes. No usable new mortality data included but an interesting description of the process.
LOE 4 Fair Retrospective cohort Supportive

Comment: Paper stresses importance of communication and discussion with parents and among obstetricians and pediatricians and also that all efforts should be made to prolong pregnancy.

LOE: 4 Fair Retrospective cohort Supportive

Comment: As with many other studies this one (which includes stillbirths) shows a very high mortality in the <24 week group despite aggressive tocolysis and intensive care. It is not clear whether the centre then adopted this as its own policy.

LOE 3 Good Retrospective cohort Supportive

Comment: The French version of the original UK Epicure study, performed in 1997. The methodology was virtually identical and produced survival data for admission to NICU, liveborns or those alive at the onset of labour. These data are now 12 years old but the results were at 22 and 23 weeks 0% survival for all groups, and at 24 weeks 48%, 31% and 9% respectively. Again, because of the completeness of the data the information helps in antenatal previability counselling.

LOE 4 Fair Retrospective cohort Supportive

Comment: Unable to tell how whether resuscitation was attempted for those <500 grams. Study is based on gestational age (that is more difficult to accurately assess) but poor outlook for babies born at 23 weeks is similar to results from other studies.

LOE 3 Fair Prospective cohort matched against historical controls Supportive

Comment: These figures are generally similar to those in other studies. Whilst gestational age survival is higher than in EPICure, if Evans and Levene’s calculations of likely overestimation are accurate these figures will be similar. Also where there was doubt greater than 2 weeks between LMP and US scan the lower estimate was always used which will overestimate these extremely preterm babies in number.
LOE 4 Fair Retrospective cohort Neutral

Comment: An interesting paper comparing what are probably 2 extremes of care in these extremely preterm babies. The authors try to look at the cost of these 2 approaches in terms of mortality, significant morbidity and financial burden of the care provided. I feel that this paper is neutral as it is impossible to balance the extra survival against the increased number of children with DCP even excluding the considerable cost implications in terms of finance and cot occupancy.


An interview based study of withdrawing and withholding treatment which included but was not specific to neonatology. It looked at both junior doctors (residents) and consultants (attendings). In general the RCPCH Framework was supported.

Comment: The study suggested that junior doctors find maintaining life in a hopeless situation (whilst they wait for a senior opinion) was one of the most stressful situations we could put them in. It also underlined that where possible such decisions should be team ones including the parents, neonatologists, neonatal nurses, obstetricians and midwives

McGraw MP and Perlman JM Attitudes of neonatologists toward delivery room management of confirmed trisomy 18: potential factors influencing a changing dynamic. Pediatrics, 2008, 121(6), 1106-1110
LOE 4 Fair Hypothetical questionnaire Supportive

Comment: A study of neonatologists using a case scenario (known trisomy 18 with congenital heart disease and imminent delivery) to determine whether respondents would initiate resuscitation in a condition which has a reported 1 year survival rate of 0-10% and has been accepted in the last ILCOR guidelines from 2005 to be a valid reason for nonintervention. Despite this 44% of respondents answered that they would consider initiation of resuscitation. The authors state “we speculate that support for the best-interest standard for neonates is diminishing in favour of ceding without question to parental autonomy.

LOE 5 Commentary

Comment: A thought provoking editorial related to the report by Itabashi et al from Japan in the same issue. There are some valid points made about the “threshold” level used to decide futility in the care of the extreme preterm babies, especially in comparison with those levels which are widely accepted in paediatric and adult practice. The article underlines the relative cost effectiveness of neonatal intensive care, compared with adult ICU.

LOE 5 Commentary
Comment: A commentary comparing the relative outlooks of HPLH and extreme prematurity (which are comparable), and how they are perceived, and acted upon very differently by professionals. An interesting spin on the arguments about what threshold is acceptable to instigate treatment in extremely preterm babies, but there are no new data reported.

LOE 4 Fair Retrospective cohort Supportive
Comment: Relatively large numbers (26 at 23 weeks, 53 at 24 weeks) with fairly complete follow-up. Significant survival at 23 weeks is noted but this is babies admitted to NICU only and therefore a highly selected group. However in view of the large numbers and excellent follow up this is an important study.

LOE N/A
Comment: An editorial by John Paris who has longstanding interest (and expertise) in neonatal ethics. The main thrust of this editorial was that neonatologists should endeavour to try to acquiesce to parental wish to initiate resuscitation, except on rare occasions when it is obviously not in the infants best interest to undergo resuscitation, such as an infant born with anencephaly, Potter’s syndrome or thanatophoric dwarfism or a neonate delivered at <22weeks gestational age.

LOE 5 Fair Physician survey Neutral
Comment: Survey of neonatologists in six New England states to determine the attitudes of these physicians to resuscitating extremely preterm babies. There was significant variation in the threshold at which these neonatologists would initiate resuscitation.

LOE: 4 Fair Retrospective cohort Supportive
Comment: The relationship of poor cognitive outcome persisted even when controlling for other factors such as medical and social risk. Mild to moderate cognitive delay (rather than severe) was associated with high social risk (and also CLD). The authors could perhaps surprisingly not show an association between outcome and birthweight, which is contrary to most other published studies.

LOE 4 Fair Retrospective cohort Supportive
Comment: Overall we can calculate that only 1% of all babies of this size in this study survived intact. Unable to define outcomes based on gestational age or specific birth weight categories. No indication of whether DR mortality was from no resuscitation or lack of response. 17/18 of the babies who survived until discharge were growth retarded. There was no increase in age at death over time. It seems fair to conclude that the infant <500 grams is still "previable", even though very small numbers survived. The authors summarise “parents and caregivers faced with the impending delivery of an infant in this gestational age/weight category should understand that survival is possible but rare without multiple major disabilities”.

LOE 5 Fair Survey and retrospective cohort Opposed

Comment: A study, which looked at the response to a questionnaire, from about 500 neonatologists in the US about how they deal with the “gray zone” mentioned in the 2005 ILCOR guidelines. It seems that many used the condition of the baby at birth, either using 1 or 5 minute Apgar score or heart rate at 1 or 5 minutes. The authors found that any of these was neither sensitive nor predictive for death before discharge, survival with neurological abnormality or intact survival. The assessment of condition at birth (sometimes with response to mask ventilation) is widely used and if these findings are correct my have implications for all of us.

LOE:4 Fair Retrospective cohort Supportive

Comment: Numbers are very small. Data were not analyzed by birth weight category, although they say their data support Lantos’ opinion that survival is poor after resuscitation of infants < 1000 g birth weight. Few of the babies were resuscitated in the DR. Differs from Lantos in that outcome was worse if arrest occurred > 72 hrs of age.

The EXPRESS Group (2009) “One-year survival of extremely preterm infants after active perinatal care in Sweden” JAMA, 301 (21), 2225-2233
LOE 3 Good Large proospective cohort Neutral

COMMENT: Good ascertainment of data at onset of labour, birth and admission and good 1 year follow-up data. Gestations were rounded down hence 22+6 days would be classed as 22 weeks and may therefore overestimate survival at 22+0 weeks where each day leads to a significant (3%) improvement in survival. Gestation was determined from relatively late (2nd trimester, 17-18 week ) scan and hence will be less accurate than 1st trimester scan dating. Nevertheless the survival figures for these extremely preterm babies match the best published results thus far. The excellent generally available healthcare and general good health of he Swedish population are the envy of most European countries but show what can be achieved with good public services, personal health and active management of labour. Overall however survival t 22 weeks for those alive at the onset of labour is only 4% and <1 % intact survival at 1 year. Wide variation in survival have recently been reported across 10 European regions (see Draper, 2009, F158)

**LOE: 3 Good Retrospective cohort Supportive**

Comment: A well designed and executed study which gives good data for counselling for the UK. Survival at 24-27 weeks had improved over the 12 year period but disability rates (25%) had remained unchanged. Overall 10% of survivors were thought unlikely to become independently mobile or to communicate effectively due to their profound disabilities. Again this complete data from ALL births suggests that intact survival at <24 weeks is extremely rare in the UK.


**LOE 4 Fair Retrospective cohort Supportive**

Comment: An interesting study from a large population from the Neonatal Research Network of the NICHD. At 22 weeks intact survival was reported in 2% of males and 4% of females, at 23 weeks 11% and 13% and at 24 weeks 18% and 31% respectively. Estimated survival whether intact or not for both sexes was 5% at 22 weeks, 17% at 23 weeks and 34% at 24 weeks. The authors present a cogent argument that taking account of the sex of the baby, whether the baby’s mother had received antenatal steroids in the previous week, whether the baby is a singleton and birthweight will improve the potential rates of both survival and intact survival in these babies (and encourage individualisation of counselling). Unfortunately there was no data presented about the fate of these babies in labour.


**LOE: 4 Fair Retrospective cohort Supportive**

Comment: This is a large database of tiny babies. However, there are no data for newborns < 500 g birth weight. The assumption that survival rates for resuscitated babies could be applied to those not resuscitated is questionable as there likely was selection bias. They emphasize that based on their data, resuscitation decisions should be based on gender, growth status and use of maternal steroids in addition to birth weight and gestational age. Whilst it is important to optimize care (eg maternal steroids) it is imperative that each individual case is considered on its own merits. Prenatal estimation of fetal weight/growth can be unreliable.


**LOE 3 Good Retrospective cohort Supportive**

Comment: A Belgian study designed along the lines of the earlier UK EPICURE study over a two year epoch, 1999-2000. The data was comparable to that in Epicure. At 22 weeks there were no survivors and hence survival was 0% for babies admitted to NICU, liveborn or alive at the onset of labour. At 23 weeks the figures were 8%, 6% and 1% respectively, and at 24 weeks 35%, 29% and 19%. Again having relevant data at all 3 stages is more useful for antenatal periviability counselling.
LOE 4 Fair Retrospective cohort Neutral

Comment: Gives us some useful ideas for clinical trials to try and tease out the areas of neonatal care that may contribute to the well described inter-hospital differences but confirms that the need for active resuscitation in these very pre-term babies is associated with significant increased risks of mortality and morbidity.

LOE: 4 Fair Retrospective cohort Supportive

Comment: Includes an entire geographical area. Fairly large numbers of infants with good follow up data at 18 months to two years. The higher intact survival rate in the outborn center for 23-24 week babies probably reflects a referral selection bias. Older data, but consistent with other data concerning very low intact survival at 23 weeks gestation.