**Pregnancy Data tables**

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| **Table 1: Identified studies focusing on the use of Extracorporeal life support** | | | | |
| **Study Acronym;**  **Author;**  **Year Published** | **Study Type/Design; Study Size (n)** | **Patient Population** | **Primary Endpoint and Results (include P value; OR combi tube RR; & 95% CI)** | **Summary/Conclusion Comment(s)** |
| **Van den Bosch et al. 2022**  Predictors and Hospital Outcomes in Pregnant Patients Undergoing Extracorporeal Membrane Oxygenation (ECMO): A Nationwide Study | Retrospective, observational, population-based cohort study was conducted using the NIS database for hospitalizations in pregnant patients from January 1, 2010 to December 31, 2016.  n= 59 | **Inclusion Criteria:**  Pregnant or postpartum cases with  respiratory failure, cardiogenic shock, and/or circulatory arrest based on the diagnosis codes at the time of admission. A subset of patients fulfilled multiple diagnostic categories who underwent ECMO | 1° endpoint:  In-hospital mortality across peripartum patients who underwent ECMO.  2O Endpoints Length of hospital stay and total hospital costs.  Prevalence of comorbidities, presumed indications for ECMO, and the incidence of complications across pregnant patients undergoing ECMO.  Evaluated the associations between these factors and the in-hospital mortality.  Logistic regression was used to assess indications for ECMO and mortality while controlling for comorbidities  A diagnosis of respiratory failure was present in 79.7% (47/59), cardiogenic shock in 64.4% (38/59), and circulatory arrest in 25.4% (15/59).  Thirty-four patients (57.6%) had >1 diagnosis.  Mortality from respiratory failure was 14/47 (29.8%)  Mortality from cardiogenic shock was  15/38 (39.5%)  Mortality from  circulatory arrest was  7/15 (46.7%). Those with combination of above had mortality of 14/34 (42.4%)  Median LOS = 13 days  Complications included  disseminated intra vascular coagulation and consumption coagulopathy, intracerebral hemorrhage, and multiorgan failure were 18.6%, 3.4%, and 22.0%, respectively.  No association was identified between comorbidities and mortality. | 6-year retrospective analysis of the NIS database finds that in-hospital all-cause mortality rate for patients undergoing ECMO in pregnancy is 1 in 3, and that mortality varied by indication with cardiogenic shock and combined cardiorespiratory collapse having higher in-hospital mortality. |

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| **Table 2: Systematic Reviews / Guidelines focusing on the use of Extracorporeal life support** | | | | | |
| **Organization (if relevant); Author and year of publication** | **Guideline or systematic review** | **Topic addressed or PICO(S)T** | **Number of articles identified** | **Key findings** | **Conclusions** |
| **Naoum E et al.**  **2020**  Extracorporeal Life Support in Pregnancy: A Systematic Review | Systematic Review | ECLS in the pregnant and postpartum periods, to define the reported indications, maternal and fetal survival, and to identify associated complications | Qualitative assessment of 221 publications revealing 358 patients including 68 fetal outcomes | 57 patients had cardiac arrest (7 antepartum, 39 immediate postpartum, 11 postpartum from 24 hours-42 days), 41 veno-arterial (VA), 6 VA-veno-venal (VV) and 7 with unknown cannulation. Maternal survival rate 87.7%.  Overall, 30-day survival rate on ECMO 75.4% for mothers and 64.7% for fetuses.  Overall, neurologically intact 78.9%  For women delivered on ECMO  maternal survival 79.4% and fetal survival 56.3%  Complications  Mild to moderate bleeding 66 (18.4%),  Severe bleeding requiring surgical intervention 48 (13.4%)  Intracranial neurologic morbidity 19 (5.3%). | Cardiac arrest was the most common indication in the immediately postpartum periods with VA ECMO with favorable survival of 87.7% compared with general adult population survival with ECMO (29%). These findings support consideration of ECLS in pregnant and immediately postpartum patients given the potential for success and relative safety of this life saving intervention  Prospective and detailed reporting with multicenter collaboration may help to better evaluate the use of ECLS in pregnancy including indications, complications, outcomes, and best management strategies for this unique population |

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| **Table 3: Identified studies focusing on perimortem cesarean delivery / Resuscitative Delivery** | | | | |
| **Study Acronym;**  **Author;**  **Year Published** | **Study Type/Design; Study Size (n)** | **Patient Population** | **Primary Endpoint and Results (include P value; OR or RR; & 95% CI)** | **Summary/Conclusion Comment(s)** |
| **Kabori et al 2019**  Utility and limitations of perimortem cesarean delivery (PMCD): a nationwide survey in Japan | Retrospective observational  Study of patients undergoing perimortem delivery n=18 | Questionnaires sent to obstetrical units throughout Japan regarding cases of PMCD performed from 4/2010 to 4/2015  44% response rate  Second survey sent to obtain more details | Outcomes in women who had PMCD  PMCD performed in 18 cases  10 were In-hospital (IH) and 8 were out of hospital (OH) ( For OH cases, 50% ROSC with 1 death within 24 hours and 3 with Hypoxic Encephalopathy (HE))  12/18 had ROSC who received PMCD  6/18 who were discharged without major sequelae were compared to 12 who were not discharged  (deaths or vegetative state)  Those discharged without major sequelae (6/18) had a statistically significant shorter median interval time from cardiac arrest (CA) to PMCD  9 min vs 34 min, P= 0.002  3/18 neonates were discharged without sequelae 6/18 neonates died in neonatal period and 9 developed hypoxic encephalopathy  Median interval time from CA to PMCD in the cases in which the neonates survived without major morbidities was significantly shorter than that in the cases of neonatal death and hypoxic encephalopathy (P = 0.01)  DIC occurred in 8/9 patients whose resuscitation took longer than 20 minutes  ROC curve to detect onset of DIC from collapse  appeared to be 20 minutes  The area under the ROC was 0.906 (P = 0.017).Percutaneous cardiopulmonary support (PCPS) was initiated in 4/9 patients. More cases with uncontrolled bleeding, possibly caused by a sudden  increase in blood flow and DIC after resuscitation, were observed in the PCPS group compared to the non-PCPS group. | PMCD can increase survival for pregnancy cardiac arrest  Transporting patients with in-hospital or out of hospital cardiac arrest during pregnancy for PMCD appeared to have worse prognosis since it resulted in delays from time of arrest to delivery  The study authors suggest  consideration of PCPS for transport prior to PMCD |
| **Beckett VA et al. 2017.**  The CAPS Study: incidence, management and outcomes of cardiac arrest in pregnancy in the UK: a prospective, descriptive study. | Prospective, descriptive study using the UK Obstetric Surveillance System (UKOSS);  n= 66 | All women who received basic life support in pregnancy between 07/01/2011 and 06/30/2014  **Inclusion Criteria:** cases with chest compressions following maternal collapse; in final year immediate postpartum and antenatal cases were included | Cardiac arrest CA) in pregnancy: Adding immediate post-partum (PP) cardiac arrests changed incidence from 2.8 (95% CI 2.2-3.6) to 6.3 (95% CI 4.7-8.4) arrests per 100,000 maternities, remains a rare event  Case Fatality: 28/66=42% (95% CI 30-55%)  Survival to discharge: 38/66= 58%  ROSC: 48/66 (72)  16/38 (42% had morbidities with 6/38 having neurological complications)  Perimortem cesarean delivery (PMCD):  Time from collapse to delivery in survivors = 7 min (IQR 2.5-17.5) versus 16 min (IQR 6.5-43.5) (P= 0.04)  Aortocaval decompression  In 29 women, N=21 had tilting of the pelvis  N=4 was manual left uterine displacement (LUD)  After review of cases, 2 women did not have PMCD when it would have been appropriate.  6/66 achieved ROSC without PMD  Death more likely when cardiac arrest at home, woman moved to perform PMCD, and longer time from arrest noted to delivery  No long-term outcomes after discharge  Data available for n= 58  24/25 neonates survived when PMCD performed within 5 minutes compared with 7/10 when PMCD > 5 minutes, P= 0.059 | Maternal survival was related to location of arrest (less likely to survive if arrest at home vs hospital).  Delivery within five minutes of recognition of arrest without ROSC was associated with improved survival for mother and fetus.  Almost 25% of arrests were related to anesthetic factors.  The authors suggest that  regular training in maternal cardiac arrest needs to continue |
| **Maurin et al. 2019**  Maternal out of hospital cardiac arrest (OHCA): a retrospective observational study | Retrospective cohort study including gravid women who sustained OHCA  n=16 | Inclusion criteria:  Gravid women 18 years of age or older who sustained OHCA from 2009-14 in Paris | Prehospital teams captured clinical and therapeutic intervention sequence, AED use and number of shocks, ROSC and survival  Prehospital ROSC  3/5 less than 14 weeks  1/3 14-26/28 weeks  1/8 for 26/28 weeks  5 achieved circulation through a mechanical device  10 were admitted to the hospital  3/8 received in hospital PMCD 55min or greater from cardiac arrest  2 were alive at hospital  Discharge day 21 and 30  1 surviving neonate after 7 weeks OHCA | Difficult to apply resuscitation techniques in prehospital setting.  No PMCD in time.  Only survivors were in the first trimester.  Only 33% of witnesses initially performed chest compressions. |
| **Schaap et al. 2019**  Maternal Cardiac Arrests (MCA) in the Netherlands: a nationwide surveillance | Prospectively collected cases of MCA using Netherlands Obstetrical Surveillance  n= 38 | All Dutch cases of MCA from 2013-16 | Main outcomes:  Incidence of MCA, use of PMCD and maternal death  7.6/100,000 pregnancies  38 cases of MCA with 18 antepartum/20 postpartum  Aortocaval compression relief in 4/14 (29%) and 11/14 (79%) had PMD  Survivors had shorter interval from MCA to PMCD, 10 minutes vs 60 minutes, p=0.004  22/38 or 58% case fatality rate  (95% CI 42-72%)  13/22 (59%) who died arrested at home (p< 0.001) | Maternal death was associated with longer interval from MCA to delivery.  Location of collapse was also correlated with death.  Analysis suggested a need for widespread training. |
| **Benson et al. 2016**  Maternal Collapse:  Challenging the four- minute rule: | Nested review with stepwise survival analysis  n=74 | All cases of MCA that underwent PMD including case reports that included clinical details and key time intervals as well as maternal and neonatal outcomes  MCA without PMD was excluded | Primary outcomes included maternal and neonatal injury free survival as a function of time from arrest to birth  Maternal outcomes:  33 women died, 8 were injured and 33 had no sequelae.  Neonatal outcomes:  17 died, 14 were injured and 42 survived without sequelae  Injury free survival had a stepwise roughly linear decline with time of arrest to birth time for both mother and neonate  Threshold for 50% injury free maternal survival rate was 25 minutes and 26 minutes for neonatal 50% injury free survival rate  Secondary outcome of interest was arrest to birth time interval  Out of 34 neonates for which the data was known, 4 newborns or 11% were born within 5 minutes or less, 12 or 35.5% were delivered between 5-11 minutes, 8 or 23.5% were delivered from 11-21 minutes and 10 or 29.4% delivered more than 21 minutes after maternal cardiac arrest | The authors concluded that resuscitation team should proceed with PMD as quickly as possible once decision is made to deliver |

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| **Table 4 Patient Positioning for Resuscitation** | | | | | |
| **RCT** |  |  |  |  |  |
| **Study Acronym;**  **Author;**  **Year Published** | **Aim of Study; Study Type;**  **Study Size (n)** | **Patient Population** | **Study Intervention**  **(# patients) /**  **Study Comparator**  **(# patients)** | **Endpoint Results**  **(Absolute Event Rates, P value; OR or RR; & 95% CI)** | **Relevant 2° Endpoint (if any);**  **Study Limitations; Adverse Events** |
| **Dohi et al. 2017**  Maternal  cardiopulmonary resuscitation in supine and left-lateral tilt positions: A prospective, crossover study using mannequins and swine models | **Study Aim:**  Use of basic life support mannequin simulation BLS-MS to evaluate CPR effectiveness comparing 30 degrees of tilt versus supine  n =20 rescuers  Measuring coronary perfusion pressure in different positions using a PEA swine model  n= 4  Study Type:  Randomized cross over study for mannequin portion | **Inclusion Criteria:**  Certified rescuers who volunteered for study participation | **Intervention:**  Chest compressions in left lateral tilt or supine performed on pigs and mannequins  **Comparison:**  Chest compression in alternate position from that originally assigned  The BLS-MS (performed by certified rescuers) served to evaluate the quality of chest compressions in 30 left lateral tilt (LLT) and supine positions. Based on a 5-point scale, each rescuer subjectively graded their experience. Compression rate and correctness of hand position, compression depth, and recoil were measures of compression quality (BLS-MS).  The PEA-FM model was used to compare coronary perfusion pressure (CPP) readings during CPR in supine, supine with left uterine displacement, 30 LLT, and 30 right lateral tilt positions. | **1° endpoint:**  Compared with LLT position, supine position enabled correct hand position (rate: 0.99 vs 0.88; p < 0.05) and compression depth (rate: 0.76 vs 0.36; p < 0.001) significantly more often. Moreover, BLS- MS rescuers found chest compressions significantly easier to perform with the mannequin in supine (vs LLT) position (difficulty score: 1.75 vs 3.95; p < 0.001).  In the PEA-FM study arm (N=4), supine position with left uterine displacement and right lateral tilt positions had the highest and lowest recorded coronary perfusion pressure readings, respectively.  CPP=20 mm Hg vs 5 mm Hg; p< 0.05 | **Study Limitations:**  Swine model applicability to pregnant women cannot be completely conceded. Specifically, the fetal mannequin was not secured in place, creating a potential for excessive mobility  Another major limitation is that CPP was the sole index of CPR effectiveness in the animal model. Cerebral perfusion pressure is an equally important measure and would be an appropriate addition to similar future investigations.  the lack of statistically significant differences in CPP values at 0.5 and 2.0 min remains unexplained, it may reflect insufficient chest compression soon after initiating CPR and fatigue before terminating CPR |