**Data tables**

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| **Critical Outcomes** |
| **Survival**  After the procedure n=0; Hospital discharge n=0 |

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| **Resuscitation and stabilization interventions** **in Delivery Room**  a. Cardiopulmonary resuscitation n= 2 {Kelleher 2013 382; Bancalari 2019 271} ; Medications =0 | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
| Kelleher 2013 382 | RCT  Alabama, USA | 488 infants  Born at or after 35 weeks of GA  Vaginal 326  Cesarean 162 | n= 242  suction mouth and nostrils with bulb syringe  Vaginal 154  Cesarean 88 | n= 246  Gentle wiping externally over face, mouth and nose with towel  Vaginal 172  Cesarean 74 | *Secondary: Advanced resuscitation*  17 (7%) vs. 24 (10%) RR 95% CI: 1.40 (0.76-2.50) (p=0.28) | No definition on “advanced resuscitation required” |
| Bancalari 2019 271 | RCT  Concepcion, Chile | 84 term infants born by C-section | n= 42  Catheter tube 8 F introduced 6 cm  Negative pressure <30cmH2O  Procedure 15 sec | n=42  No suction  Routine care; cleaning | Resuscitation maneuvers  0/42 vs. 0/42 | None required resuscitation maneuvers during and for 48 h |

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| **Resuscitation and stabilization interventions**  b. Apgar score less than 7 at 1 minute, 5 and 10 minutes n=0 ; Apgar score at 1, 5, and 10 min n= 7 {Carrasco 1997 832; Waltman 2004 32; Gungor 2005 453; Gungor 2006 9, Kelleher 2013 382; Nejad 2014 400; Bancalari 2019 271) | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
| Carrasco 1997 832 | RCT  Montevideo, Uruguay | 30 term infants, vaginal delivery | n= 15  After birth suction with catheter tube 3R polyethylene, first nasopharynx and then nose no more 6 cm during 8 to 10 sec, negative pressure < 30cmH2O | n= 15  No suction | *Secondary: Apgar score at 1 and 5 min*  At 1 min 7 or more  At 5 min 7 or more | No numbers reported |
| Waltman 2994 32 | RCT pilot study  Mississippi, USA | 20 term infants, vaginal delivery | n= 10  Suction mouth and nose one time each with 2-ounce soft rubber bulb syringe or ear/ulcer syringe 1.5 inches deep, and finger pressure, when the head was delivered  and mouth  and nose wiped with a towel if any visible matter | n= 10  No suction, all the mouth  and nose wiped with a towel if any visible matter | *Secondary: Apgar score at 1, 5 and 10 min*  1 min: mean 8.95 ± 0.22  5 min: mean 9 ± 0  10 min: 9.40 ± 0.44  Range Apgar:  < 9 at 1 min 1 vs. 1  < 9 at 5 min 0 vs. 0  < 9 at 10 min 0 vs. 0 | Infants were placed under radiant warmer, dried thoroughly, and received standard care according to the NRP guidelines  **None of both groups had Apgar less than 8 at 1, 5 or 10 min** |
| Gungor 2005 453 { | RCT  (Ankara Turkey) | 140 term infants, vaginal delivery | n=70  Catheter tube 8 Ch., polyethylene, negative pressure <30cmH2O procedure 15 sec | n=70  No suction or wipe away any visible matter | Secondary: *Apgar score at 1, 5 min*  1 min: > 7 (8 to 9) n= 70/70 vs. 70/70  5 min Apgar 10  32/70 vs. 70/70 (0.001) | Newborns dried thoroughly under radiant heat next room.  SaO2 monitor on right hand from 1st min  **At 1 and 5 min both groups had Apgar > 7** |
| Gungor 2006 9 | RCT  (Ankara Turkey) | 140 term infants born by C-section | n=70  Catheter tube 8 Ch., polyethylene, negative pressure <30cmH2O procedure 15 sec | n=70  No suction or wipe away any visible matter | *Secondary: Apgar score at 1, 5 and 10 min*  1 min: 8.17 ± 0.38 vs. 8.26 ± 0.50 (NS)  5 min: 9.34 ± 0.48 vs. 10±0.0 (<0.001)  Apgar 10 at 5min  24/70 vs. 70/70 (<0.001) | **All mothers** received **general anesthesia** protocol. Newborns dried thoroughly under radiant heat next room. SaO2 monitor on right hand from 1st min  **At 1 and 5 min both groups had Apgar > 7** |
| Kelleher 2014 382 | RCT  Alabama, USA | 488 infants  Born or after 35 weeks of GE Vaginal 326  Cesarean 162 | n= 242  suction mouth and nostrils with bulb syringe | n= 246  Gentle wiping externally over face, mouth and nose with towel | *Secondary: Apgar score at 1 and 5 min*  Median (IQR)  1 min 8 (7-8) vs. 8 (7-8)  5 min 9 (9-9) vs. 9 (9-9) | After umbilical cord was cut, and long as a neonate remained in resuscitation area  2010 NPR guidelines |
| Nejad 2014 400 | RCT  Kerman, Iran | 170 term infants vaginal delivery | n= 85  Suction: < 15 sec after birth  Catheter polyethylene  Negative pressure <30cmH2O | n= 85  No suction: was only to remove any visible material. | *Secondary Apgar score at 1 and 5 min:*  1 min: all 8 or 9  5 min: all 10  Mean 8.96 ± 0.19 vs 8.99 ± 0-11 | Under radiant heat “standard care” |
| Bancalari 2019 271 | RCT  Concepcion, Chile | 84 term infants born by C-section | n= 42  Catheter tube 8 F introduced 6 cm  Negative pressure <30cmH2O  Procedure 15 sec | n=42  No suction  Routine care; cleaning | *Secondary: Apgar score*  1 min: 9 (8-9) vs. 9 (7-9) NS  5 min 9 (9-10) vs. 9 (9-10) NS | Routine care (cleaning, drying, stimulation), not mentioned how |

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| **Resuscitation and stabilization interventions**  Respiratory rate: n= 1 {Kelleher 2013 382}; Respiratory mechanics n= 1 {Estol 1992 297} | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
| Kelleher 2013 382 | RCT  Alabama, USA | 488 infants  Born or after 35 weeks of GE Vaginal 326  Cesarean 162 | n= 242  suction mouth and nostrils with bulb syringe | n= 246  Gentle wiping externally over face, mouth and nose with towel | *Primary mean respiratory rate in first 24 h after birth*  Respiratory rate 50 ±6 vs. 51 ± 8 | Respiratory rates were similar at every time point |
| Estol 1992 297 | RCT  Montevideo, Uruguay | 40 term infants  Vaginal delivery | n= 20  After birth nares and mouth suction with electric aspirator  Catheter polyethylene 5F  negative pressure < 30cmH2O | n= 20  No suction | *Primary: pulmonary mechanics*  Inspiratory C Dyn.: no differences at 10, 30 and 120 min  Expiratory C Dyn: no differences at 10, 30 and 120 min  Inspiratory R: no differences at 10, 30 and 120 min  no differences at 10, 30 and 120 min  Expiratory R: no differences at 10, 30 and 120 min | Newborns after intervention were wrapped in a dry napkin and put on mother´s breast  At 10 min after birth 1st spyrometric assessment |

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| **Resuscitation and stabilization interventions**  Time to reach SaO2 > 90% n= ; Time to reach > 92% n= 4 {Waltman 2004 32; Gungor 2005 453; Gungor 2006 9; Nejad 2014 400} ; Time to reach > 86% n= 2 { Gungor 2005 453; Gungor 2006 9} Effect or differences on SaO2 n= 4 {Carrasco 1997 832; Waltman 2004 32; Bancalari 2019 271; Konstantelos 2015 777} | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
| Carrasco 1997 832 | RCT | 30 term infants, vaginal delivery | n= 15  After birth suction with catheter tube 3R polyethylene, first nasopharynx and then nose no more 6 cm during 8 to 10 sec, negative pressure < 30cmH2O | n= 15  No suction | *Differences in SaO2 first 20 min*  SaO2 lower in suction between 1 to 6 min (0.05)  *Time to reach 86%:*  8.2 ± 3.3 vs 5.0 ± 1.2 (0.05)  *Time to reach 92%:*  10.2 ± 3.3 vs 6.8 ±1.8 s (0.05) | SaO2 sensor in right hand, reading between 20 and 30 sec, 1st reading al 1 minute |
| Waltman 2004 32 | RCT pilot study  Mississippi, USA | 20 term infants, vaginal delivery | n= 10  **When the head was delivered** the mouth and nose **wiped** with a towel if any visible matter **Suction mouth and nose** one time each with 2-ounce soft rubber **bulb** syringe **or** **ear**/ulcer **syringe** 1.5 inches deep, and finger pressure | n= 10  No suction: all mouth and nose wiped with a towel if any visible matter | *Differences in SaO2 first 20 min*  Average changes over time (5–20 minutes)  at 5 min Suction: 3% ± 2.3% less than No (NS)  at 10 min Suction: 3% ±  2.3% more (NS)  At 15 min Suction: 4.8% ± 1.7% (.005)  At 20 min: 92% vs. 97%  Time to reach >92%  8 min (48s) vs. 5 min (30s) (model) | Reusable neonatal saturation sensor applied to the hand  Only SaO2 measurements recorded from 5 to 20 minutes were used in  the analysis |
| Gungor 2005 453 | RCT  Ankara Turkey | 140 term infants, vaginal delivery | n=70  Catheter tube 8 Ch., polyethylene, negative pressure <30cmH2O procedure 15 sec | n=70  No suction or wipe away any visible matter | *Primary; time to reach 92% SaO2:*  SaO2: 83.37 ± 1.69 vs. 92.06 ± 0.23 (at 6 min. < 0.001); n= 0/70 vs. 70/70 at 6 min)  *Secondary:* Time to reach 86%  SaO2: 77.60 ± 1.30 vs. 86.89 ± 2.72 (4 min, < 0.001)  n= 10/70 vs. 70/70 (<0.001) | Newborn dried thoroughly under radiant heat next room SaO2 monitor on right hand from 1st min |
| Gungor 2006 9 | RCT  Ankara Turkey | 140 term infants born by C-section | n=70  Catheter tube 8 Ch., polyethylene, negative pressure <30cmH2O procedure 15 sec | n=70  No suction or wipe away any visible matter | *Primary; time to reach 92% SaO2:*  80.60 ± 1.84 vs. 92.04 ± 0.20 (<0.001);  n= 0/70 vs. 70/70 at 6min  *Secondary: Time to reach 86% SaO2:*  77.64 ±1.39 vs. 87.43 ± 3.09 (<0.001)  n= 2/70 vs. 70/70 (<0.001) | All mothers received general anesthesia protocol. Newborns dried thoroughly under radiant heat next room  SaO2 monitor on right hand from 1st min |
| Nejad 2014 400 | RCT  Kerman, Iran | 170 term infants vaginal delivery | n= 85  Suction: < 15 sec after birth  Catheter polyethylene  Negative pressure <30cmH2O | n= 85  No suction: was only to remove any visible material. | *Primary: time to reach 92% SaO2*  At 9 min (54s) 89.23 ± 5.17 vs. 92.0 ± 5.119 (0.002)  Sao2 at 1 min: 75.91 ± 6.95 vs. 75.46 ± 7.51 (0.7) NS  SaO2 at 5 min 85.02 ± 4.85 vs. 85.51 ± 6.64 (0.6) NS | SaO2 monitor attached to middle fingers right hand at 1st min |
| Konstantelos 2015 777 | Observational cohort study  Dresden, Germany | n= 346  Born by elective C-section  261 term infants  86 preterm infants | n= 58 term infants  n= 57 preterm  Suction | n= 202 term infants  n= 29  No suction | *Primary: Effects on SaO2*  In term without respiratory support lower oxygen saturation in suctioning group (p<0.05 at 3 and 5-10 minutes after suctioning). No effect in preterm infants. | One infant with severe desaturation after suctioning. |
| Bancalari 2019 271 | RCT  Concepcion, Chile | 84 term infants born by C-section | n= 42  Catheter tube 8 F introduced 6 cm  Negative pressure <30cmH2O  Procedure 15 sec | n=42  No suction  Routine care (cleaning, drying, stimulation) | *Primary: Effect on SaO2 during 60 min*  1 min: 52.0 ± 8 vs. 56.0 ± 10 (0.2) NS  5 min: 80.7 ± 9 vs. 81.2 ± 8 (0.8) NS  10 min 93.7 ± 2 vs. 93.8 ± 3 NS  Need of oxygen supplementation: 0/0 vs.=/0 | Pulse oximeter first 10 min and at 15, 30 and 60 min, in one lower extremities  There are a difference between the table in SaO2 (52.0 ± 8 vs. 56.0 ± 10) and the authors discussion (1 min: 52.6 ± 7.6 vs. 56.1 ±10.8)  This was reported but no was an outcome |

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| **Resuscitation and stabilization interventions**  d. Need endotracheal tube n= 0 | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
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**Important Outcomes**

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| **Delay in providing respiratory support**  Time needed for intervention (suction) n= 1 {Konstantelos 2015 777} | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
| Konstantelos 2015 777 | Observational cohort study  Dresden, Germany | n= 346  Born by elective C-section  261 term infants  86 preterm infants | n= 58 term infants  n= 57 preterm  Suction | n= 202 term infants  n= 29  No suction | *Primary: Median duration of total suctioning*  Term: 22 (IQR 11-35) or 36 (12-56) sec for infants without or with respiratory support respectively.  Preterm: 35 or 23 (14-61) sec for infants without or with respiratory support respectively.  *time in suction*  Median time single suctioning 9 s approx.  Median total time 30 s. approx. | Suctioning was performed in 74% oropharyngeal, 8% nasal, 7% oral/nasal,11% other combinations;  In median 2.5 suctioning episodes / infant |

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| **Morbidities:**  Respiratory complications (respiratory distress, tachypnea) n= 1 {Kelleher 2013 382} | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
| Kelleher 2013 382 | RCT  Alabama, USA | 488 infants  born or after 35 weeks of GE | n= 242  suction mouth and nostrils with bulb syringe | n= 246  Gentle wiping externally over face, mouth and nose with towel | *Secondary any respiratory rate value >60 bpm in first 24 h*  112 (46%) vs. 113 (46%) | No specific pathology reported |

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| **Side effects:**  Arrhythmia n= 1 {Cordero 1971 441}; Apnea n=1x {Cordero 1971 441}; Need Oxygen supplementation (desaturation) n= 1 {Bancalari 2019 271}; Injury n= 0 ; Infection n= 0 | | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | | **Notes** |
| Cordero 1971 441 | Case report  Connecticut, USA | n= 87  Apparently term infants  Delivery vaginally or by C-section | n= 46  After delivery another suction with introduction through nose or mouth nasogastric Catheter tube 5 or 8 connected to glass de Lee trap | n= 41  After delivery another suction with bulb syringe | *Primary: cardiac arrhythmias of vagal origin*  7/46 vs. 0/41  *Secondary: vagal Apnea*  5/46 vs. 0/41 | **All patients as the head of an infant were delivered, oral and nasal suction is applied with a bulb syringe**.  Recorded HR and ECG were obtained from one minute of life to 1st hour.  All neonates had a HR of 120 to 180 bpm and an identifiable ECG before suction | |
| Bancalari 2019 271 | RCT  Concepcion, Chile | 84 term infants born by C-section | n= 42  Catheter tube 8 F introduced 6 cm  Negative pressure <30cmH2O  Procedure 15 sec | n=42  No suction  Routine care; cleaning | Oxygen during 48h  0/0 vs. 0/0 | | None required oxygen for 48 h |

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| **Time to reach heart rate > 100**  HR at 1 min: n= 1 {Nejad 2014 400}; HR over 5 to 20 min: n=4 {Waltman 2004 32; Gungor 2005 453; Gungor 2006 9; Konstantelos 2015 777}; HR during 60 min: 1 {Bancalari 2019 271} | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
| Waltman 2004 32 | RCT pilot study  Mississippi ,USA | 20 term infants, vaginal delivery | n= 10  **When the head was delivered** the mouth and nose **wiped** with a towel if any visible matter **Suction mouth and nose** one time each with 2-ounce soft rubber **bulb** syringe **or** ear/ulcer **syringe** 1.5 inches deep, and finger pressure | n= 10  No suction, all the mouth  and nose wiped with a towel if any visible matter | *HR first 20 min*  HR mean 160.84 (SD 7.65) for both groups  range 150–166 vs. 166–173 bpm  HR suction group 11 ±  5.2 bpm less (.042) | Electrodes for simultaneous heart rate recording were also applied to verify the accuracy of measurements obtained by the saturation sensor.  **HR in both groups never was under 100 bpm** |
| Gungor 2005 453 | RCT  Ankara Turkey | 140 term infants, vaginal delivery | n=70  **Catheter** tube 8 Ch., polyethylene, negative pressure <30cmH2O procedure 15 sec | n=70  No suction or wipe away any visible matter | *Secondary: HR*:  At 1 min: 136.60 ± 4.09 vs. 133.91 ± 7.87 (NS) | **HR in both groups never was under 100 lpm** |
| Gungor 2006 9 | RCT  Ankara Turkey | 140 term infants born by C-section | n=70  **Catheter** tube 8 Ch., polyethylene, negative pressure <30cmH2O procedure 15 sec | n=70  No suction or wipe away any visible matter | *Secondary HR:*  At 1 min:137.3683.38 vs. 132.84±10.71 (<0.031) | All mothers received general anesthesia protocol. Newborns dried thoroughly under radiant heat next room SaO2 monitor on right hand from 1st min **HR in both groups never was under 100 lpm** |
| Nejad 2014 400 | RCT  Kerman, Iran | 170 term infants vaginal delivery | n= 85  Suction: < 15 sec after birth  Catheter polyethylene  Negative pressure <30cmH2O | n= 85  No suction: was only to remove any visible material. | *Secondary HR at 1 min:*  146.29 ± 8.73 vs 146.67 ± 9.74 (0.8) NS | Under radiant heat “standard care” | |
| Konstantelos 2015 777 | Observational cohort study  Dresden, Germany | n= 346  Born by elective C-section  261 term infants  86 preterm infants | n= 58 term infants  n= 57 preterm | n= 202 term infants  n= 29 | *Primary: Effect of suctioning on HR*  In term with respiratory support: higher HR (p<0.05 at 5, 7, 9 and 10 minutes)  No difference in preterm infants. | Suctioning did not cause severe bradycardia, | |
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| Bancalari 2019 271 | RCT  Concepcion, Chile | 84 term infants born by C-section | n= 42  Catheter tube 8 F introduced 6 cm  Negative pressure <30cmH2O  Procedure 15 sec | n=42  No suction  Routine care (cleaning, drying, stimulation) | *Primary: Effect on HR during 60 min*  1 min: 137 ± 25 vs. 148 ± 13 (0.02)  5 min: 162 ± 19 vs. 161 ± 13 (0.35) NS  10 min: 154 ± 16 vs. 151 ± 143 (0.44) NS | Pulse oximeter first 10 min and at 15, 30 and 60 min, in one lower extremities  In the discussion the authors inverse the results compared with the table  **HR in both groups never was under 100 lpm** |

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| **NICU admission required**  n= 1 {Kelleher 2013 382} | | | | | | |
| **Reference** | **Methods** | **Participants** | **Interventions** | **Comparisons** | **Outcomes** | **Notes** |
| Kelleher 2013 326 | RCT  Alabama, USA | 488 infants  At or after 35 weeks of GE | n= 242  suction mouth and nostrils with bulb syringe | n= 246  Gentle wiping externally over face, mouth and nose with towel | *Secondary NICU admission*  30 (12%) vs. 45 (18%) RR (95%CI: 1.5 (0.96-2.30) (0.07) | No special pathology reported |
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Note: all comparisons are Suctioning vs. NO-suctioning or wiping

**Further data description**

This scoping review identified 10 articles with the predefined inclusion criteria. They were reviewed by year of publication, type of study, and by intervention (suction versus no suction or wipe). If available, data were presented separately for premature and term or near-term infants and for different type of delivery; vaginal or C-section (Table ). Most of the available data was from infants at term or near-term. The proportion of delivery mode was similar for vaginal or C-section. The total number of newborn infants included in the suction group was 802 (bulb plus catheter) versus 579 in the no suction or wipe group.

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| **Author year** | **Study type** | **Preterm**  **(n)** | **Term or near term**  **(n)** | **Vaginal**  **Delivery**  **(n)** | **Cesarean**  **Delivery**  **(n)** | **Suction bulb**  **(n)** | **Suction catheter**  **(n)** | **No suction**  **or wipe**  **(n)** |
| Cordero 1971 | Case Report | --- | 87 | Not reported | Not reported | 87 | +46 de Lee trap | + 41 another bulb suction |
| Carrasco 1997 | RCT | --- | 30 | 30 | --- | --- | 15 | 15 |
| Estol 1992 | RCT | --- | 40 | 40 | --- | --- | 20 | 20 |
| Gungor 2005 | RCT | --- | 140 | 140 | --- | --- | 70 | 70  wiped |
| Gungor 2006 | RCT | --- | 140 | --- | 140 | --- | 70 | 70  wiped |
| Waltman 2004 | RCT pilot | --- | 20 | 20 | --- | 10  wiped | --- | 10  wiped |
| Kelleher 2013 | RCT | --- | 488  > 35 w | 326 | 162 | 242 | --- | 246 wiped |
| Nejad 2014 | RCT | --- | 170 | 170 | --- | --- | 85 | 85 wiped |
| Konstantelos 2015 | Cohort videos | 86 | 260 | --- | 346 |  | 115 | 231 |
| Bancalari 2019 | RCT | --- | 84 | --- | 84 | --- | 42 | 42 |
| Total |  | 86 | 1459 | 726 | 732 | 339 | 463 | 579 |