Table 1

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| **Author, year** | **Design/** **Country of Origin**  | **Population/****Exposure** | **Participant Characteristics** | **Intervention / Control** | **Outcomes** |
| **Clinical studies** |  |  |  |  |
| **Lee, 202314** | Prospective randomized controlled study / South Korea | OHCA | BLS and ALS hospital providers | Flow sensor real-time visual ventilation feedback device (Zoll Accuvent) / No feedback | Intervention = 63, control = 58ROSC (55.5% vs. 36.2%, p=0.04)30h survival (49.2% vs. 46.5, p=0.001). Survival to discharge (4.9% vs. 8.6%, p=0.54) Survival with good outcome (11.1 vs. 10.3, p=0.77)No data on ventilation measures reported  |
| **Drennan, 20247** | Prospective before-after study / Canada | OHCA | BLS and ALS EMS providers | Flow sensor real-time visual ventilation feedback device (Zoll Accuvent) / No feedback | Intervention = 221, Control = 191ROSC (27% vs. 29%, p=NS)Ventilation rate (12 (IQR 10, 17) vs. 14 (11, 19), p= 0.035)Prop rate in target (53%±38 vs. 29%±9, p<0.001)Insufflation volume measured (401ml (353, 472) vs. 374 (274, 453), p= 0.058)Proportion volume in target (28%±17 vs. 21%±16, p<0.001)Proportion volume & rate in target (19%±17 vs. 7%±10, p<0.001) |
| **Abella, 20071** | Prospective cohort study / USA | IHCA  | BLS and ALS hospital providers | Real-time audiovisual feedback system using thoracic impedance / No feedback | Intervention = 101, Control = 45ROSC (44.6% vs. 40.0%, p=0.58)Survival to discharge (8.9% vs. 9.1%, p=0.97) Ventilation rate (20+/-10 vs 18+/-8, p=0.12 for difference in mean and p=0.04 for difference in variance),  |
| **Gerber, 20238** | Case series / USA | OHCA | EMS providersED hospital providers | Fow sensor real-time visual ventilation feedback device (Zoll Accuvent) / No control groupComparison between EMS providers vs. hospital staff after ED admission | Total number of subjects = 3Case 1: Rate 8/min vs. 17/minMean insufflation volume measured 500ml vs. 844ml Case 2: Rate 6/min vs. 15/minMean insufflation volume measured 382ml vs. 610ml Case 3: Rate 10/min vs. 14/minMean insufflation volume delivered 478ml vs. 638ml  |
| **Lemoine, 202415** | Prospective cohort study / France | OHCA | BLS EMS providers | Flow sensor real-time visual ventilation feedback device (EOlifeX®) / no control group | N = 104Mean insufflation volume measured: 538 [IQR 412–645] mlVolume measured with passive exhalation: 291 [219–405] mlLeakage: volume 199 [119–287] ml, ratio 41% [26%–54%]intervention-time showed a slight improvement in leakage in ventilation 2 compared to one in 30:2 ratio |
| **McCarty, 201218** | Observational study, abstract only / USA | ED | ED hospital providers | CO2/Flow sensor real-time visual ventilation feedback device (NICO monitor, Philips) / no control group | N=11Ventilation rates 17/min (IQR 11,20)Insufflation volume measured 707 ml (IQR 564,827) |
| **Simulation studies** |   |  |   |   |
| **Gould, 20209** | Simulation study / USA | MannikinAdult resuscitation scenarios  | BLS and ALS EMS providers  | Flow sensor real-time visual feedback device (Zoll AccuVent) / no feedback | N=20Ventilations in target for:Rate (71% vs. 41%, p<0.001)Insufflation volume measured (79% vs. 31%, p<0.001), Both (63% vs. 10%, p<0.001). |
| **Heo, 202010** | Simulation study / Korea | MannikinAdult and pediatric resuscitation scenarios  | BLS (n=4) and ALS (n=22) hospital providers | Flow sensorreal-time visual feedbackdevice (Zoll AccuVent) / no feedback | N=26Adult BV:Insufflation volume measured: 432±64 vs. 393±136Optimal insufflation volume measured: 47.3% vs. 18.5%Optimal ventilation interval: 95.6% vs. 50.2%Pediatric BV Insufflation volume measured: 145±23 vs. 131±34Optimal insufflation volume measured: 89.51% vs. 72.66%Optimal ventilation interval: 95.83% vs. 57.14%all p value<0.001 |
| **Khoury, 201912** | Simulation study / France | MannikinAdult resuscitation scenarios  | BLS (n=20) and ALS (n=20) EMS providers  | Flow sensor (EOlifeX®) visual ventilation feedback for manual ventilation / no feedback | N=40ALS Group (ETT):Ventilation rate: 10.7±1.1 vs. 16.2±6.9Insufflation volume measured: 529±43 vs. 549±153Inspiratory time: 1.3±0.5 vs. 1.2±1.5I/E ratio: 0.3±0.1 vs. 0.5±0.2Optimal ventilation volume (defined as insufflation volume between 300 to 600 ml and rate between 8-15 /min): 85% vs. 15%BLS group (bag mask):Ventilation rate: 10.8±1.1 vs. 18.2±8.0Insufflation volume measured: 451±86 vs. 549±153Inspiratory time: 1.3±0.5 vs. 1.2±1.5I/E ratio: 0.3±0.3 vs. 0.6±0.2Optimal ventilation: 90% vs. 15%all p value<0.001 |
| **Kim, 202013** | Simulation study / Korea |  Bench model  | Senior hospital providers and EMT students  | Flow sensor (Amflow®) real-time visual portable feedback device / no feedback | N=40Insufflation volume measured: 505.6±32.2 vs. 534.2±73.5, p=0.012Accurate volume range: 85.4% vs. 41%, p<0.001Ventilation rate : 10 (IQR 10,10) vs. 9.4 (8.2, 12.2), p=0.62Accurate rate : 99.2% vs. 12.5%, p<0.001 |
| **Lyngby, 202117** | Simulation study / Denmark | MannikinAdult resuscitation scenarios  | BLS (n=27) and ALS (n=5) EMS providers | Pressure flow sensor (Zoll AccuVent) real-time visual feedback / no feedback | N=32Ventilations in target for:Rate 97% vs. 67%, p<0.001Volume 77.5% vs. 53%, p<0.001Both 75% vs. 22%, p<0.001 |
| **Charlton, 20214** | Simulation study / UK | MannikinAdult resuscitation scenarios  | BLS (n=28) and ALS (n=78) EMS providers | Pressure flow sensor (Zoll AccuVent) real-time visual feedback system / no feedback | N=106Insufflation volume within recommendation: 94.3% vs. 22.7%Mean Insufflation volume: 546 (IQR 531-560) vs. 630 (518-725)Ventilation within recommendation: 94.3% vs. 51%Median Ventilation rate: 9 (IQR 9-9) vs. 10 (8-14) (McNemars test p=<0.0001). |
| **Scott, 202121** | Simulation study / USA | MannikinAdult resuscitation scenarios  | ALS hospital providers | CO2/Flow sensor real-time visual ventilation feedback device (NICO, Philips) / no feedback | N= 52Ventilatory rate: 10.7 (IQR 7.9-13.8) vs. 9.8 (8.0-13.5), p=0.79Before feedback Insufflation volume measured appeared to be impacted among participant by sex, glove size. |
| **Wagner, 202223** | Simulation study / Austria | MannikinPediatric resuscitation scenarios  | ALS hospital providers | Pressure flow sensor (Neo Training) real-time visual feedback system / no feedback | N=40Volume (ml/kg):Inspiratory 10.15±4.6 vs. 12.83±6.0, p=0.002Expiratory 6.81±2.6 vs. 7.34±3.5, p=0.174Mask leak (%) 24.10±18.6 vs. 31.76±23.4, p=0.009Dwell time on feedback devices was high, reducing attention to the infant's chest and mask.  |
| **You, 201724** | Simulation study / South Korea | MannikinAdult resuscitation scenarios  | BLS (n=10) and ALS (n=42) EMS and hospital providers  | Flow sensor tidal volume monitoring device / no feedback | N=14Optimal ventilation (%): 84.3±12.1 vs. 31.8±22.8, p<0.001Ventilation interval (s): 6.1±0.1 vs. 6.1±0.1, p=0.29 |
| **Melia, 201219** | Simulation study, abstract only / USA | MannikinAdult resuscitation scenarios  | EMS providers | Ventilation timer providing immediate feedback on respirations rate / no feedback | N=49Ventilation rate: 11.77 (95% CI = 8.02–15.51) vs. 13.04 (95% CI = 9.29–16.78), p=0.016  |
| **Tran Dinh, 20236** | Simulation study, abstract only / France | ManikinAdult resuscitation scenarios  | Medical students trained at ALS level of care | Flow sensor (EOlifeX®) visual ventilation feedback / no feedback | N=344 Ventilation volumes (ml): 468 ± 90 vs. 625 ± 162, p < 0.0001)Insufflation times (ms): 1478 ± 580 vs. 1180 ± 417, p < 0.0001 |
| **D'Agostino, 20245** | Simulation study, letter to editor / Italy | MannikinAdult resuscitation scenarios  | ALS hospital providers  | Flow sensor (EOlifeX®) visual ventilation feedback / instructor evaluation of ventilation quality | Correct ventilation assessmentRate: 45% with feedback vs. 100% instructor, p<0.001Volume: 5% with feedback vs. 100% instructor, p<0.001 |
| **Lemoine, 202416** | Simulation study, abstract only / France | MannikinAdult and pediatric resuscitation scenarios  | BLS EMS provider | Blinded Flow sensor (EOlifeX®) visual ventilation feedback / no control group | Pediatric simulation (3 years – 14kg manikin)Insufflation volume:  139ml  [IQR 89 - 193]Volume exhaled:     117ml [IQR 78 - 163]insufflation time: 758 [IQR 560–1019] msExsufflation time: 326 [254–385] msLeakage ratio: 11% [4–19]Prop in target volume: 13% [6–8 ml/kg] |

ROSC: Return of Spontaneous Circulation, IQR: Interquartile Range, BV: Bag valve, OHCA: out-of-hospital cardiac arrest, IHCA: in-hospital cardiac arrest, EMS: Emergency medical services, ALS: Advanced Life Support, BLS: Basic life support, EMT: Emergency Medical Technician, ED: Emergency Department