TABLE 1 Data extraction

Author (year)	Study design	PEDro score	Groups	Participants	Intervention	IPV characteristics	Intervention period	Results
Homnick et al[16]	RCT	5	Group 1: IPV	8 (5M/3F) subjects with CF, mean age 12 y (5-24 y)	IPV, 20-30 min 2×/d, with albuterol	Type: Percussionator; f: 3-5 Hz; p: 10-30 cmH_2O	180 d	Lung function (FVC, FEV1, FEF25-75): NS change Anthropometrics (BMI, BW): NS change Satisfaction survey: subjects stated they would continue the use of IPV AE: 1 event of minor hemoptysis possibly related to IPV
			Group 2: CPT	8 (5M/3F) subjects with CF, mean age 10 y (5-18 y)	CPT: 20 min of percussion and postural drainage; preceded by aerosol with albuterol; 2×/d		180 d	Lung function (FVC, FEV1, FEF25-75): NS change Anthropometrics (BMI, BW): NS change AE: none reported IV antibiotic days: NS difference IPV compared to CPT Days of hospitalization: NS difference IPV compared to CPT
Natale et al[19]	Randomized crossover	7	1 group, 3 treatment regimens	9 (5M/4F) subjects with CF, mean age 14.6 y ±3,6	a) IPV, with albuterol	Type: Percussionator IPV-1; f: 200-300 cycles/min; O_2 delivery pressure 1.2 psi/kg body weight	3x 1 d	Expectorated sputum: NS differences in physical properties between treatments
					b) HVA/P&PD: high volume aerosol with albuterol, followed by CPT (percussion and postural drainage) c) STD: standard aerosol with albuterol, followed by CPT (percussion and postural drainage)			Lung function (FVC, FEV1, FEF25-75): NS pre vs post treatment within the three regimens, NS differences between regimens, except in more severe disease IPV was correlated with a greater ↑ in FEF25-75 AE: none reported in any of the treatment regimens
Newhouse et al[20]	Randomized crossover	6	1 group, 3 treatment r egimens	10 (9M/1F), children with CF, mean age 17 y (9-25 y)	a) IPV: 20 min 3 d/w, with albuterol	Type: IPV-1, percussionaire; p (10-30 cmH_2O) and f (3-5 Hz) individually determined to patient comfort and visible thoracic movement	3× 1 Session	Sputum wet weight: NS differences between treatment regimens
					b) Flutter: standard aerosol with albuterol, followed by 15 min flutter, 3 d/w			Lung function: FVC sign. ↑ after 1 h for flutter; FEV1 sign ↑ after 1 and 4 h for flutter and after 1 h for IPV; RV, TLC, RV/TLC, NS change; NS differences between the treatment regimens

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TABLE 1 (Continued)

Author (year)	Study design	PEDro score	Groups	Participants	Intervention	IPV characteristics	Intervention period	Results
					c) CPT: standard aerosol with albuterol, followed by 20 min conventional CPT, 3 d/w			AE: none reported in any of the treatment regimens
Deakins et al[15]	Retrospective	7	1 group	46 subjects with atelectasis, median age 4.2 y (1 m-15 y)	IPV, 10 min every 4-6 h, with albuterol	type: Percussionator IPV-1; f: 180-220 cycles/min; p: 15-30 cmH_2O	6.2 d	AS: ↓ 3 to 1 ($P < 0,001$) AE: none reported
	RCT		Group 1: IPV	7 subjects with atelectasis, age range 7 w-3 y	IPV, 10 min in intervals of 20 s with 5-10 s pauses, every 4 h	Type: Percussionator IPV-1; f: 180-220 cycles/min; p: 15-30 cmH_2O	3.1 d	AS: ↓ 2.3 to 0.9 ($P = 0.026$) Static compliance: NS change SpO_2: NS change f: NS change AE: none reported
			Group 2: CPT	5 subjects with atelectasis, age range 2 m-14 y	CPT (percussion, clapping, vibration), 10-15 min, every 4 h		6.2 d	AS: NS change Static compliance: NS change SpO_2: NS change f: NS change AE: none reported
Ha et al[21]	Prospective uncontrolled cohort	3	1 group	6 subjects in respiratory distress with suspicion of atelectasis, mean age 36 m ±24	IPV, 10 min 2×/d	type: Impulsator; f: 150-220 cycles/min; p: 0.5-1 kPa; I/E ratio: 1/1	5 d	AS: NS change SpO2: ↑ from 93.2 to 95.3% ($P = 0.002$) Clinical score: ↓ from 2.8 to 0.8 ($P = 0.012$)
Morgan et al[23]	Retrospective	3	1 group	59 (37M/22F) invasively ventilated subjects, median age 2 y (1 m–19 y)	IPV, 10 min	Type: MetaNeb, CHFO mode, f: 230 cycles/min	1–39 treatments per subject	HR: NS change; BP: NS change Ventilation parameters: PIP ↓ from 14 cmH_2O to 8 cmH_2O ($P < 0.001$); other ventilator parameters (PEEP, exhaled Vt, airway pressure, breathing f) NS change Gas exchange parameters: FiO_2:↑ from 0.35 to 0.40 ($P = 0.002$); SaO_2/FiO_2 ↓ from 259 to 243 ($P = 0.003$); other gas exchange parameters (PaO_2/FiO_2, $PaCO_2$, oxygen index): NS change AE: air leak in 1 subject
Bidiwala et al[22]	Retrospective	4	1 group, 2 treatment regimens	8 (4M/4F) tracheostomy dependent subjects with chronic illness, age 1-22 y	1st year: HFCWO, 2-3x/d		2x 1 y	# Respiratory illness: ↓ from 32/y with HFCWO to 15/y with IPV ($P < 0.001$)

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TABLE 1 (Continued)

Author (year)	Study design	PEDro score	Groups	Participants	Intervention	IPV characteristics	Intervention period	Results
					2nd year: IPV, 10 min, 2-3×/d	Type: Metaneb, 2 modes used in a cyclic manner: CHFO and CPEP		# Respiratory tract infections: ↓ from 15/y with HFCWO to 6/y with IPV ($P = 0.01$) Use of bronchodilators: ↓ from 53 episodes with HFCWO to 21 episodes with IPV ($P < 0.001$) Use of steroids: ↓ from 12 courses with HFCWO to 4 with IPV ($P = 0.003$) # hospitalizations: ↓ from 8 to 3 with IPV ($P = 0.003$) AE: none reported
Reardon et al[17]	RCT	7	Group 1: IPV	9 (6M/3F) subjects with NMD, median age 17 y (11-19 y)	IPV, 10-15 min 2×/d	Type: Impulsator; f: 120 cycles/min; p: individually set inducing visible chest oscillations, range 20-40 cmH_2O	7 m	Days of antibiotics: 0 Days hospitalised: 0 School days missed: 1 Pulmonary infections: 0 Lung function (FEV1, FVC, TLC, MVV, MIP, MEP): NS change Supplemental respiratory treatments: 60 extra albuterol inhalations; 22 extra IPV sessions
			Group 2: IS	9 (8M/1F) subjects with NMD, median age 17 y (14-19)	IS, 5-10 min 2x/d		7 m	Days of antibiotics: 44, sign. higher than IPV with IRR = 43 Days hospitalized: 8, sign. higher than IPV with IRR = 8,5 School days missed: 5 Pulmonary infections: 3 Lung function (FEV1, FVC, TLC, MVV, MIP, MEP): NS change Supplemental respiratory treatments: 166 extra albuterol inhalations; 172 extra IPV sessions; both sign. higher than IPV group ($P < 0,001$)
Van Ginderdeuren et al[32]	RCT	9	Group 1: IPV	31 (15M/16F) subjects with bronchiolitis, mean age 135 d ±132	IPV, 4 cycles of 5 min per day, combined with bouncing	Type: -; f: 300 cycles/min, P: 6-10 mbar	From hospital admission until discharge	Days of hospitalization: 3.5 ± 1.3; sign. ↓ than control ($P = 0,03$), but NS with AAD Secondary outcomes: Wang score improved sign. better than control, sign. better than AAD immediately after intervention, but NS after 1 h; HR and SaO_2 showed NS changes

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TABLE 1 (Continued)

Author (year)	Study design	PEDro score	Groups	Participants	Intervention	IPV characteristics	Intervention period	Results
			Group 2: AAD	31 (16M/15F) subjects with bronchiolitis, mean age 121 d ± 118	AAD, 20 min/d, combined with bouncing		From hospital admission until discharge	Days of hospitalization: 3.6 ± 1.4; sign. ↓ than control ($P < 0,05$), but NS difference with IPV Secondary outcome: Wang score improved sign. better than control; HR and SaO_2 showed NS changes
			Group 3: control	31 (13M/18F) subjects with bronchiolitis, mean age 160 d ± 143	Bouncing, 20 min/d		From hospital admission until discharge	Days of hospitalization: 4.5 ± 1.9; sign. ↑ than IPV and AAD Secondary outcomes: Wang score sign. less improvement than IPV and AAD; HR and SaO_2 showed NS changeschanges

AAD, assisted autogenic drainage; AE, adverse events; AS, atelectasis score; BP, blood pressure; BMI, body mass index; BW, body weight; CHFO, continuous high frequency oscillations; CPT, chest physiotherapy; CPEP, continuous positive expiratory pressure; f, frequency; FEF25-75, forced expiratory flow at 25–75% of vital capacity; FEV1, forced expiratory volume in one second; FiO_2, fraction of inspired oxygen FVC, forced vital capacity; HFCWO, high frequency chest wall oscillations; HR, heart rate; IPV, intrapulmonary percussive ventilation; IRR, incidence rate ratio; NS, non-significant; p, pressure; $PaCO_2$, partial pressure of arterial carbon dioxide; PaO_2, partial pressure of arterial oxygen; PEEP, positive end expiratory pressure; PIP, peak inspiratory pressure; RCT, randomised controlled trial; RV, residual volume; SaO_2, blood oxygen saturation level by invasive oximetry; sign., significant; SpO_2, blood oxygen saturation level by pulse oximetry; TLC, total lung capacity, Vt, tidal volume; #, number of.