Table 1. Study characteristics of the included studies

Author, year	Patients: N, mean age, % women	% COPD	Type of surgery	Intervention				
				Type	*Location*	*Cumulated time (min)*	*Weeks preop*	*Intensity**
Preoperative physiotherapy								
Inspiratory/respiratory muscle training								
Dronkers, 2008	I: 10, 70 years, 20% C: 10, 59 years, 30%	I: 10% C: 10%	Aortic	Inspiratory muscle training program	Home	15 min, 6 sessions, 6 days a week	2	NR
Barbalho-Moulim, 2011	32, 35.5 years, 100.0	NR	Abdominal	RMT, supervised, unsupervised	Hospital	270	2-4	Moderate
Valkenet, 2018	241, 63.2 years, 22.8	13.7	Esophageal (61% MIA)	RMT, supervised, unsupervised	Home	160	2	High
Guinan, 2019	60, 64.13 years, 30%	NR	Esophageal	Inspiratory muscle training	Home	30 breaths, twice daily	2	NR
Onerup, 2022	668, 68 ± 11 years, 40%	NR	Colorectal cancer surgery	IMT + daily aerobic activity	Home	30 min daily + IMT 30 x 2 breaths twice daily	14 ± 4 days	Relative medium-intensity
Kulkarni, 2010	34, 62.5 years, 42.5	NR	Abdominal	RMT, unsupervised	Home	420	2	Moderate
Comprehensive physiotherapy								
Dronkers, 2010	41, 70.0 years, 25.9	90.3	Abdominal	Combined, supervised, unsupervised	Home, Hospital	1,035	2-4	High
Soares, 2013	28, 56.5 years, 47.0	NR	Abdominal	Combined, supervised, unsupervised	Home, Hospital	550	2-3	Moderate
Dunne, 2016	37, 62 (54-69) years, 30%	NR	Liver resection	Comprehensive physiotherapy	Home	30 min, 12 times	4	Moderate to vigorous
Abdelaal, 2017	I: 26, 55.5 (49-67) years, 54% C: 24, 52 (47-65) years, 58%	NR	Laparoscopic upper abdominal	Comprehensive physiotherapy	Home	15 min, twice daily	2	Low
Barberan-Garcia, 2018	125, 71.0 years, 26.0	NR	Abdominal	ET, supervised, unsupervised	Home	560	4	High
Single physiotherapy session								
Boden, 2018	I: 218, 63.4 (IQR 51.1-71.9), 39% C: 214, 67.5 (IQR 56.3-75.3), 39%	NR	Upper abdominal	Physiotherapy education and breathing exercises	Hospital	30 min	Within 6 weeks pre-op	NR
Perioperative physiotherapy								
Chest physiotherapy								
Roukema, 1988	119, NR	NR	Upper abdominal	Chest physiotherapy + education	Home, hospital	Once per day	1	NR

				(continued post-op)				
Condie, 1993	170, NR	NR	Abdominal	Chest physiotherapy + education (continued post-op)	NR	NR	NR	NR
Fagevik Olsén, 1997	I: 174, 53.5 ± 17.4, 59% C: 194, 52.9 ± 17.5, 56%	NR	Abdominal	Chest physiotherapy (continued post-op)	NR	10-15 min, every hour during daytime	1 day	NR
Chumillas, 1998	81, 64.1 years, 46 women	NR	Upper abdominal	Chest physiotherapy (continued post-op)	Home, hospital	10-15 min, four times daily	2-3 days	NR
Inspiratory/respiratory muscle training								
Huang, 2022	I: 13, 46.4 ± 12.9 years, 46.2% C: 15, 44.8 ± 14.2 years, 26.7%	NR	Upper abdominal surgery	IMT program	Home and hospital	25-30 min, twice a day, five days per week for at least 2 weeks	3 weeks	Moderate to high, increased by 5-10% per week
Breathing exercises								
Qin, 2020	I: 120, 63.49 ± 12.76 years, 40% C: 120, 62.48 ± 12.44 years, 38%	I: 2% C: 4%	Laparoscopic colorectal surgery	Breathing training	Hospital	Three times daily	5 days	NR
Chen, 2022	I: 132, 69.3 ± 10.1 years, 48% C: 132, 70.1 ± 9.4 years, 54%	I: 8% C: 6%	Laparoscopic colorectal surgery	Breathing exercises	Hospital + home	Twice daily	5 days	NR
Postoperative physiotherapy								
Chest physiotherapy								
Morran, 1983	I: 51, 44 ± 6, 78% C: 51, 47 ± 7, 80%	NR	Gallbladder	Chest physiotherapy	Hospital	15 min,	NA	NR
Mackay, 2005	I: 29, 63 ± 13, 48% C: 21, 69 ± 15, 53%	NR	Open abdominal	Chest physiotherapy	Hospital	3 times daily	NA	NR
Silva, 2013	I: 28, 73.1 ± 8.2, 43% C: 28, 71.1 ± 7.3, 57%	I: 14% C: 4%	Open upper abdominal	Chest physiotherapy	Hospital	Four sets of five repetitions	NA	Moderate
Incentive spirometry								
Celli, 1984	86, NR	NR	Abdominal	Incentive spirometry	NR	NR	NA	NR
Lunardi, 2015	137 I: 33, 73% C: 35, 60%	I: 0% C: 3%	Upper abdominal	Incentive spirometry	Hospital	Five series of 10 reps	NA	NR

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Richtlijn Preventie van postoperatieve pulmonale complicaties bij pulmonaal belaste patiënten 2025

Pantel, 2017	224, 45.6 ± 11.8, 77.7%	2.2%	Bariatric	Incentive spirometry	Hospital	NR	NA	NR
Mobilization and breathing exercises								
Svensson-Raskh, 2021	I1: 73, 72 (IQR 63.5-77) years, 62% I2: 76, 69 (IQR 60-73) years, 58% C: 65, 68 (IQR 59-72) years, 63%	NR	Abdominal	Mobilization and breathing exercises	Hospital (postoperative recovery unit)	6 hours (or less)	NA	NR
Combined training								
Yamana, 2015	60, 67.1 years, 22.0	NR	Esophageal	Combined, supervised	Hospital	420	At least 1	Moderate

NR: not reported, NA: not applicable, RMT: Respiratory muscle training, ET: Endurance training, Combined: combination of RMT and ET, MIA: minimally invasive approach. *Moderate intensity: achieve <75%of maximal heart rate for ET; achieve ≥30% of maximal inspiratory pressure or ≥30% of maximal voluntary ventilation or use volumetric/incentive spirometry for RMT; or no physiological marker used as a target for ET/RMT. High intensity: achieve ≥75%of maximal heart rate, 100% of peak work rate, or >5% of rate perceived exercise for ET; achieve ≥60% of maximal inspiratory pressure or guided to achieve rate of perceived exercise >5% for RMT