Recrutement pulmonaire et spirométrie incitative: Pour ou Contre?

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Historique

- Prévalence importante de complication post-op
- Développement de manœuvres de respiration
- Mise au point SI en 1973
- Deux indications principales
  - Post-op chirurgie abdominale
  - Post-op chirurgie thoraco-pulmonaire

Bartlett, JAMA 1973

SI et physiologie

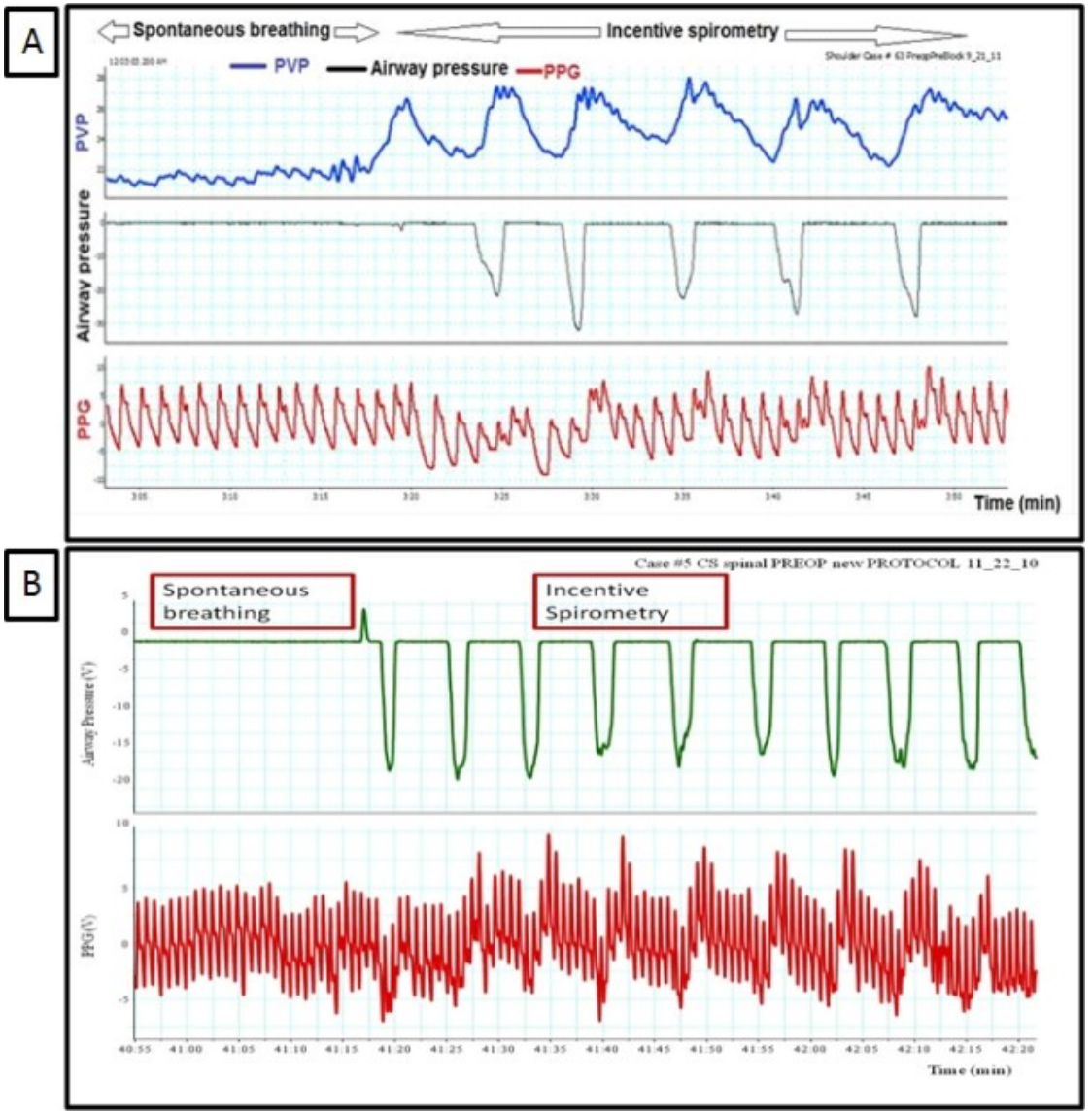
peripheral venous pressure

Airway pressure

photoplethysmographic

Airway pressure

photoplethysmographic



Central Venous Pressure

Aymen, Sensors 2013

Travail en débit ou en volume

20 sujets sains

évalués par pléthysmographie optoélectronique

	Quiet Breathing (mean ± SD)	Flow-Oriented Incentive Spirometry (mean ± SD)	Volume-Oriented Incentive Spirometry (mean ± SD)
Volume, L			
Chest wall	0.62 ± 0.18	2.08 ± 0.99*	2.48 ± 1.22*†
Upper rib cage	0.22 ± 0.11	0.86 ± 0.39*	0.97 ± 0.57*
Lower rib cage	0.12 ± 0.07	0.50 ± 0.25*	0.57 ± 0.36*
Abdomen	0.28 ± 0.09	0.73 ± 0.53*	0.94 ± 0.55*†
Time, s			
Inspiratory	2.00 ± 0.81	2.17 ± 1.06	3.81 ± 3.30*†
Total	4.68 ± 1.22	4.94 ± 2.49	7.18 ± 3.98*†
Inspiratory/total	0.43 ± 0.10	0.44 ± 0.07	0.42 ± 0.11
Asynchrony (upper rib cage × abdomen), phase angle	7.08 ± 9.28	33.38 ± 32.58	14.48 ± 14.70
Root mean square muscle activity, 10^{-3} mV			
Right sternocleidomastoid	6.5 ± 3.8	22.8 ± 20.4*†	18.1 ± 21.5*
Right intercostal	6.5 ± 1.6	38.4 ± 29.2*†	27.0 ± 24.1*
Left intercostal	6.4 ± 2.9	16.4 ± 9.8*	13.9 ± 7.7*

* $P < .05$ compared with quiet breathing.
† $P < .05$ compared between devices.

Paisani, Resp Care 2013

SI et pontage coronarien

Comparison 1. Atelectasis

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Incentive spirometry versus conventional physical therapy	2	257	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.11 [0.58, 2.16]
2 Incentive spirometry versus continuous positive airway pressure (CPAP)	1	63	Peto Odds Ratio (Peto, Fixed, 95% CI)	2.33 [0.72, 7.58]
3 incentive spirometry versus bilevel positive airway pressure (BiPAP or NIV-2P)	1	63	Peto Odds Ratio (Peto, Fixed, 95% CI)	2.33 [0.72, 7.58]
4 Incentive spirometry versus Intermittente positive pressure breathing (IPPB)	1	52	Peto Odds Ratio (Peto, Fixed, 95% CI)	2.51 [0.76, 8.23]
5 Incentive spirometry versus active cycle of breathing techniques	1	60	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.86 [0.29, 2.53]
6 Incentive spirometry versus preoperative physiotherapy advice only	1	75	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.83 [0.33, 2.11]

Erfs, CD 2012

SI et pontage coronarien

Comparison 2. Pneumonia

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Incentive spirometry versus conventional physical therapy	2	258	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.71 [0.31, 1.64]
2 Incentive spirometry versus preoperative physiotherapy advice only	1	75	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.38 [0.08, 1.79]
3 Incentive spirometry versus continuous positive airway pressure (CPAP)	1	63	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.10 [0.07, 18.08]
4 incentive spirometry versus bilevel positive airway pressure (BiPAP or NIV-2P)	1	63	Peto Odds Ratio (Peto, Fixed, 95% CI)	8.17 [0.16, 413.39]
5 Incentive spirometry versus Intermittente positive pressure breathing (IPPB)	1	52	Peto Odds Ratio (Peto, Fixed, 95% CI)	2.03 [0.63, 6.52]

Erfs, CD 2012

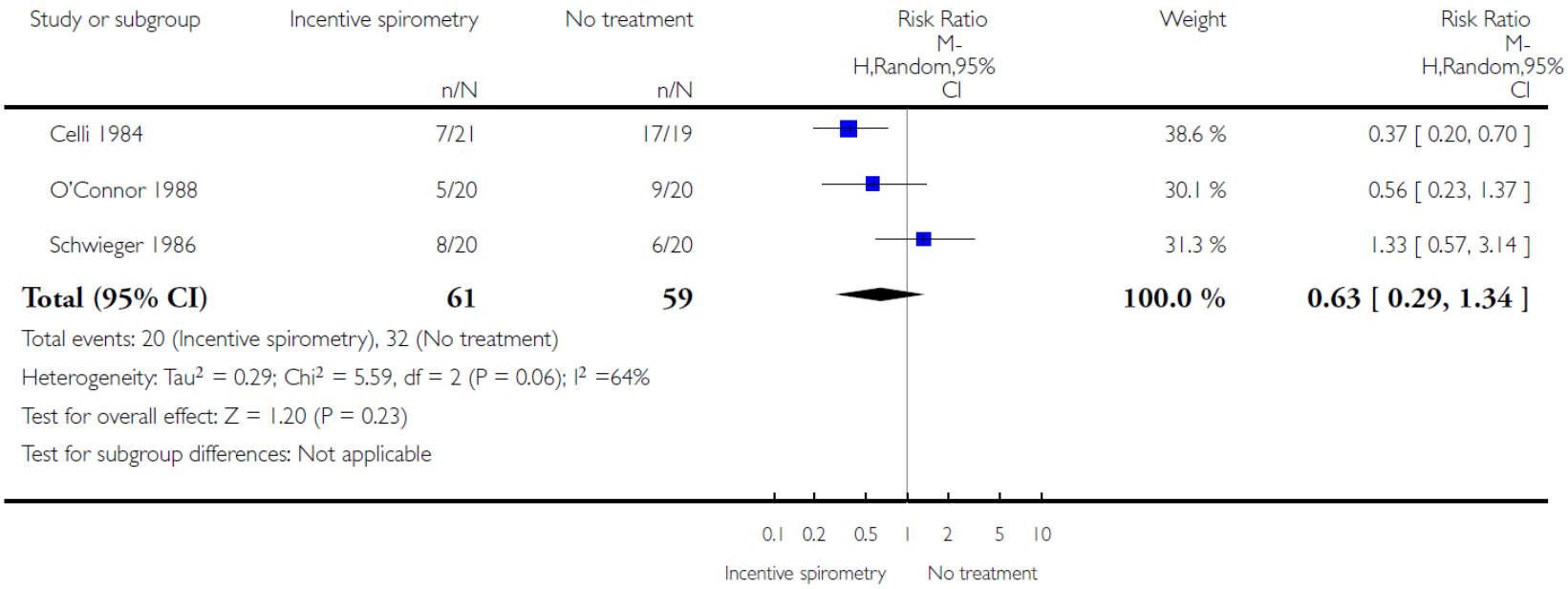
Meta analyse Post Tx et cardiaque

Carvalho, RevBrasFisioter 2011

Authors	Control	Other intervention	IS	IS + co intervention	Results
Thoracic Surgery					
Weiner et al.[50]	No treatment (n=15)			IS 30x + RB 30min/1h (Pre+PO) (n=17)	↑ LF on IS + RB
Vilaplana et al.[46]	No treatment (n=19)		IS 5min/1h (n=18)		Similar: LF, oxygenation and PPC
Gosselink et al.[42]		Orientation 5-10 IMT+FE+ cough 2x/1h (n=35)		Orientation 10-20 IS+FE+AC/1h	Similar: PPC and HS
Cardiac Surgery					
Yánez-Brage et al.[41]	No treatment (n=104)		IS 30x/1h (n=159)		Similar PPC
Dias et al.[43]		Orientation pre (n=11) RB + orientation (n=12)		IS + orientation (n=12)	↑ LF on RB
Renault et al.[52]		DB+AC+EM 30x/day (n=18)		IS+AC+EM 30x (n=18)	Similar: LF, MP and oxygenation
Haeffener et al.[38]		Orientation + DB (n=17)		IS + EPAP 18x, 2x/day (n=17)	MIP, 6MWT, PPC and HS ↓ on IS+EPAP
Romanini et al.[49]		IPPB 20 min/day (n=20)	IS 20min (n=20)		↑ MP on IS
Matte et al.[39]		CPAP + SP (n=31) Bilevel + SP 1h/3h (n=31)		IS 20x + SP/2h (n=28)	LF and oxygenation ↓ IS
Crowe and Bradley[37]		SP (n=95)		IS + SP/1h (n=32)	Similar: LF, PPC and HS
Oikkonen et al.[40]		IPPB 10x 4x/day (n=26)		IS + RP 5x,/2h (n=25)	Similar: LF, oxygenation and PPC
Jenkins et al.[44]		EM (n=37); RP + TP (n=38) 30-50x/h	IS 30-50x/1h (=35)		Similar: PPC, LF and HS
Stock et al.[45]		IMT 4-5x + AC/2h (n=13) CPAP 2-3x/5 min (n=13)	IS 5x/2h (n=12)		Similar PPC and ↑ LF on IS
Dull and Dull[51]		EM + AC 2 x/day (n=16) IMT + EM 10x, 4x/day (n=17)		IS 10x + EM 4x/day (n=16)	Similar PPC
Gale and Sanders[47]		IPPB 20x/4h (n=57)	IS 10-20min/4h (n=52)		Similar: ↑ LF on IS, PPC and oxygenation
Iverson et al.[48]		IPPB (n=42) 15min; RB	IS 3-5x/3h (n=58)		↓ PCP on RB

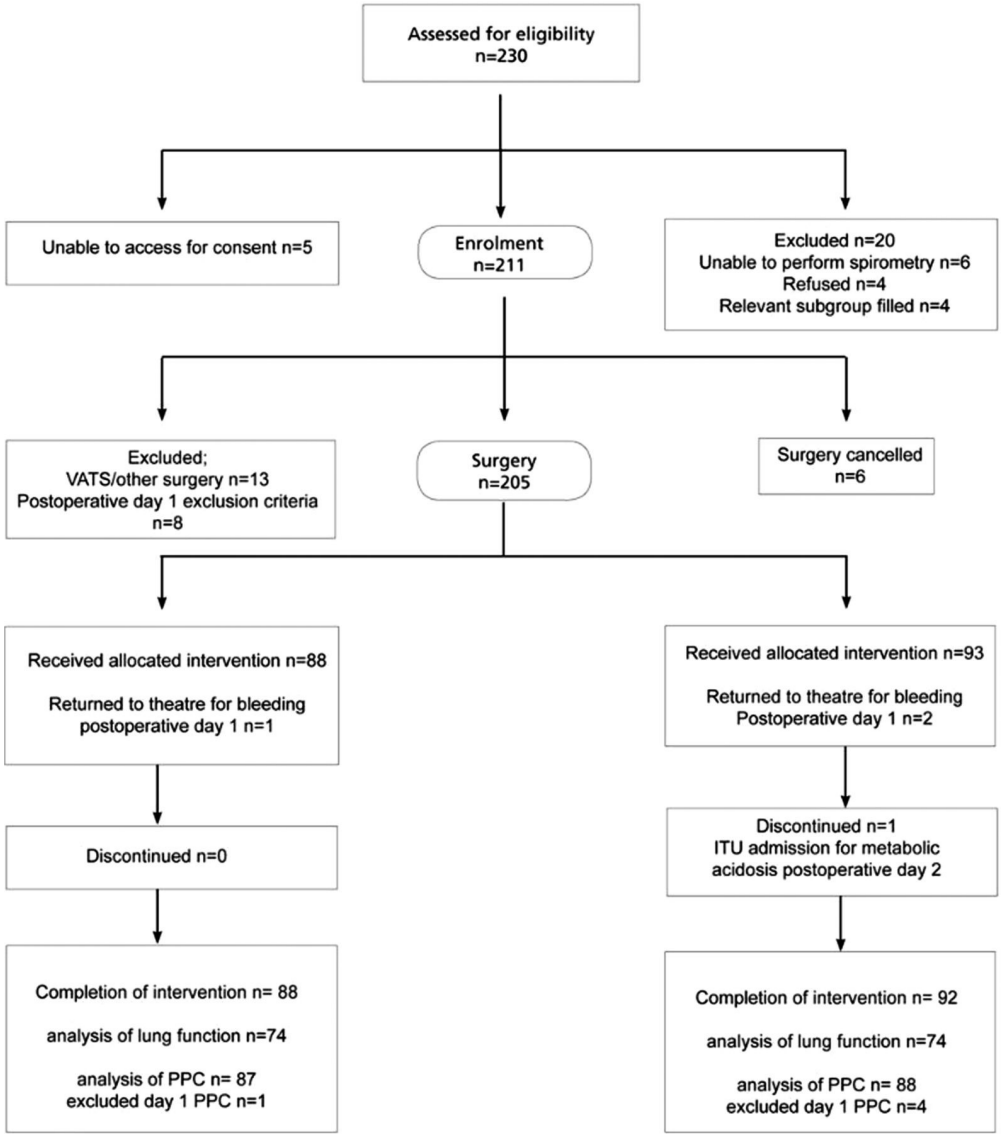
SI et chirurgie abdominale

Complications post-opératoire



Guimaraes, CD 2009

SI et post chirurgie thoracique



Agostini, Thorax 2013

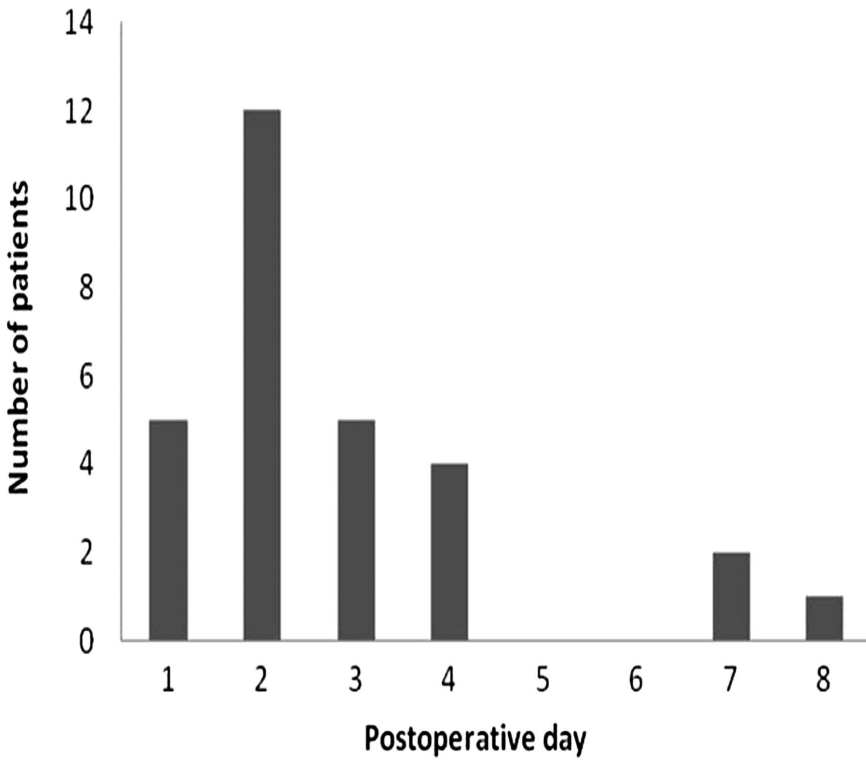
SI et post chirurgie thoracique

Table 1 Control and intervention group demographic and risk factors

Demographics, risk factors and postoperative pain	Control (n=88)	Intervention (n=92)	p Value
Male	47% (41)	49% (45)	0.871
Lung cancer	91% (80)	94% (85)	0.536
% predicted FEV_1, median (IQR)	75 (24)	77 (23)	0.818
Age (years), median (IQR)	70 (9)	65 (14)	0 .003
BMI, mean±SD	27±5	27±5	0.965
ASA >3	70% (61)	54% (50)	0.044
Current smoking/ ex-smokers of up to 6 weeks	22% (19)	26% (24)	0.595
COPD	26% (23)	25% (23)	1.000
Preoperative activity level >2 km	69% (61)	74% (68)	0.604

Data shown as % (n).
ASA, American Society of Anaesthesiologists; BMI, body mass index; COPD, chronic obstructive pulmonary disease.

Apparition de complication post-op



Agostini, Thorax 2013

SI et post chirurgie thoracique

Table 3 Secondary outcomes in high-risk and low-risk subgroups

Outcome measure	High-risk subgroup			Low-risk subgroup		
	Control (n=43)	Intervention (n=43)	p Value	Control (n=44)	Intervention (n=45)	p Value
PPC frequency	23% (n=10)	14% (n=6)	0.406	7% (n=3)	11% (n=5)	0.714
Insertion of 'rescue' minitracheostomy	11% (4/38)	0% (0/36)	0.115	7% (3/42)	5% (2/42)	1.000
Postoperative LOS, median (IQR)	6 (3)	5 (1)	0.075	6 (4)	5 (3)	0.287
HDU LOS, median (IQR)	2 (3)	2 (2)	0.893	2 (1)	1 (1)	0.051
ICU admission	0% (0)	2.3% (1)	1.000	–	–	–

HDU, high-dependency unit; ICU, intensive care unit; LOS, length of stay; PPC, postoperative pulmonary complication.

- PPC ↗ si patient BPCO: OR :2.89[1.11 to 7.75]
- Patients à risque doivent être les patients sélectionnées

Agostini, Thorax 2013

SI et AVC

- Etude observationnelle de 20 AVC appariée avec 20 SS avec SI en volume
- Evaluation par pléthysmographie optoélectronique et EMG
- Utilisation en réhabilitation post AVC

Lima, Resp Care in press

SI et AVC

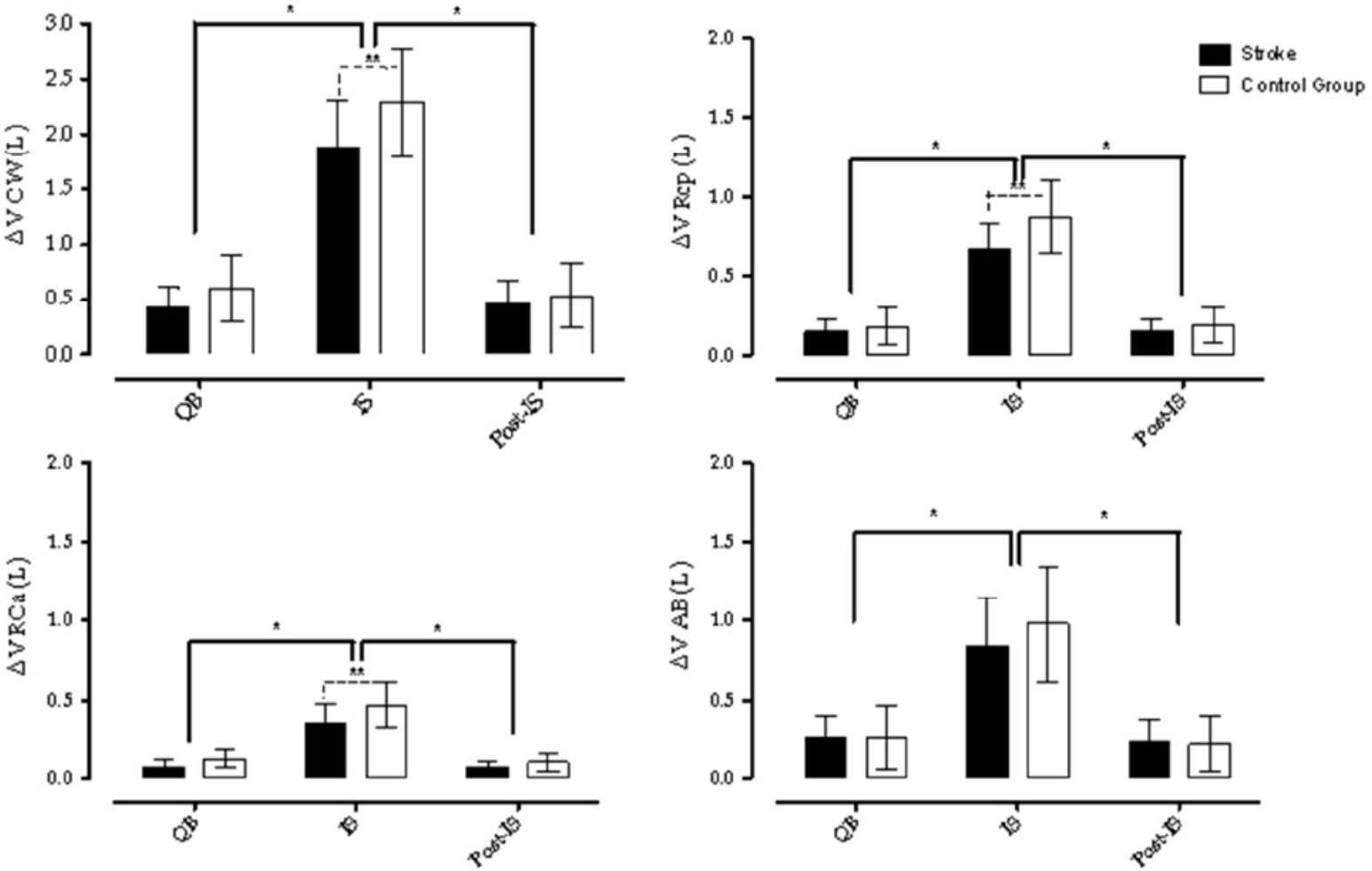


Figure 1. Tidal volumes of the entire chest wall (ΔVCW), pulmonary rib cage (ΔVRCp), abdominal rib cage (ΔVRCa) and abdomen (ΔVAB) during spontaneous quiet breathing (QB), incentive spirometry (IS) and breathing after IS (post-IS) in the patients with stroke (light gray bars) and controls (dark gray bars). * p< 0.05 – EG (Stroke) vs. CG (Healthy) – Two-way ANOVA, between the instances (Pre-Is, IS and Post-IS). ** p< 0.05 – EG (Stroke) vs. CG (Healthy) – Two-way ANOVA, between groups. † p< 0.05 – interaction between the disease (stroke) and the instances (Pre-IS,IS and Post-IS). Bonferroni's post hoc between instances and groups.

Lima, Resp Care in press

Guidelines SI

- Pas de recommandations pour SI en post-op prophylactique

- Pas de recommandations en routine

Strickland, Resp Care 2013

Conclusion

- Qualité des études publiées
- Utilisation plutôt en volume
  - Meilleure synergie thoraco-abdominale
  - ↗ du recrutement
- Doit être utilisé chez des patients sélectionnés Collaboration, CV > 30% de valeur prédit

Conclusion

- Travail actif
- Prise en charge globale
  - Ne peut être l'unique traitement respiratoire
  - Ne doit pas être utiliser pour améliorer la PaO_2
- Aspect didactique
- Ne doit pas être sur ttes les tables de nuit des patients