Preoperative Pulmonary Evaluation

台北榮民總醫院
呼吸治療科主治醫師
連德正

tclien@vghtpe.gov.tw

Outline

- Risk factors for postoperative pulmonary complications
- Lung cancer being considered for resectional surgery (ACCP 2007, 2013 guidelines)
- Risk reduction strategies
- Indications and contraindications for chest physical therapy

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Risks for postoperative pulmonary complications

Smetana *NEJM* 1999;340:937

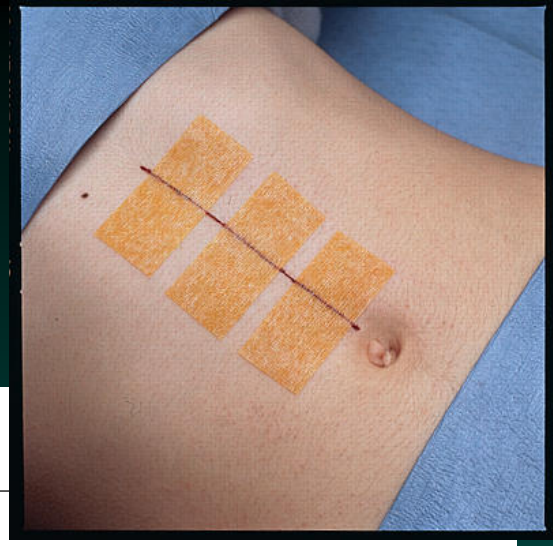
Potential Risk Factor*	Type of Surgery	Study	Incidence of Pulmonary Complications (percent)		Unadjusted Relative Risk Associated with Factor
			When Factor Was Present	When Factor Was Absent	
Smoking	Coronary bypass	Warner et al.[7]	39	11	3.4
	Abdominal	Wightman,[3] Morton,[8] Brooks-Brunn[9]	15–46	6–21	1.4–4.3
ASA class >II	Unselected	Wolters et al.[10]	26	16	1.7
	Thoracic or abdominal	Brooks-Brunn,[9] Kroenke et al.,[11] Hall et al.,[12] Garibaldi et al.[13]	26–44	13–18	1.5–3.2
Age >70 yr	Unselected	Wightman,[3] Pedersen[14]	9–17	4–9	1.9–2.4
	Thoracic or abdominal	Garibaldi et al.,[13] Thomas et al.,[15] Calligaro et al.[16]	17–22	12–21	0.9–1.9
Obesity	Unselected	Wightman[3]	11	9	1.3
	Thoracic or abdominal	Brooks-Brunn,[9] Hall et al.,[12] Garibaldi et al.,[13] Moulton et al.,[17] Dales et al.[18]	19–36	17–27	0.8–1.7
COPD	Unselected	Wightman,[3] Pedersen et al.,[5] Tarhan et al.[19]	6–26	2–8	2.7–3.6
	Thoracic or abdominal	Kroenke et al.[11]	18	4	4.7

Influence of ASA classification on postoperative pulmonary complications

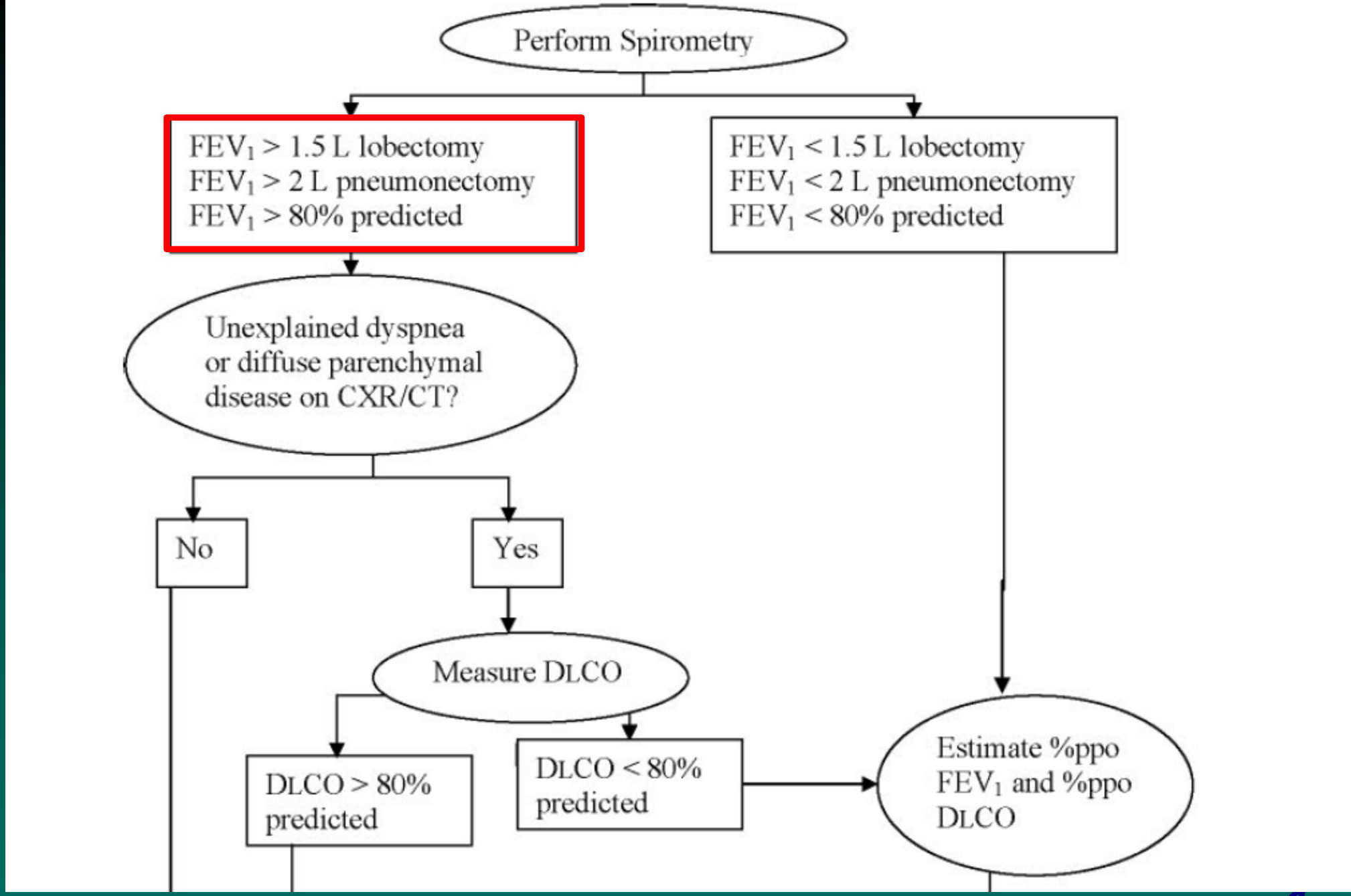
ASA Class	Class Definition	Rates of PPCs by Class, %
I	A normally healthy patient	1.2
II	A patient with mild systemic disease	5.4
III	A patient with systemic disease that is not incapacitating	11.4
IV	A patient with an incapacitating systemic disease that is a constant threat to life	10.9
V	A moribund patient who is not expected to survive for 24 hours with or without operation	NA

Qaseem *AIM* 2006;144:575

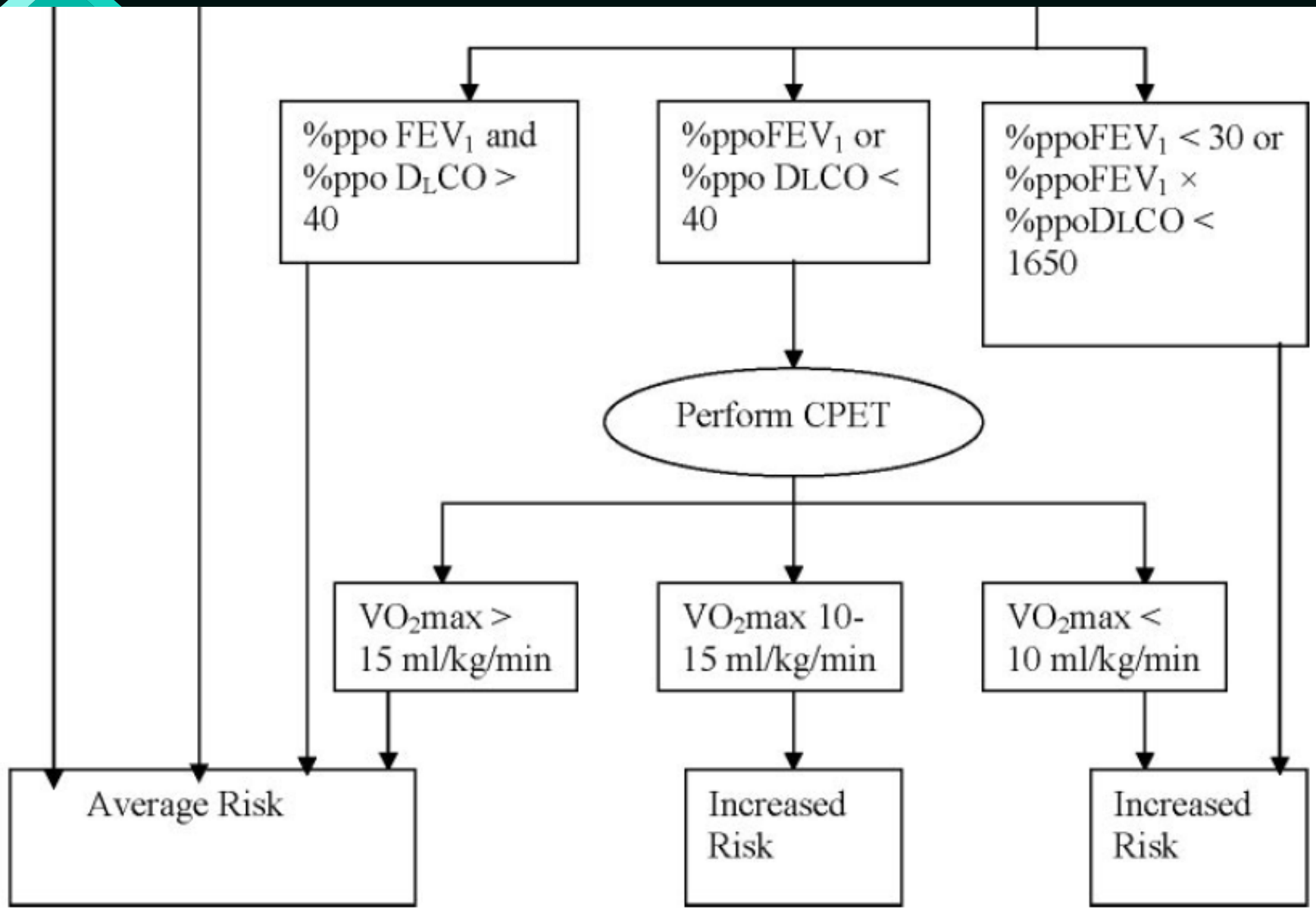
Influence of surgical sites on postoperative lung complications



Study	Year	Type of Surgery				
		Upper Abdominal	Lower Abdominal	Laparoscopic Cholecystectomy	Thoracic	All Other
		% of cases with complications (total no. of cases)				
Pooler[39]	1949	19 (331)	11 (1334)			0.7 (4204)
Wightman[3]	1968	19 (130)	6 (323)			0.6 (330)
Tarhan et al.[19]*	1973	13 (75)	7 (45)		10 (112)	3 (396)
Gracey et al.[6]†	1979	25 (57)	0 (7)		19 (21)	17 (72)
Garibaldi et al.[13]‡	1981	17 (201)	5 (208)		40 (102)	
Pedersen et al.[5]	1990	33 (419)	16 (200)			3 (6687)
Southern Surgeons Club[40]	1991			0.3 (1518)		
Phillips et al.[29]	1994			0.4 (841)		
Brooks-Brunn[9]	1997	28 (238)	15 (162)			



Colice *Chest* 2007;132:161S



Colice *Chest* 2007;132:161S

Preoperative evaluation for lung cancer ACCP 2013 guideline

- Basic evaluation
  - Cardiovascular evaluation
  - Spirometry: FEV1
  - Diffusing capacity: DLCO
- Predicted postoperative (PPO) lung function
  - Low risk: both FEV1 & DLCO > 60% pred
  - Either test 30-60% pred => Low tech exercise test (ET)
  - Either test < 30% pred => cardiopulmonary ET (CPET)

Brunelli *Chest* 2013;143:166S

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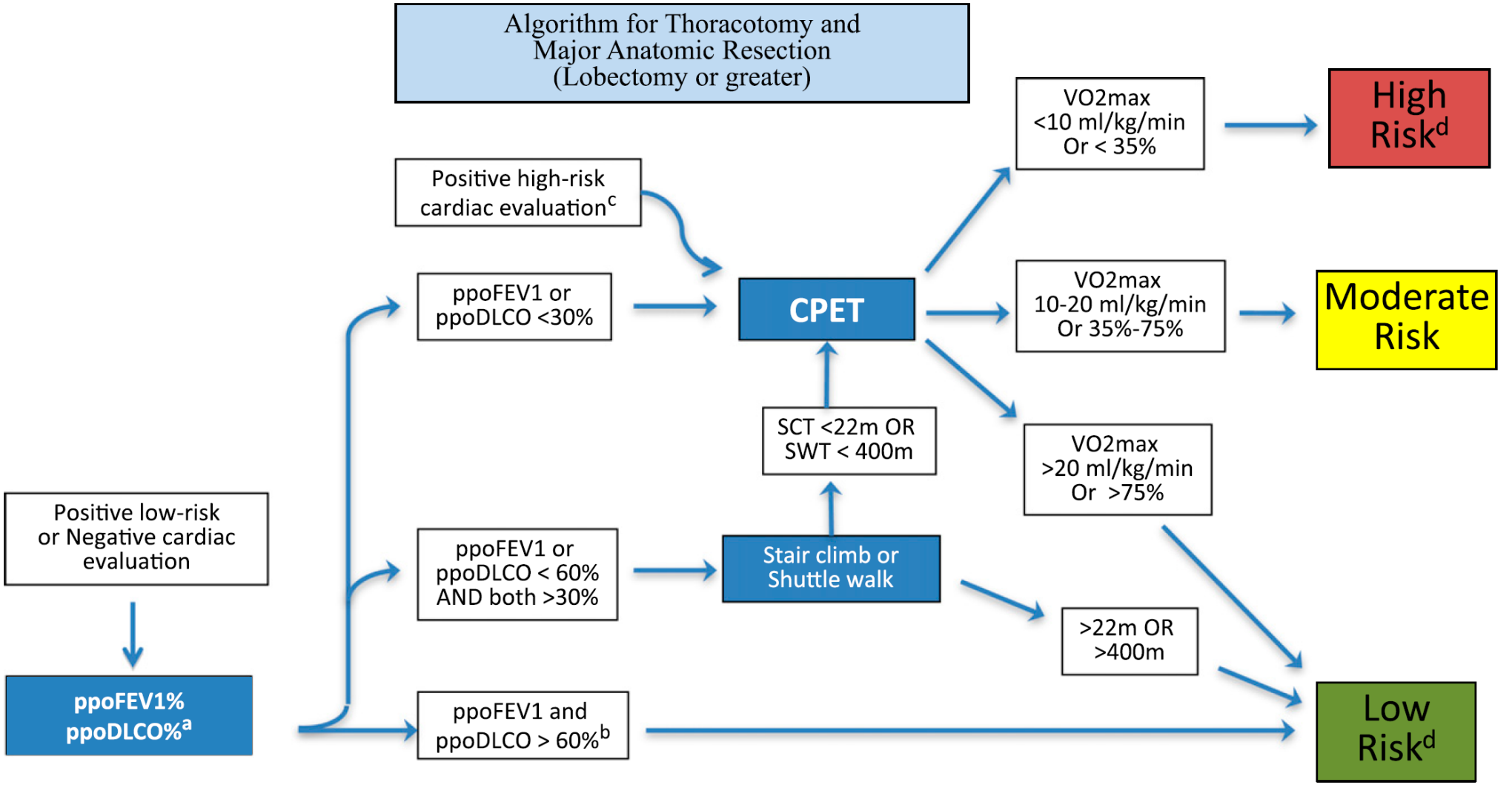

Brunelli *Chest* 2013;143:166S

Predicted postoperative (PPO) lung function

- Pneumonectomy => perfusion ratio study
  - PPO FEV1 = preoperative FEV1 x (1 - fraction of total perfusion for the resected lung)
- Lobectomy
  - PPO FEV1 = preoperative FEV1 x (1 –y/z)
  - y: segments to be removed
  - z: total functional segments
    - Right 10: 3 + 2 + 5
    - Left 9: 5 + 4

Brunelli *Chest* 2013;143:166S

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Risk reduction strategies

- Preoperative
  - Cessation of smoking > 8 wk
  - Treatment of COPD and asthma
  - Delay surgery if lung infection present
  - Education regarding lung expansion maneuvers

Smetana *NEJM* 1999;340:937

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Risk reduction strategies

- Intraoperative
  - Limit duration of surgery to less than **3 hrs**
  - Use spinal or epidural anesthesia
  - Avoid use of pancuronium
  - Use laparoscopic procedures when possible
  - Substitute less ambitious procedure for upper abdominal or thoracic surgery when possible

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Risk reduction strategies

- Postoperative
  - Deep-breathing exercises or incentive spirometry
  - Continuous positive airway pressure
  - Epidural analgesia
  - Intercostal nerve blocks

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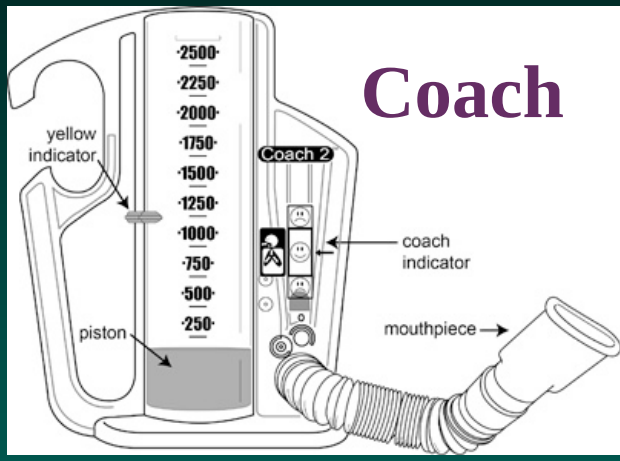
Indications for incentive spirometry

- Presence of atelectasis
- Conditions predisposing to atelectasis
  - Thoracic surgery
  - Upper abdominal surgery
  - Surgery in patients with COPD
- Restrictive lung defect with quadriplegia or diaphragmatic dysfunction



Chest physical therapy (CPT)

- Directed cough and huff
- Postural drainage
- Chest percussion and vibration

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The selection of CPT

- The most effective and important part of conventional CPT is directed cough.
- The other components of conventional CPT add little if any benefit and **should not be used routinely**.
- *Alternative airway clearance modalities* (e.g. high-frequency chest wall compression, vibratory positive expiratory pressure, and exercise) are not proven to be more effective than conventional CPT and **usually add little benefit to conventional CPT**.

Schans *Resp Care* 2006;52:1198

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Indications for CPT

- Copious secretion
  - > 25-30 ml/day => postural drainage
- Acute lobar atelectasis
- Acute respiratory failure with retained secretion

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Contraindications to postural drainage and chest percussion

- Absolute contraindications
  - Active hemorrhage with hemodynamic instability
  - Unstable head and neck injury
- Relative contraindications
  - ICP > 20 mm Hg, recent spinal surgery, surgical wound
  - Active hemoptysis, pulmonary embolism
  - Rib fracture, lung contusion
  - Bronchopleural fistula, large pleural effusion….

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呼吸治療會診建議及注意事項

- 手術及CPT會診後請至13樓呼吸治療科第一間辦公室(玻璃屋)完成醫囑開立（日期、床號及簽名)
  - 手術: Preop, Postop, Coach training
  - CPT: e.g. LLL x 3 d. 或 bil. 教看護
- 全院目前只有一位治療師負責此業務(電話8#0049)，請節制CPT醫囑的開立(儘量小於3天、每天不超過一次、有看護或家屬幫忙….)
- 呼吸器(包括BiPAP)病人直接溝通不需會診，如有會診可要求該區呼吸器督導醫師負責答覆會診。

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第一間辦公室(玻璃屋)

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醫囑開立本


回收光碟片及磁碟片
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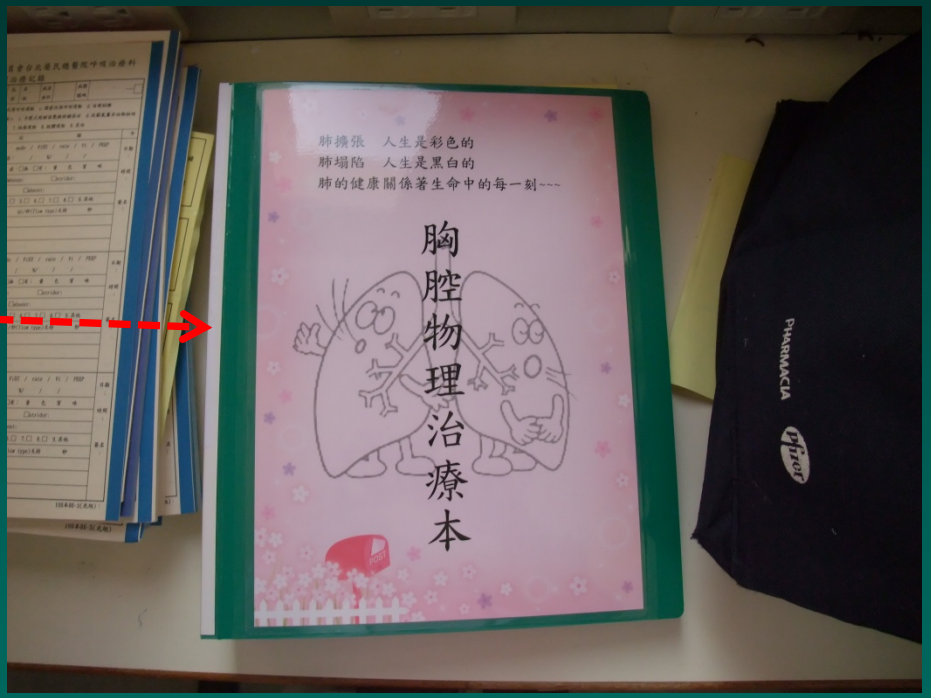
D組


肺擴張　人生是彩色的
肺塌陷　人生是黑白的
肺的健康關係著生命中的每一刻~~~
胸腔物理治療本
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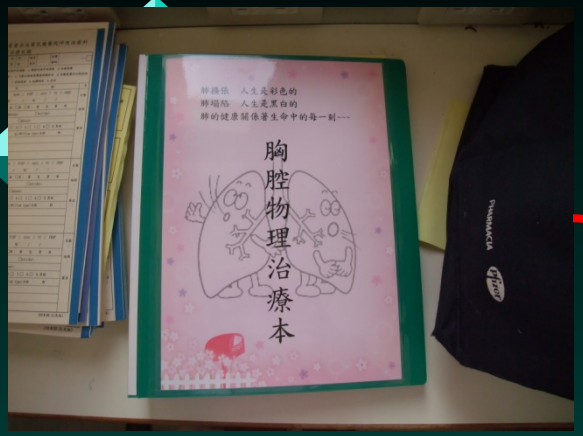
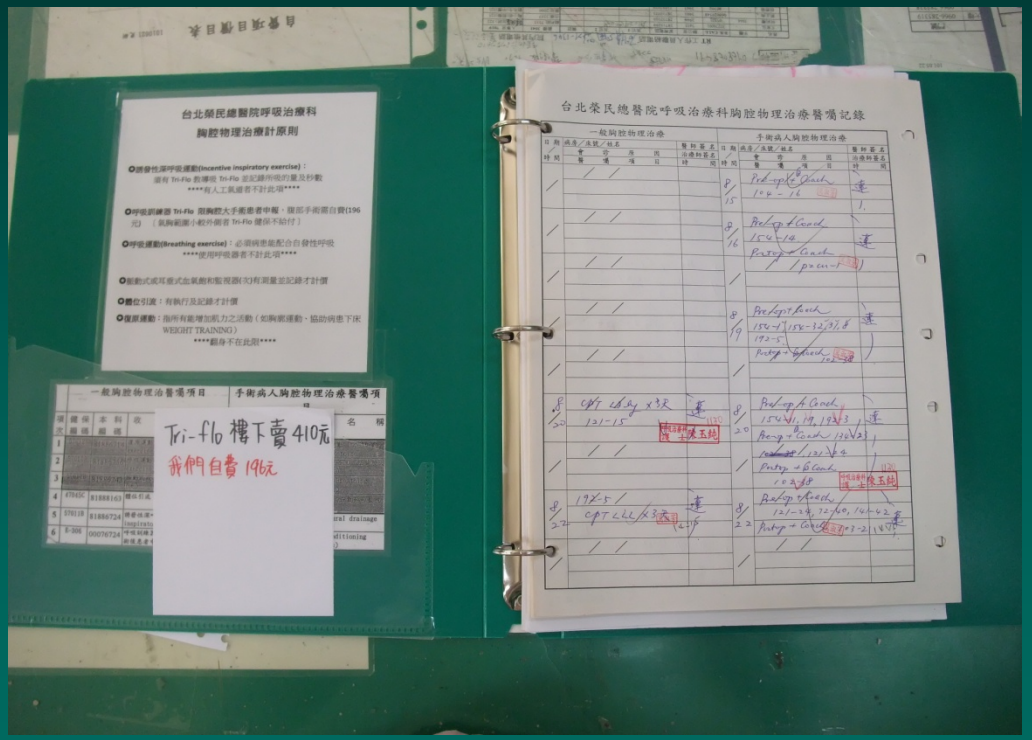
醫囑開立本內頁


胸腔物理治療本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手術病人胸腔物理治療
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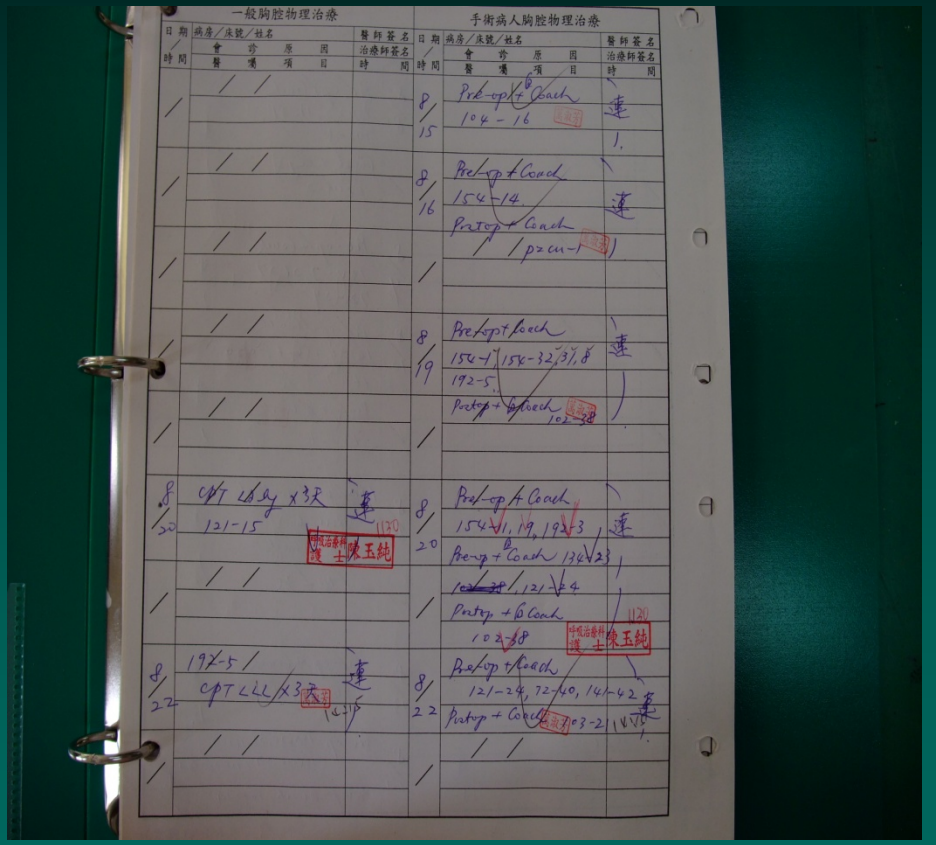
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手術病人胸腔物理治療

Thank You
for
Your Attention