

# Postoperative Pulmonary Complications following Thoracic Surgery: Comparison of Three Scoring Systems.

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# Postoperative Pulmonary Complications (PPC)

- Most frequent complication
- Significant clinical and economic impact
- Major cause of mortality

# Background

- Definition of PPC varies widely
  - large range reported
- Several scoring systems used to aid recognition of PPC for research purposes
- ? most appropriate/ validity/ reliability

# Aims

- Identify the scoring system most appropriate to recognise PPC in patients undergoing thoracotomy and lung resection
- Determine the utility of such a scoring system in clinical practice

# Methods

- Prospective observational study in a Regional Thoracic Unit
- Consecutive thoracotomy and lung resection patients
- October 2007 to April 2008
- 3 PPC Scores applied daily by physiotherapists
  - Reeve et al (2008) - Melbourne Group Score (MGS)
  - Gosselink et al (2000)
  - Brooks-Brunn (1997)
- Other clinicians blinded to results of scores

# Melbourne Group Score (MGS)

**PPC = 4 or more factors +ve:**

- Chest x-ray - atelectasis/consolidation
- Elevated WCC >11.2
- Pyrexia >38°C
- Microbiology
- Purulent sputum
- O<sub>2</sub> sats <90% on air
- Physician diagnosis
- HDU/ITU care for respiratory care

# Gosselink Score

**PPC = all 3 factors +ve:**

- Chest x-ray score
  - 1- minor unilateral infiltration
  - 2- minor bilateral infiltration
  - 3- **major unilateral infiltration**
  - 4- **major bilateral infiltration**
- Elevated WCC >12 or +ve microbiology
- Pyrexia >38°C

# Brooks-Brunn Score

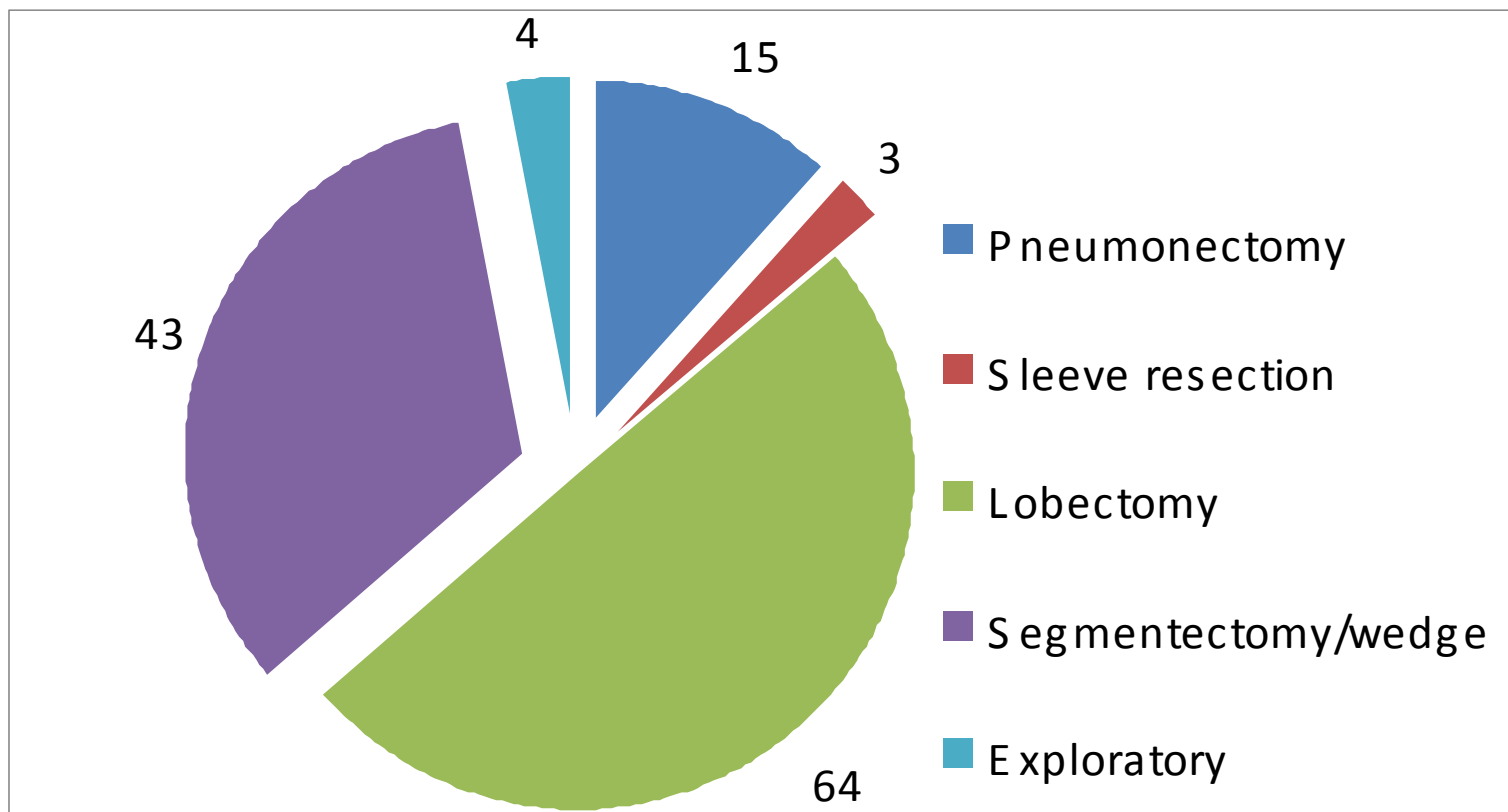
**PPC = 2 factors +ve for 2 consecutive days:**

- Chest x-ray - atelectasis/ infiltration
- Pyrexia  $>38^{\circ}\text{C}$
- New cough/ sputum
- Physician diagnosis
- Abnormal breath sounds compared to baseline

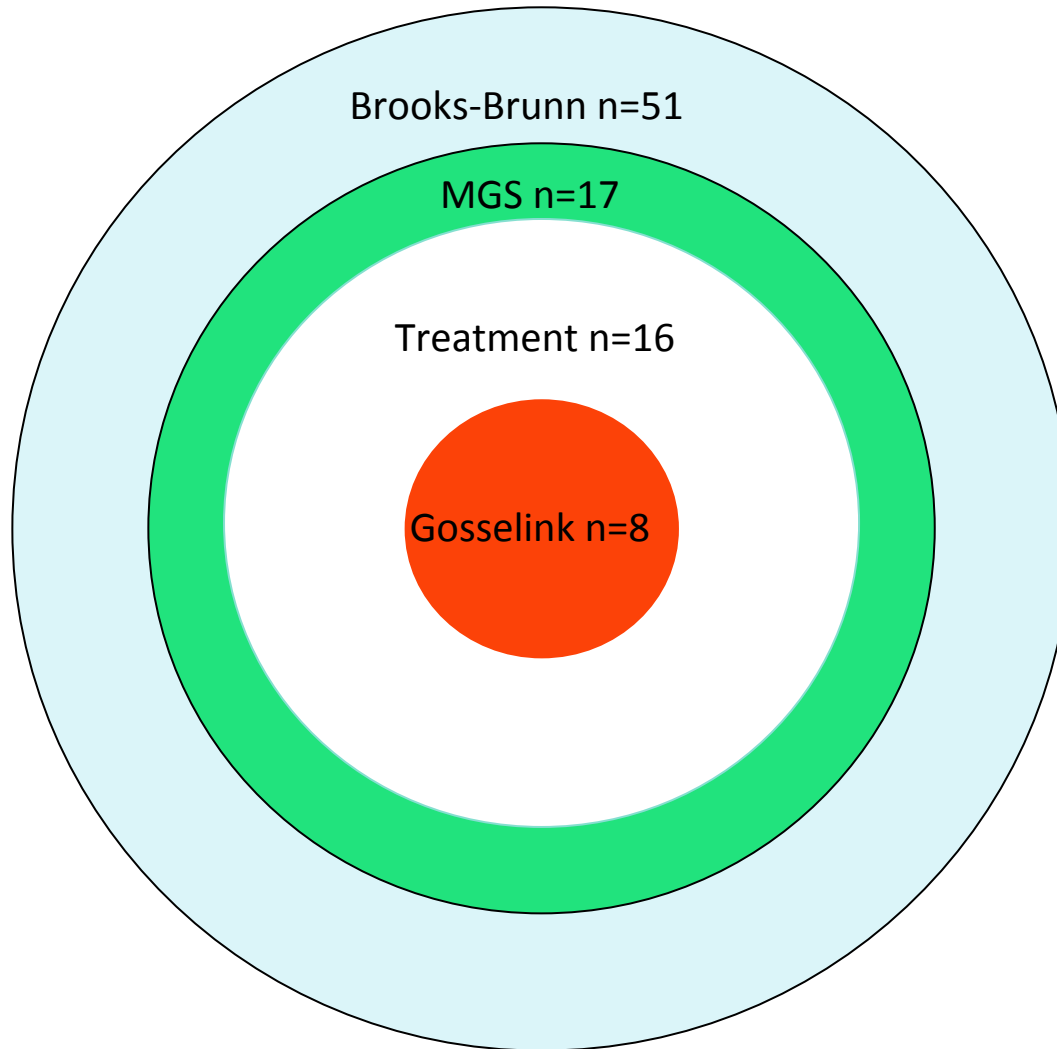
# Demographics n =129

- Male 75 (58%)
- Age (years) Mean (SD) 61 ( $\pm 15$ )
- % Predicted FEV<sub>1</sub> Mean (SD) 83% ( $\pm 20$ )

# Operative procedures



# Results



## Rate of PPC

- Gosselink 6.2%
- MGS 13.2%
- Brooks-Brunn 39.5%
- Treatment\* 12.4%

\*antibiotics for pneumonia n=15  
bronchoscopy for atelectasis n=1

# Postoperative LOS (days)

median (95%CI)

Score	PPC Group	Non- PPC Group	p value
Gosselink	17(10-22)	5 (5.5-7)	p<.001
MGS	12 (11-18)	5 (5-6)	p<.001
Brooks-Brunn	7 (7-10)	5 (5-6)	p=.001

# Postoperative HDU LOS (days)

median (95%CI)

Score	PPC Group	Non- PPC Group	p value
Gosselink	4 (2-9)	1 (1.7-2.3)	p=.002
MGS	5 (3-7)	1 (1.5-2)	p<.001
Brooks-Brunn	2 (2-3.5)	1 (1.5-2)	p=.187

# Mortality n=3

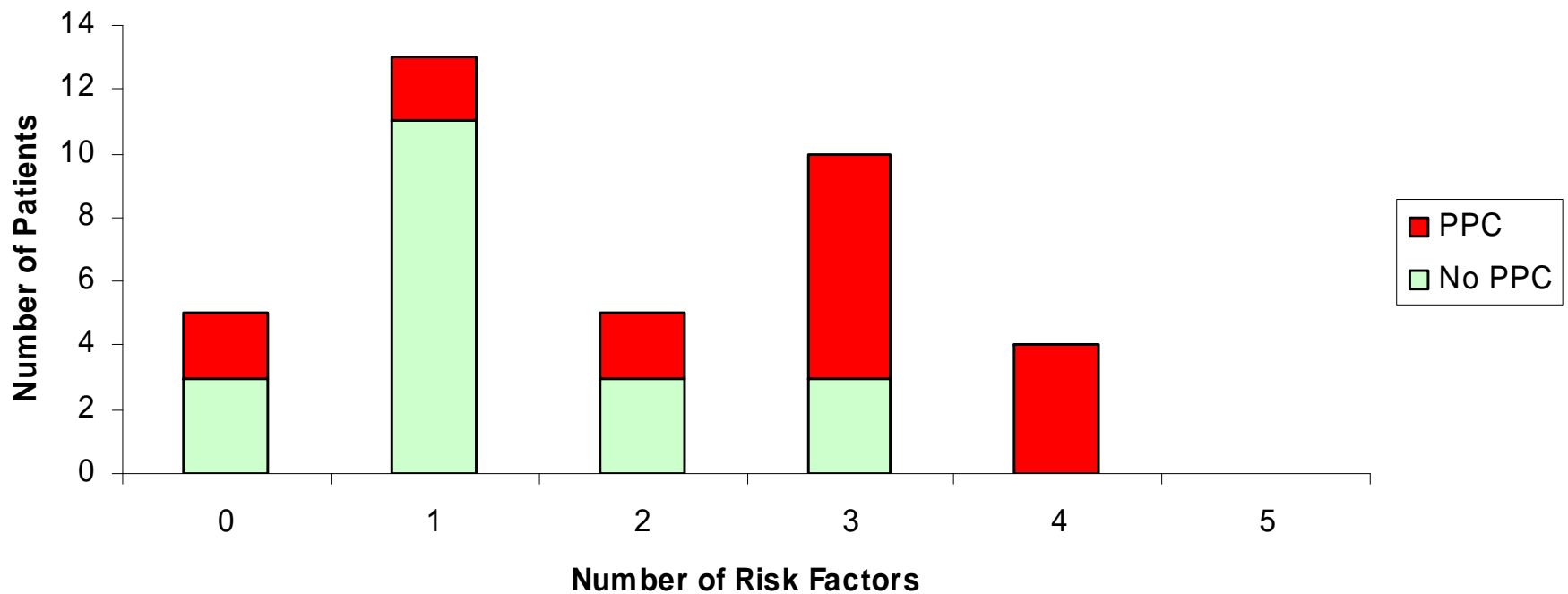
Score	Patient A pneumonia (PPC)	Patient B pneumonia (PPC)	Patient C MI (Non PPC)
Gosselink	-ve	-ve	-ve
MGS (p=.046)	+ve	+ve	-ve
Brooks-Brunn	+ve	+ve	+ve

# Comparison Summary

- MGS and Gosselink score best markers of LOS
- Early data suggest MGS better marker of mortality - small numbers
- MGS correlated best with treatment rate for PPC

# Utility of MGS (n=234)

- 234 thoracotomy and lung resection patients
- Observation of all patients scoring 3, the level below PPC
- n = 37
- 17 (46%) patients developed PPC
- Incidence of PPC increased with increasing risk factors



- Identification of very high risk group -68% 2 or more factors
- Allows for optimization of treatment

# Conclusion

MGS following thoracotomy and lung resection;

- Best score to recognise PPC
- Corresponds to outcomes -LOS and mortality
- Score combined with risk factors can aid identification of high risk patients
- Effect of optimizing treatment in these patients needs further investigation

# Any Questions?

## Score References:

- Brooks-Brunn. Chest 1997; 111 (3):564-571
- Gosselink et al. Critical Care Medicine 2000; 28(3):6
- Reeve et al. Journal of Cardiothoracic Surgery 2008 Jul 18; 3:48

# Risk Factors (n=234)

	Odds Ratio	95% CI
<b>Age <math>\geq</math> 75</b>	3.9	1.5-10.4
<b>ASA <math>\geq</math> 3</b>	3.9	1.3-11.5
<b>Current smoking</b>	7.4	2.6-21.3
<b>BMI <math>\geq</math> 30</b>	2.9	1.1-7.7
<b>COPD</b>	2.9	1.1-7.6

## % PPC as risk factors increase (n=234)

Risk Factors	PPC n=	% PPC
0 n=60	3	5
1 n=84	4	5
2 n=61	11	18
3 n=23	12	52
4 n=5	4	80
5 n=1	1	100

# Scores of 3 combined with increasing risk

Risk Factors	Non PPC n=20	PPC n=17
0	3	2
1	11	2
2	3	2
3	3	7
4	0	4
5	0	0

MGS – 4+ factors	Gosselink- All factors +ve	Brooks-Brunn 2 factors +ve for 2 days
CXR Atelectasis/Infiltration	CXR Score 0- NAD 1- minor unilateral infiltration 2- minor bilateral infiltration	CXR Atelectasis/Infiltration
	<b>3- major unilateral infiltration</b> <b>4- major bilateral infiltration</b>	
Temp >38	Temp >38	Temp >38
WCC >11.2	WCC >12 / Microbiology	
+ve microbiology		
Physician diagnosis of pneumonia/chest infection		Physician diagnosis of pneumonia/chest infection
Purulent sputum		New Cough / Sputum
SpO <sub>2</sub> < 90% on air		Abnormal Breath sounds
Readmission/ prolonged stay ITU/HDU		