The road to successful weaning

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Intensive Care St Anna, Geldrop

- Level 1 general IC
- 12 bed combicare IC/CC
- 5 beds for mechanical ventilation
- In 2008 885 ventilation days

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Introduction

- Weaning from mechanical ventilation in St Anna
- Aim and objective of this study
- Hypothesis
- Methods
- Results
- Conclusion and discussion
- Role of the Ventilation Practitioner

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Weaning from mechanical ventilation in St Anna

- At time of study - anesthesist in charge of mechanical ventilation & weaning
- Weaning protocol
- NVIC guidelines version 3. 2007 [2]
  - Sufficient gas exchange PaO_2/ FiO_2 (mmHg, >26,7 kPa)
  - PEEP ≤ 5 cm H2O
  - f/Vt ≤ 105 (rapid shallow breathing index)
  - Cough reflex present
  - No vasopressors (dopamine ≤ 5 цg/kg/min)
  - No sedation (intermittent doses are allowed)

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Interesting observation

- Total fluid balance was not routinely taken into account - only when weaning failed.

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Aim & Objective

- Compare the relevance of these 3 factors when weaning:
  - PaO_2/ FiO_2 ratio (P/F ratio)
  - Rapid shallow breathing index (RSBI)
  - Total fluid balance (TFB)

Total fluid balance ??

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Hypothesis

- **3 factors:**

  -Total fluid balance (TFB)

  -Rapid shallow breathing index (RSBI)

  -PaO_2/ FiO_2 ratio (P/F ratio)

  can all be used to predict a successful weaning outcome

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Relevant studies

- Epstein CD, Peerless, 2006 [3]
- Amoateng – Adjepong, 2005 [4]
- Randolf AG, Forbes PW, 2005 [5]
- A Yang KL, Tobin MJ, 1991 [7]
- Bruce P, Kreiger, 1997 [8]

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Methods

- Retrospective study
- June 2008 – March 2009
- Permission from hospital ethics commitee
- Information collected from
  - Database TISS Mediscore
  - Medical & nursing records
  - ICIP (Philips Medical)
- SPSS

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Definitions used for the purpose of this study

- Weaning
- Successful extubation
- 3 time points of weaning

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Definition of weaning

- **Weaning** is the transition from total dependency on mechanical ventilation to spontaneous breathing.

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Definition of successful extubation

- **Successful extubation** : 48 hours after extubation the patient is breathing spontaneously without the need for mechanical ventilation.

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3 time points of weaning

1) Volume controlled or Pressure controlled ventilation → Pressure support ventilation.

2) Further reduction in pressure support ventilation.

3) Release from mechanical ventilation and successful extubation.

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Collected information

- PaO_2/ FiO_2 ratio
- Rapid shallow breathing index
- Total fluid balance
- PEEP
- Age
- Outcome

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Rapid shallow breathing index

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Results

- 119 patients ventilated
- 74 patients excluded
- 45 patients included
- Ages 17 – 94 years (mean 66,44 std deviation 16,33)
- PEEP constant factor (5cm H_2O)

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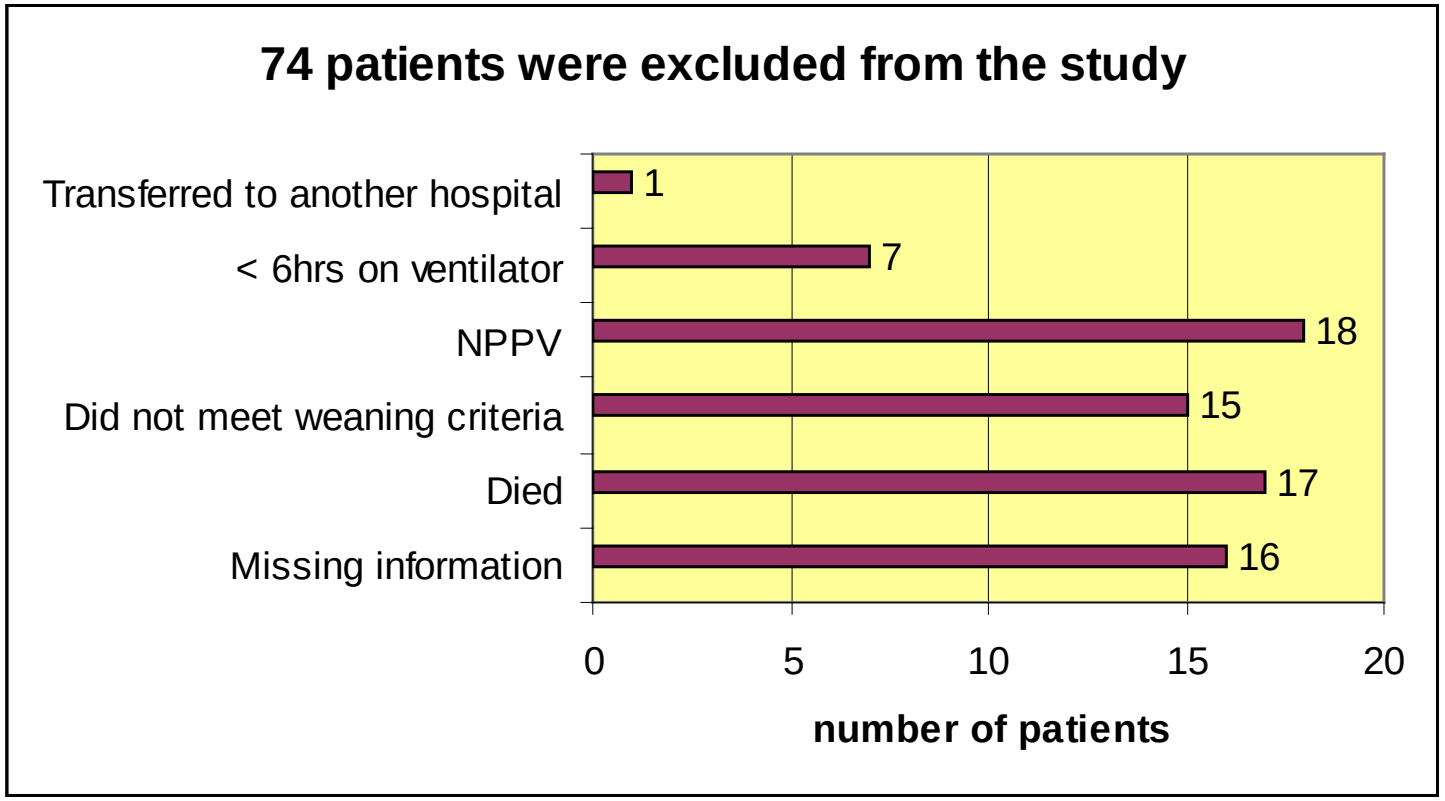
Reason for exclusion



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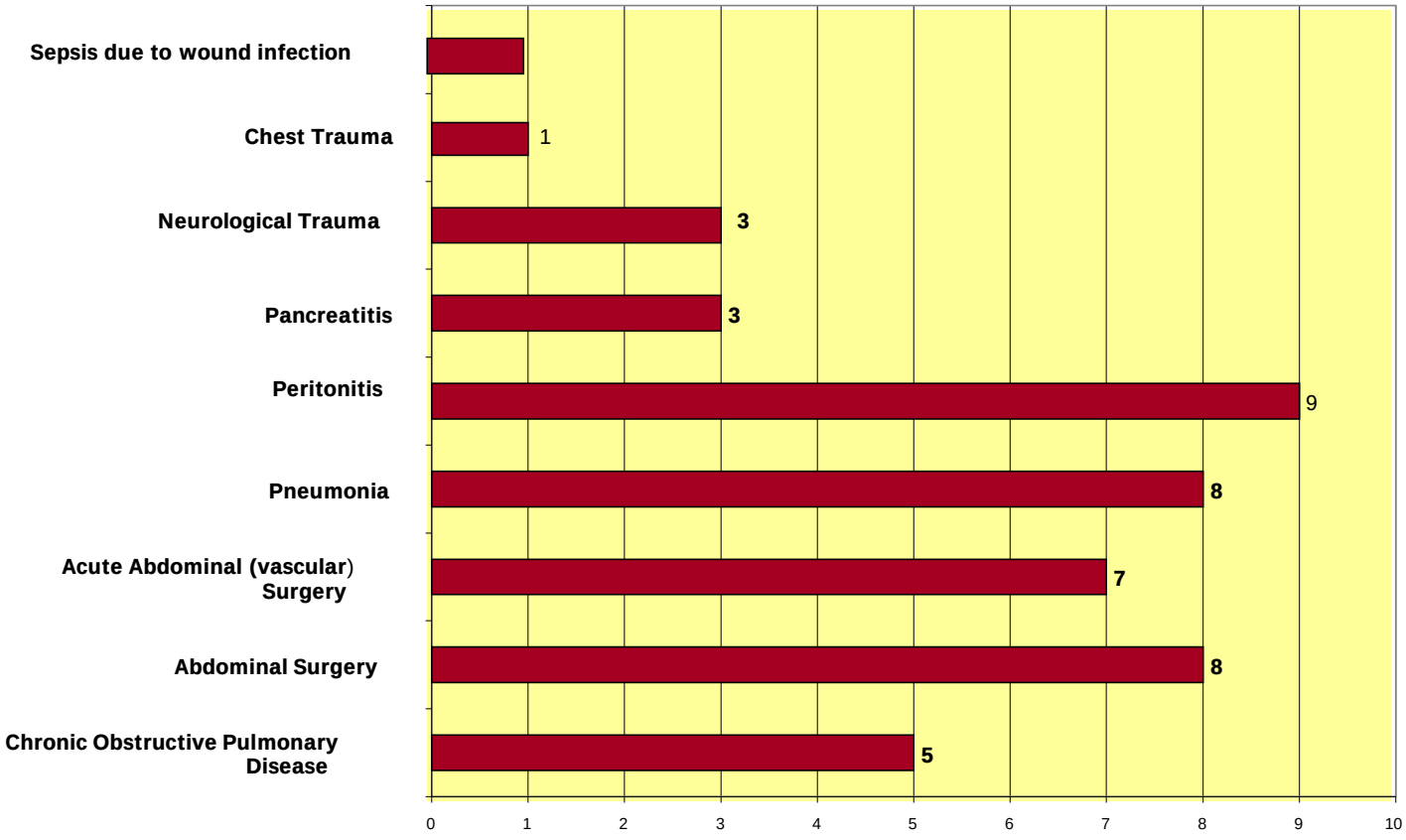
45 patients included



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The most significant results

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Total fluid balance (ml)

Time point 1	yes/no	Time point 2	yes/no	Time point 3	yes/no
7995	y	8980	y	11620	y
33100	n	24935	y	27920	y
1200	y	1540	y	1610	y
3175	y	3900	y	3900	y
6855	n	10525	y	8755	y
16275	y	9490	y	4230	y
2475	y	2505	y	1280	y
3500	y	4600	y	3255	y
2580	y	3870	y	3810	y
13195	y	14600	y	16135	y
7960	y	1760	y	-3120	y
11965	n	9220	y	680	y
245	n	3730	y	7104	y
-260	n	720	y	1390	n
6220	n	1511	y	-389	y
6038	y	7393	y	-2815	y
6499	y	12974	n	8439	y
-366	y	567	n	4029	y

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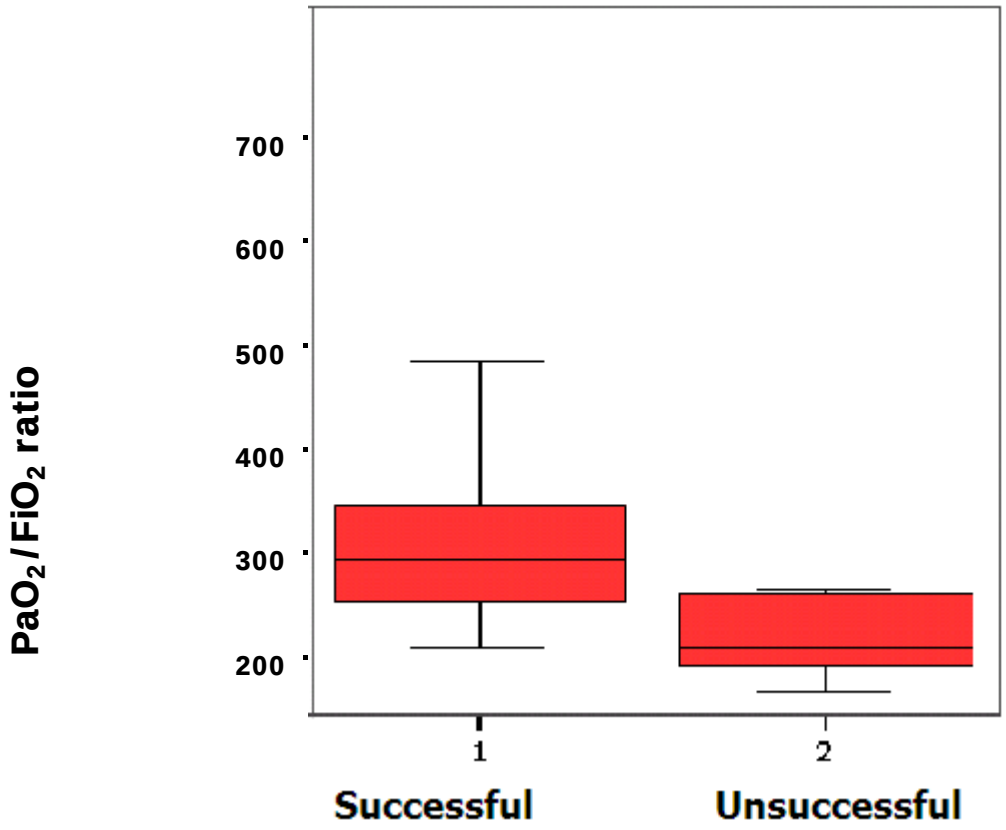
PaO_2/ FiO_2 ratio



p value = 0,031

PaO_2/FiO_2 ratio at time point of transition from controlled to supported ventilation

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Rapid shallow breathing index

	Successful	**Unsuccessful**
Controlled ventilation to supported ventilation (1)	Not recorded *	Not recorded *
Reduction of supported ventilation (2)	Not recorded *	Not recorded *
Extubation (3) **(p value= <0.001)**	75,25 ± 21,62 (n=28)	155,20 ± 25,2 (n=5)

RSBI not measured at time points 1 & 2 – considered unethical

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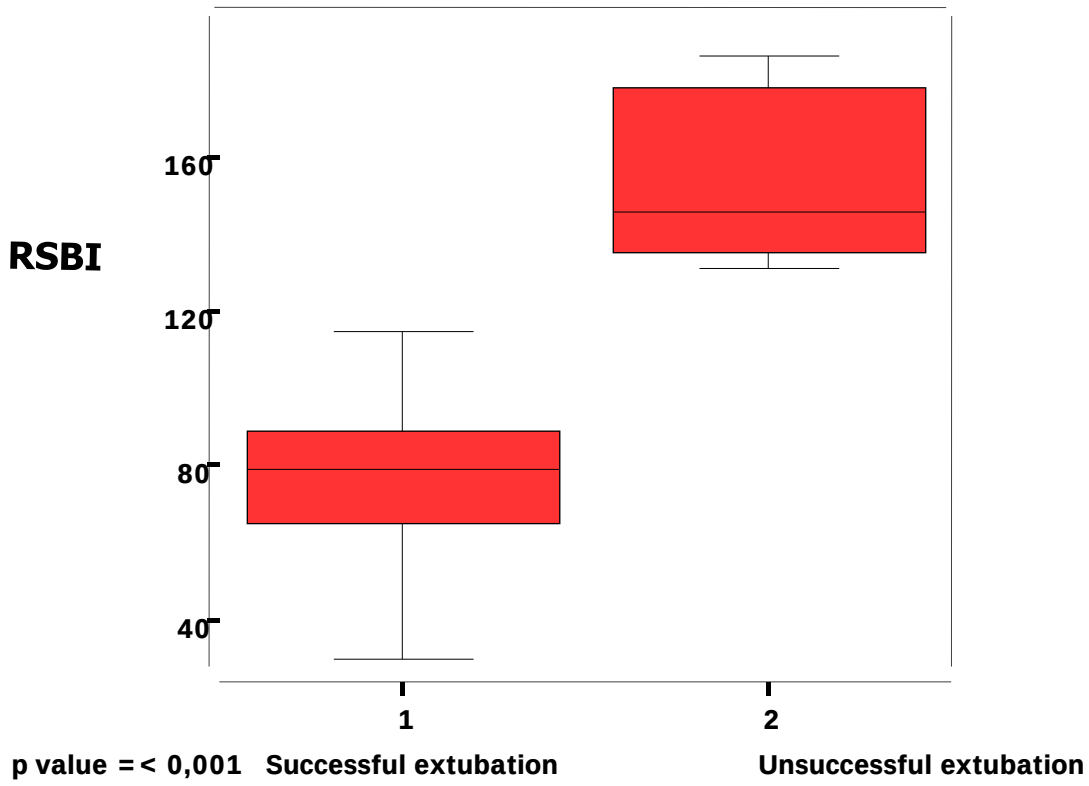
Rapid shallow breathing index



RSBI at time point of extubation

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Conclusion

- Total fluid balance in this study did not predict successful weaning (p value = 0,31)
- PaO_2/ FiO_2 ratio >250mmHg significant at time point 1 (p value = 0,031)

  - controlled ventilation → pressure support

- RSBI ≤105 significant at time point 3 (p value =0,001)

  - successful extubation

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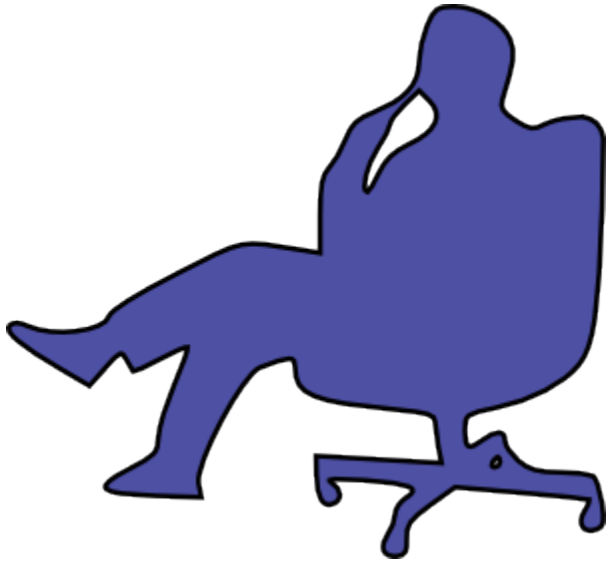
Reflection

Retrospective study

Prospective study

Small study group n=45



Interesting results

Missing information

Future studies

P/F ratio & TFB

Use of RSBI via servo i ?

The next step

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Role of Ventilation Practitioner

- identifies problems, thinks in possibilities, intiates change & guides

- Works together with the team & intensivists to improve quality of care
- Teaching, bedside coaching on & off the IC
  -training programme for students
- Ventilation group
- Project to improve care of patients with tracheostomie
- Brings new ideas to the IC
- Uses network

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