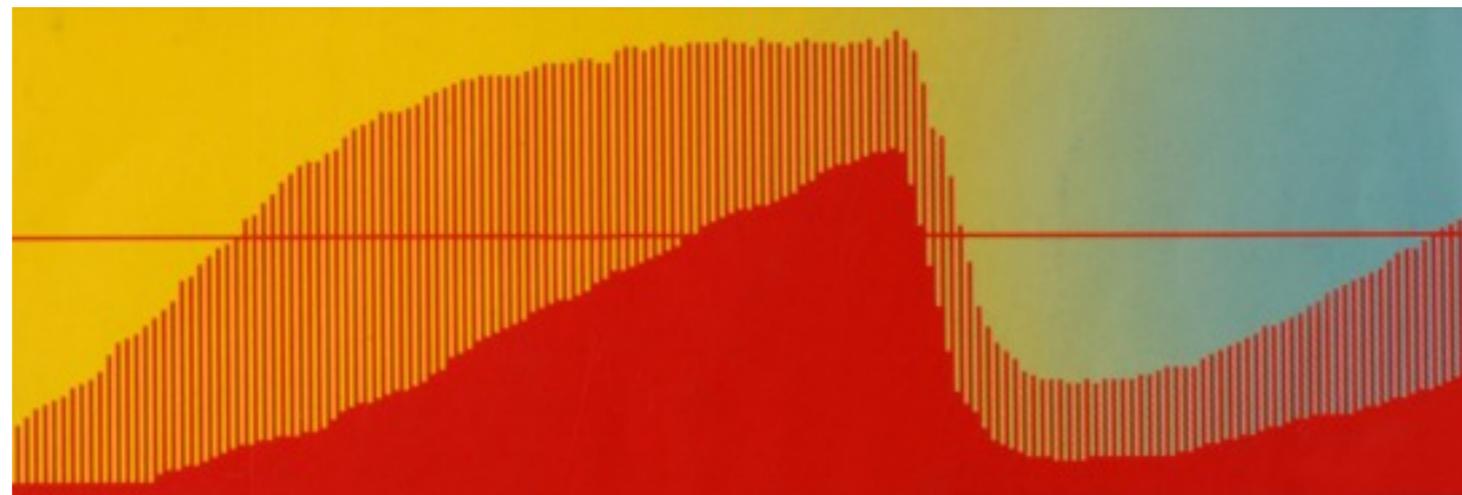
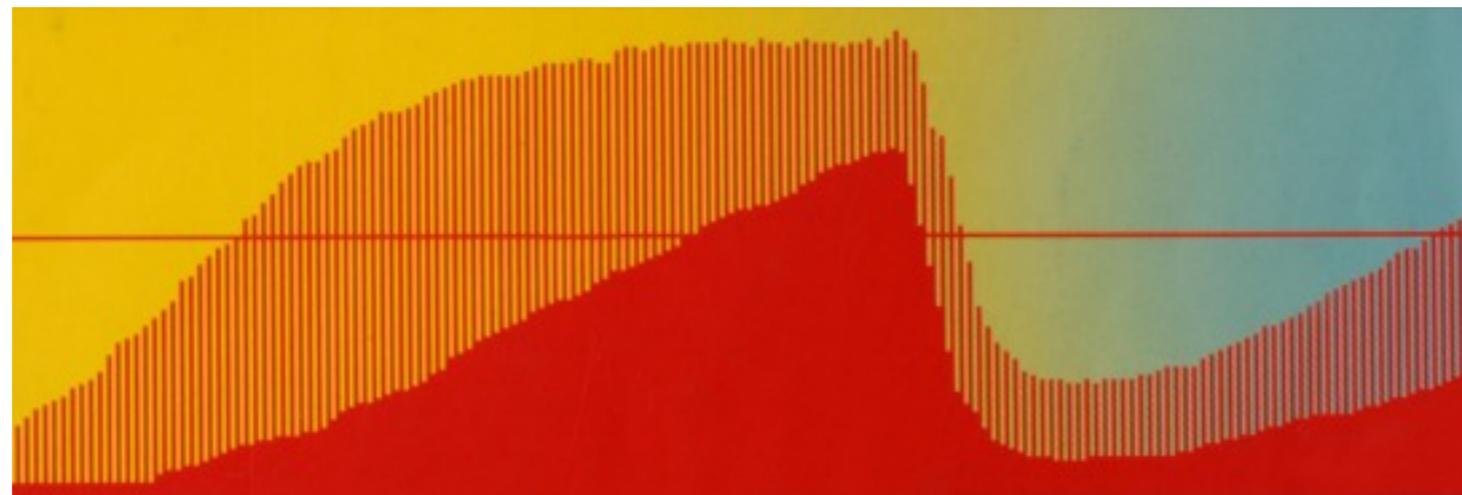


# Muskelrelaxantien zur Intubation



Univ. Prof. Thomas Fuchs-Buder CHU NANCY/Brabois

# Muskelrelaxantien zur Intubation!



Univ. Prof. Thomas Fuchs-Buder CHU NANCY/Brabois

# Nancy, Place Stanislas



# Intubieren ohne Muskelrelaxanzien

« ... Intubation under thiopentone alone is a safe and practicable procedure for all types of patients. From our experience we believe that aids to intubation such as deep inhalation anaesthesia, carbon dioxide, cocainisation and curare are unnecessary... »

# Intubieren ohne Muskelrelaxanzien

Anesthesiology 2003; 98:1049-56

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## *Laryngeal Morbidity and Quality of Tracheal Intubation*

### *A Randomized Controlled Trial*

Thomas Mencke, M.D.,\* Mathias Echternach, M.D.,† Stefan Kleinschmidt, M.D.,\* Philip Lux,‡ Volker Barth, M.D.,† Peter K. Plinkert, M.D.,§ Thomas Fuchs-Buder, M.D.||

Propofol (3 mg/kg-1), Fentanyl (2-3 µg/kg-1)  
± Atracurium (0.5 mg/kg)

- postop Heiserkeit
- Stimmbandschädem
- NNH

**Table 4. Intubating Conditions and Intubating Scores**

	Atracurium (n = 37)	Saline (n = 36)	P
Intubation conditions	—	—	—
Cormack grades	1 (1-2)	1 (1-2)	0.613
Time of intubation (s)	26 (10-106)	29 (7-90)	0.920
Attempts (n)	1 (1-3)	1 (1-3)	0.919
Intubation scores	—	—	—
Excellent	16	2	<0.001
Good	19	22	0.55
Poor	2	12	0.006
Clinically acceptable	35	24	0.006
Non-excellent	21	34	<0.001

# Intubieren ohne Muskelrelaxanzien

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# Intubieren ohne Muskelrelaxanzien

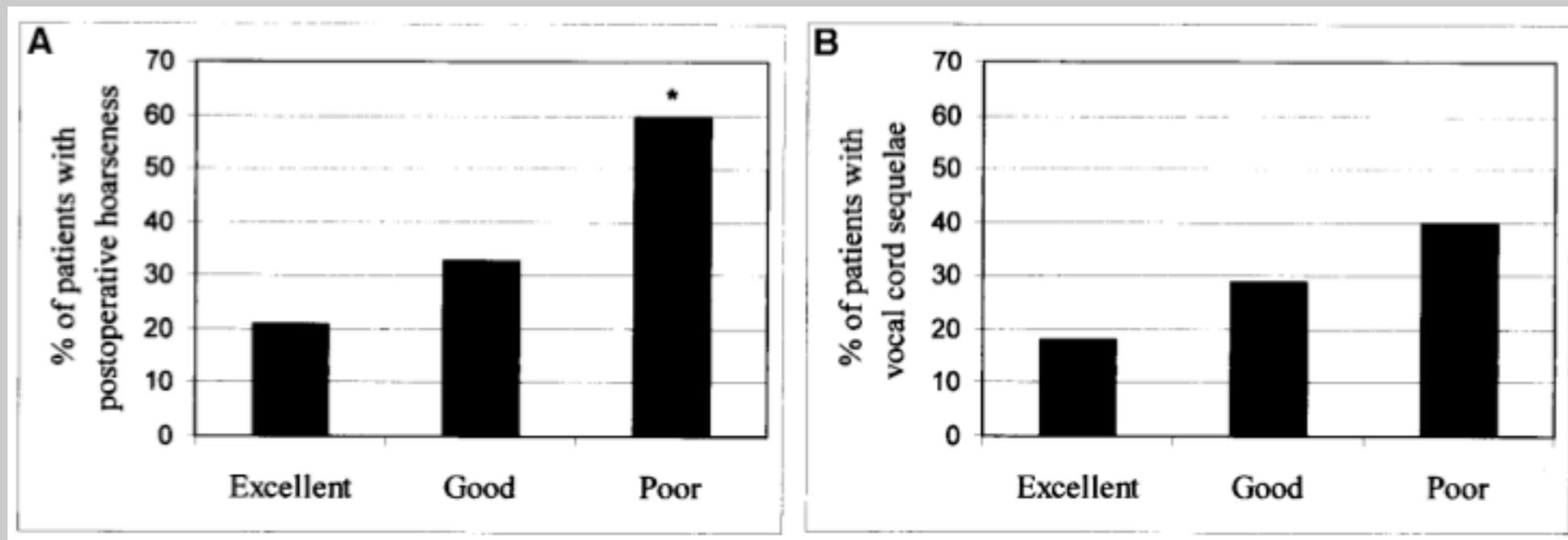
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# Intubationsqualität & Larynxmorbidity

**Table 5. Incidence of Postoperative Hoarseness and Vocal Cord Sequelae**

	Postoperative Hoarseness			Vocal Cord Sequelae		
	Atracurium (n = 37)	Saline (n = 36)	<i>P</i>	Atracurium (n = 37)	Saline (n = 36)	<i>P</i>
PACU	6	13	0.1	NA	NA	—
At 24 h	0	6	0.01	3	15	0.002
At 48 h	0	4	0.05	NA	NA	—
At 72 h	0	1	0.5	1	8	0.014
>72 h	0	1	0.5	0	2	0.25
Days*	6	25	<0.001	5	50	<0.001
Patients	6	16	0.02	3	15	0.002

Values are shown as numbers of patients (n).

\* Days = number of days with PH or VCS. PH was first assessed in the PACU and thus, the day of surgery was taken as the first day with PH. VCS was first assessed at 24 h and thus, postoperative day 1 was taken as the first day with VCS. † Patients: number of patients with PH or VCS.

PACU = postanesthesia care unit; PH = postoperative hoarseness; VCS = vocal cord sequelae; NA = not assessed.

# Intubationsqualität & Larynxmorbidity

## Klinische Relevanz der Intubationsqualität

NNH Stimmbandschäden: 3.5 (2.1 - 12.3)

NNH Postop. Heiserkeit: 2.9 (1.9 - 6.6)

**Table 5. Incidence of Postoperative Hoarseness and Vocal Cord Sequelae**

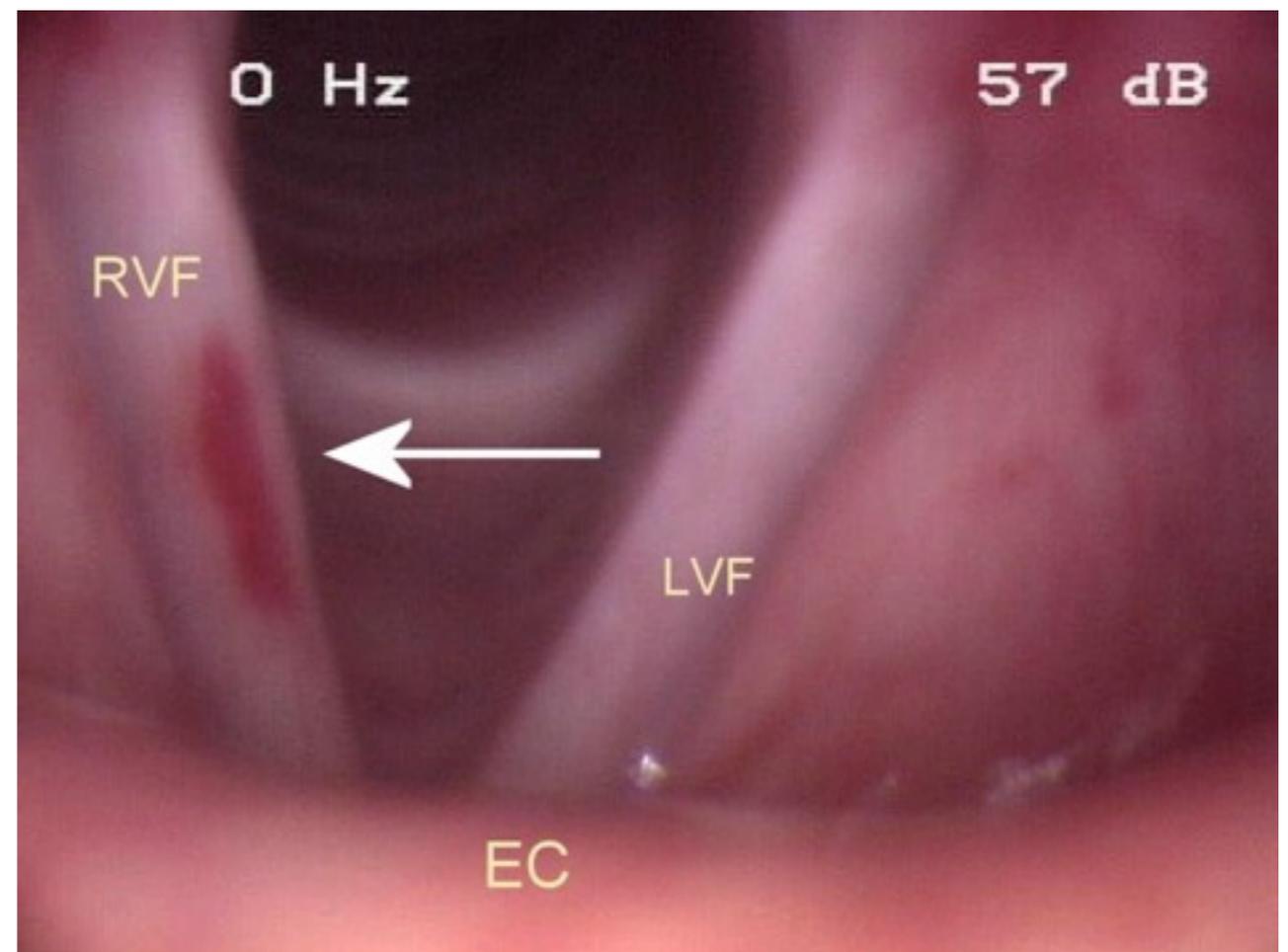
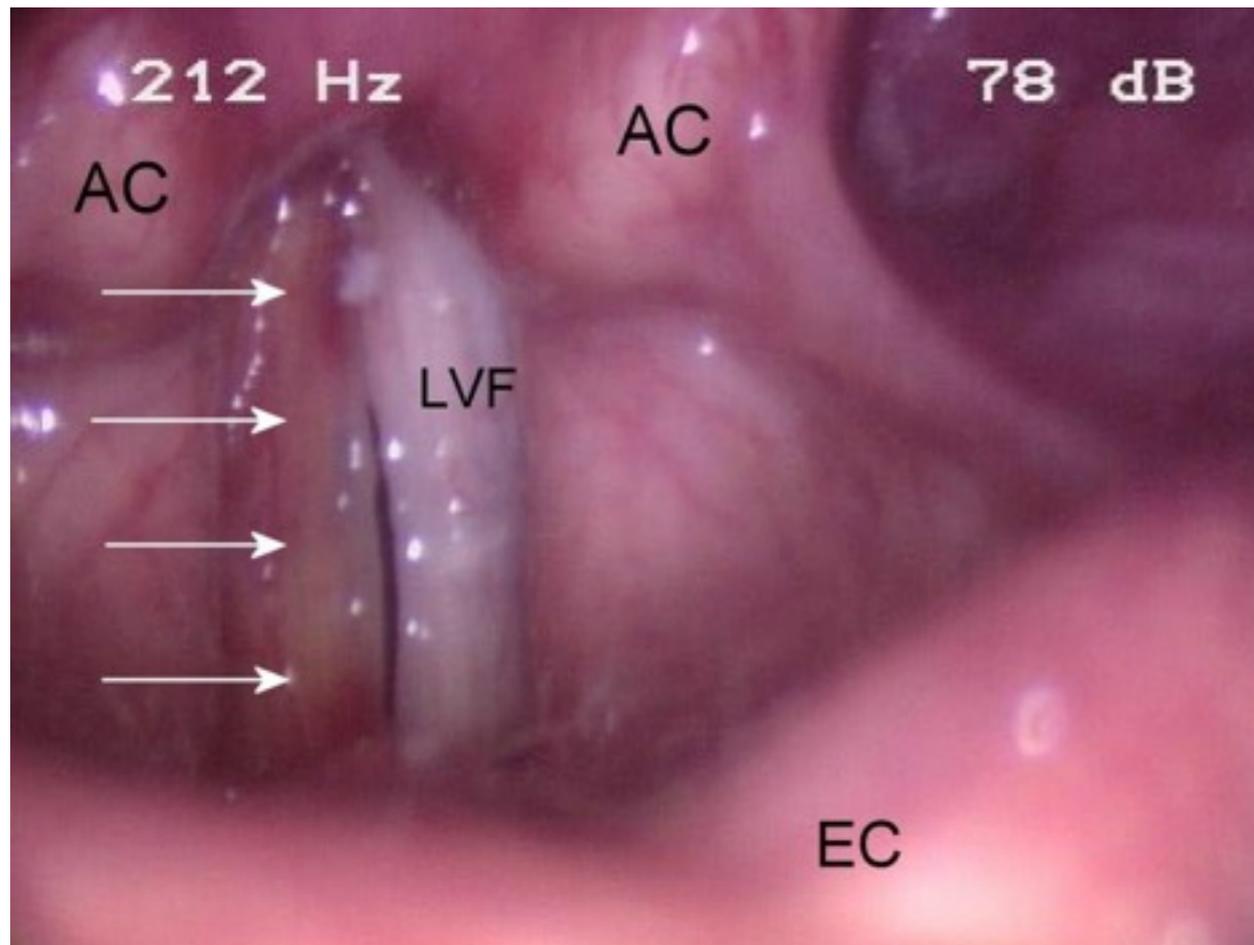
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# Intubationsqualität & Larynxmorbidity



# Vergleich zweier Einleitetechniken ( $\pm$ Muskelrelaxanz)

- Gruppe A
  - Propofol 2.5 mg
  - Alfentanil 15  $\mu$ g
  - Rocuronium 0.6mg
- Gruppe B
  - Propofol 2.5 mg
  - Alfentanil 40  $\mu$ g
- n = 2 x 150!

# Vergleich zweier Einleitetechniken ( $\pm$ Muskelrelaxanz)

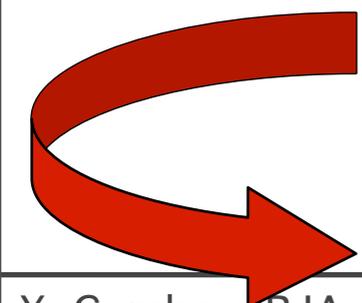
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- Gruppe B
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  - Alfentanil 40  $\mu$ g
- n = 2 x 150!
- Hämodynamik:
  - $\downarrow\downarrow$  in RR & f B  $\gg$  A; p < 0.05
  - Ephedrin 3 vs 13
  - Atropin 1 vs 5
- Postop Heiserkeit: B  $\gg$  A; p < 0.05
- Intubationschwierigkeiten (IDS > 5) 1 vs 18 !!; p < 0.05

# Vergleich zweier Einleitetechniken ( $\pm$ Muskelrelaxanz)

n = 2 x 150	ohne Curare	Rocuronium
Versuche: 1,2,3,4	117/13/16/4	137/11/2/0
„Intubatoren“: 1,2	140/10	147/3
alt. Techniken: ja/nein	146/4	150/0
Cormack: 1,2,3,4	91/41/17/1	106/39/5/0
Kraft: normal, erhöht	103/47	126/24
BURP: nein, ja	41/109	52/98
Stimmbänder: ab, ad	117/33	140/10

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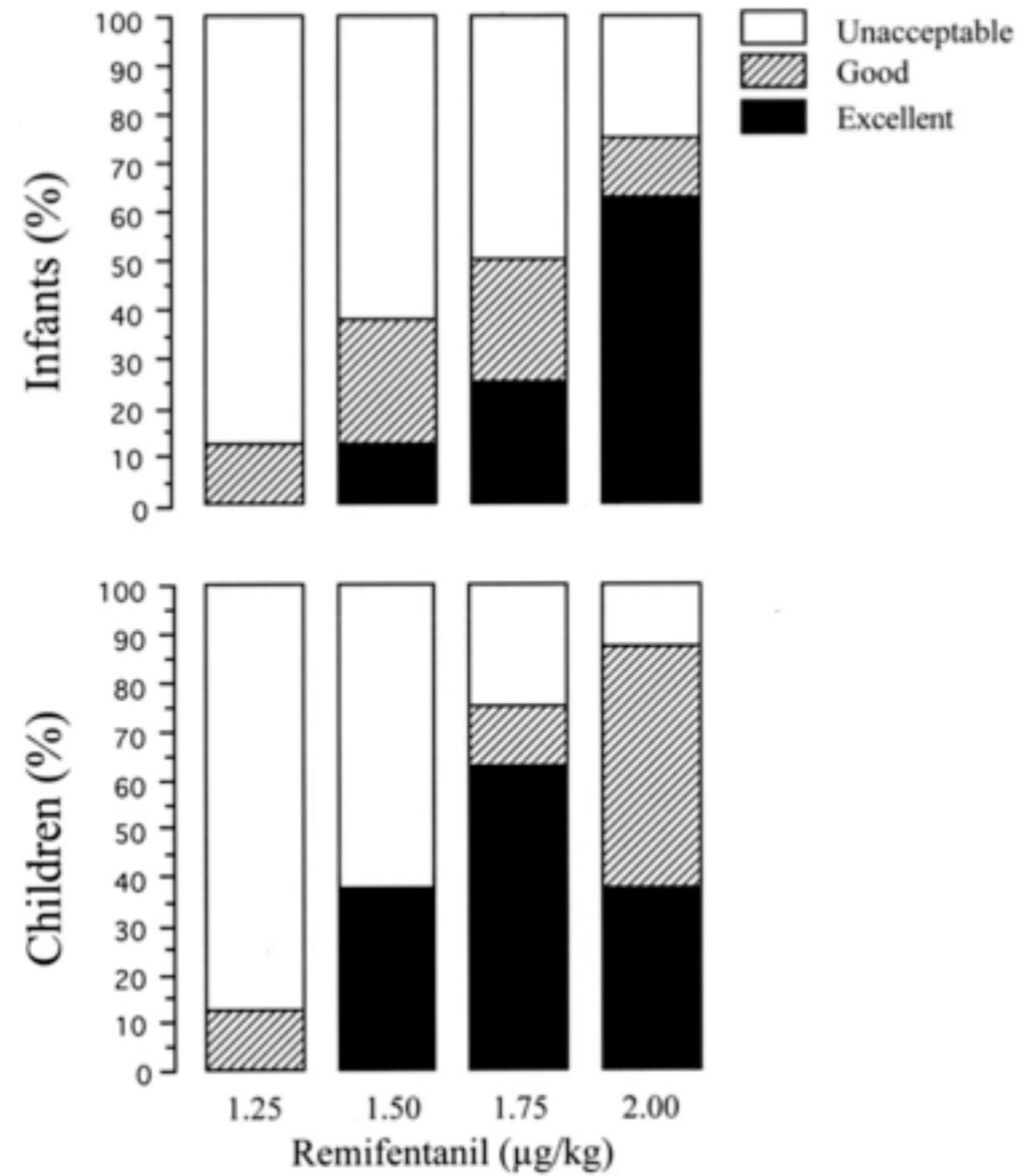
erschwerte Intubation (IDS > 5) 18 vs 1 !! p < 0.05

# Intubieren mit Propofol (ohne Relaxanz)

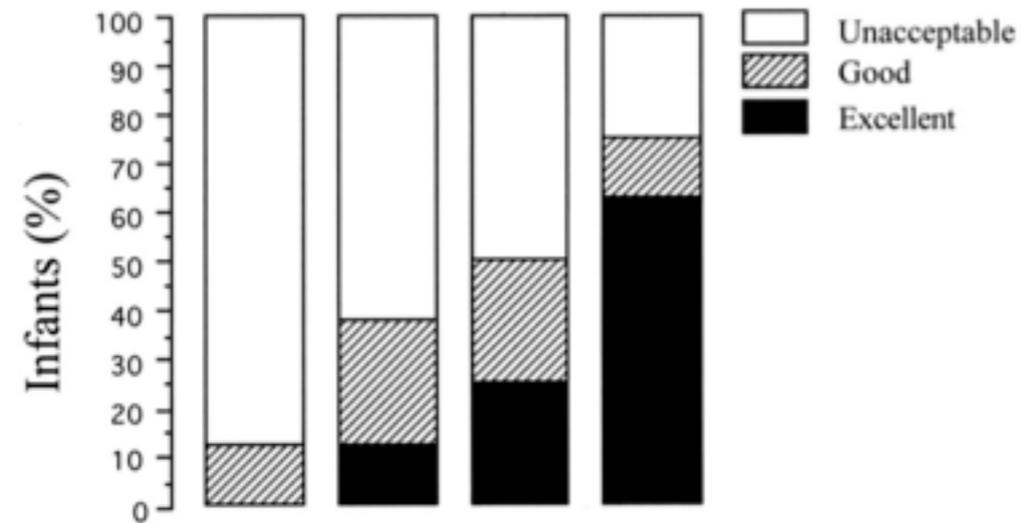
	Erfolg 1. Versuch	Dosis
Propofol	77%	6.3±2.7 mg/kg
Propofol & Opiat	85%	5.8±4.4 mg/kg

Umfrage an 5 frz. Unikliniken während eines Monats; n = 502

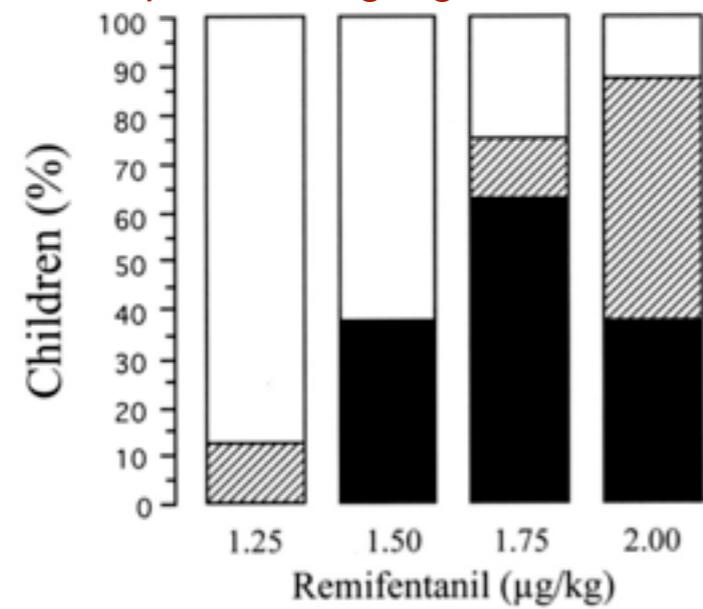
# Dose-response of remifentanyl for tracheal intubation in infants



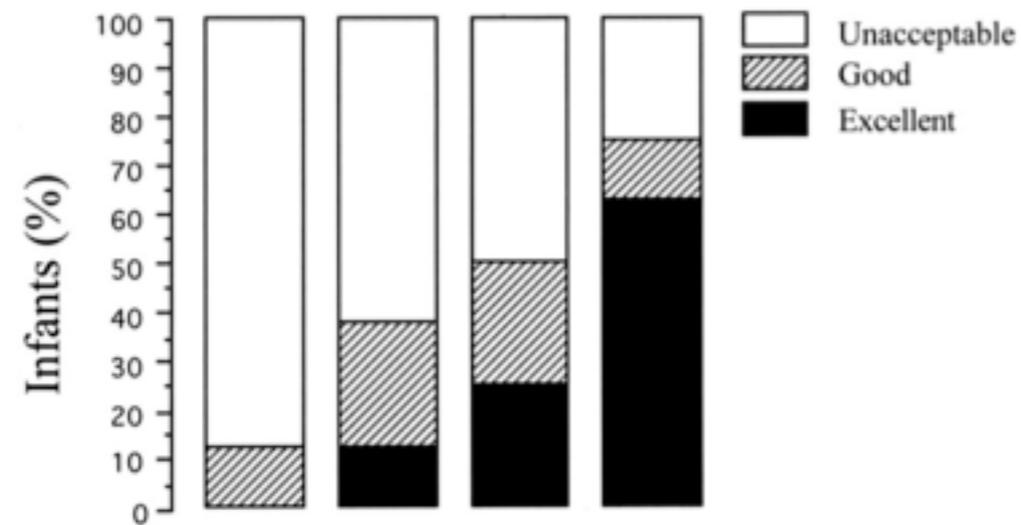
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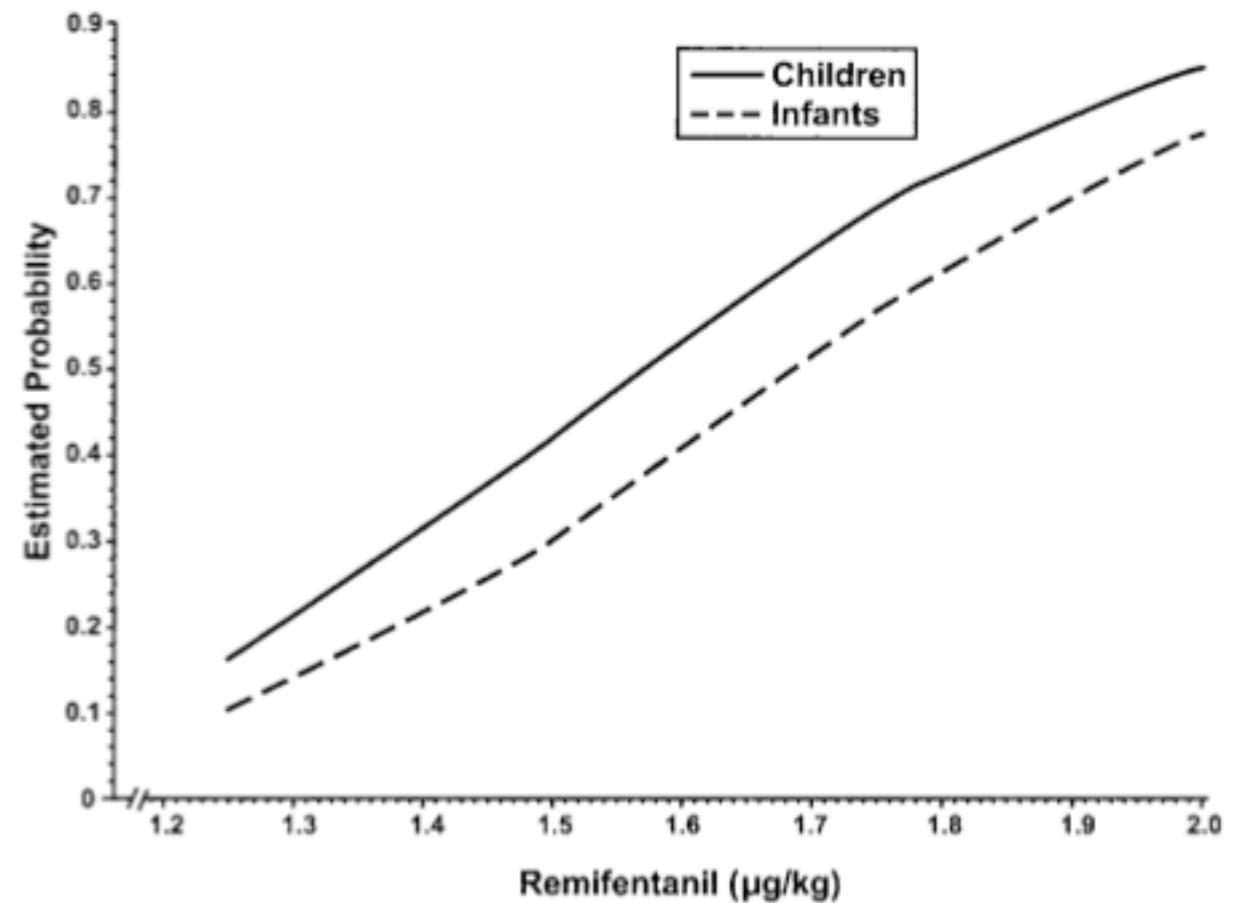
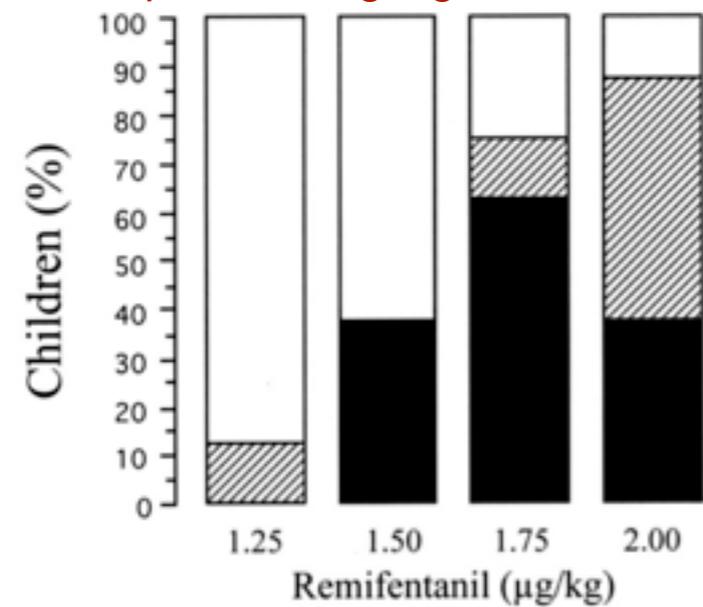
Propofol: 4 mg/kg + Remifentanyl



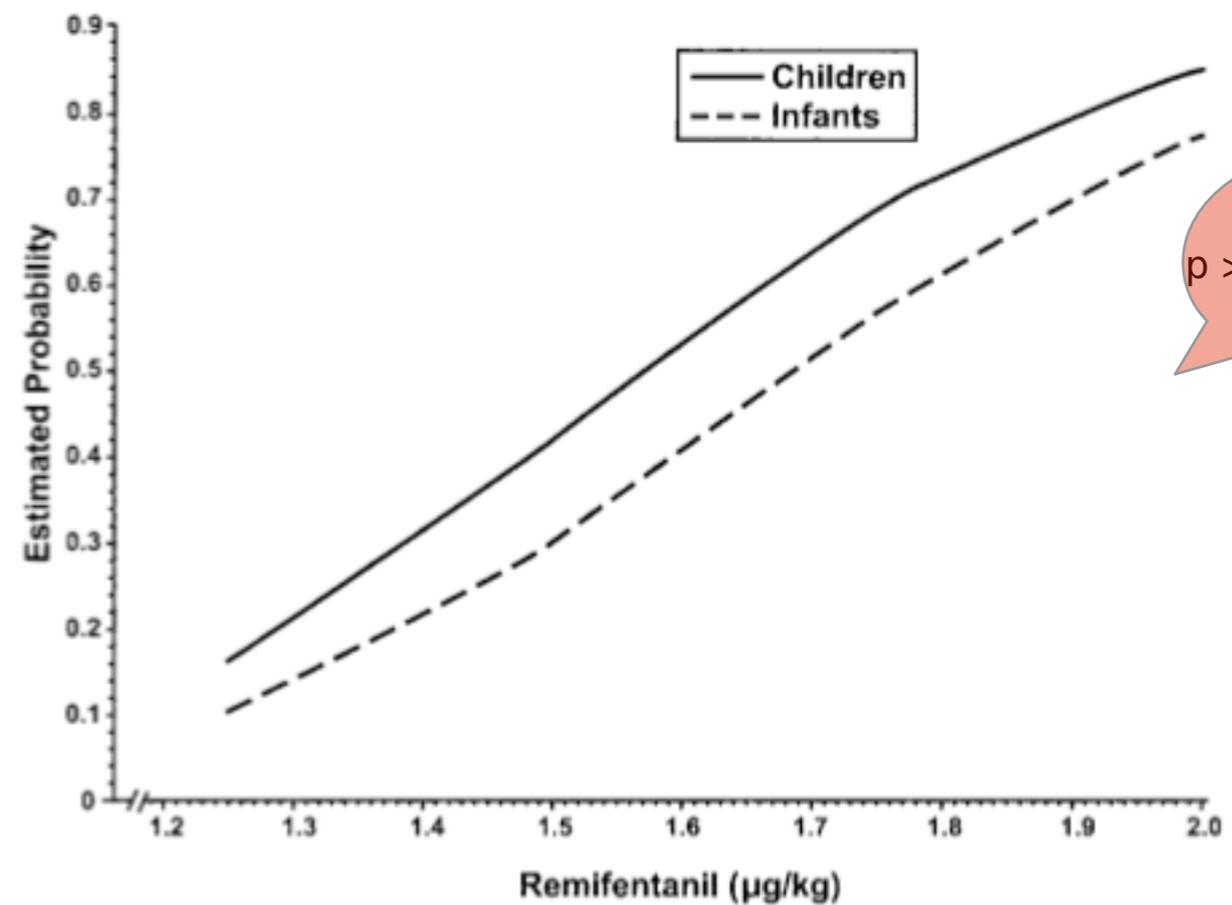
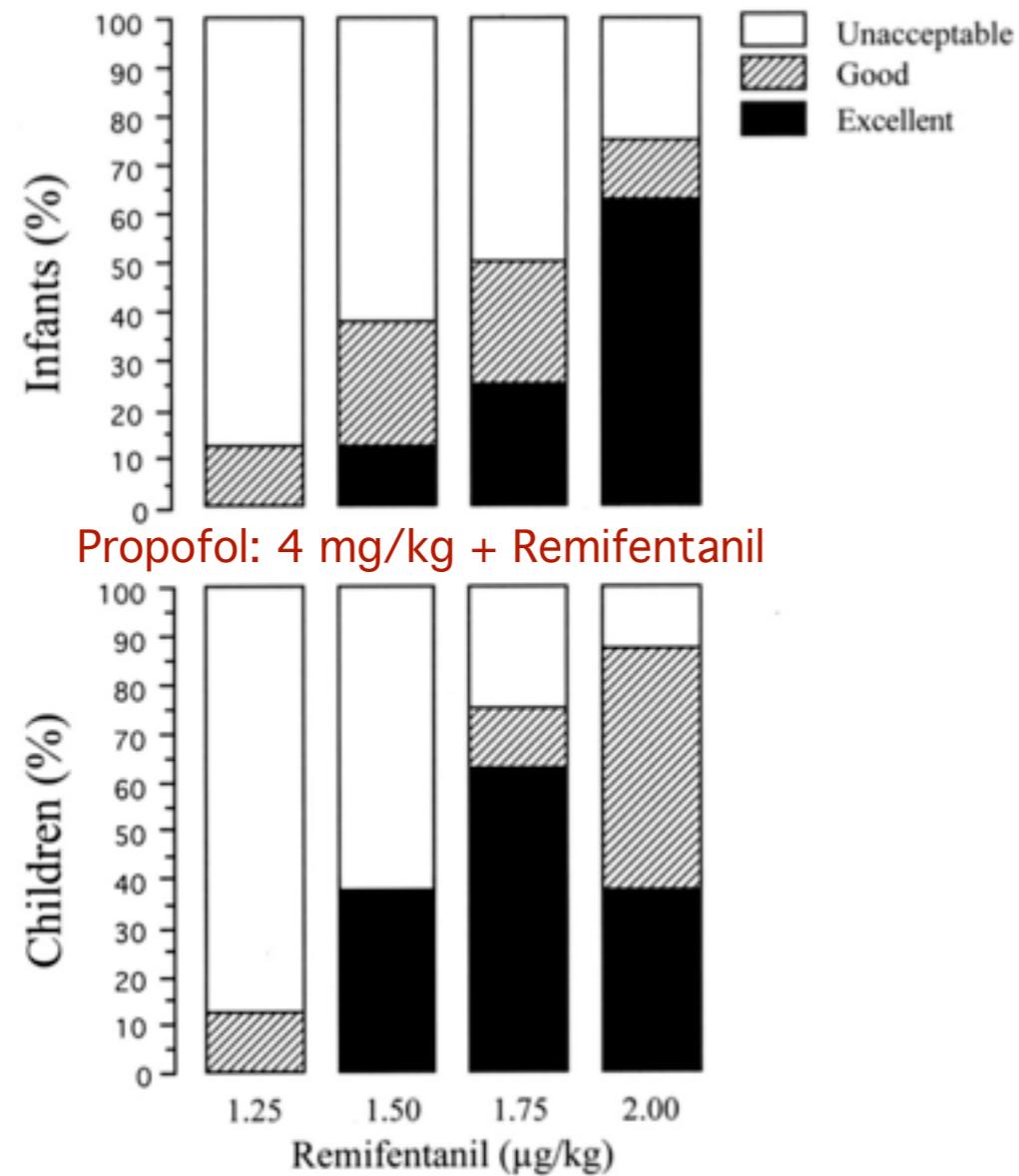
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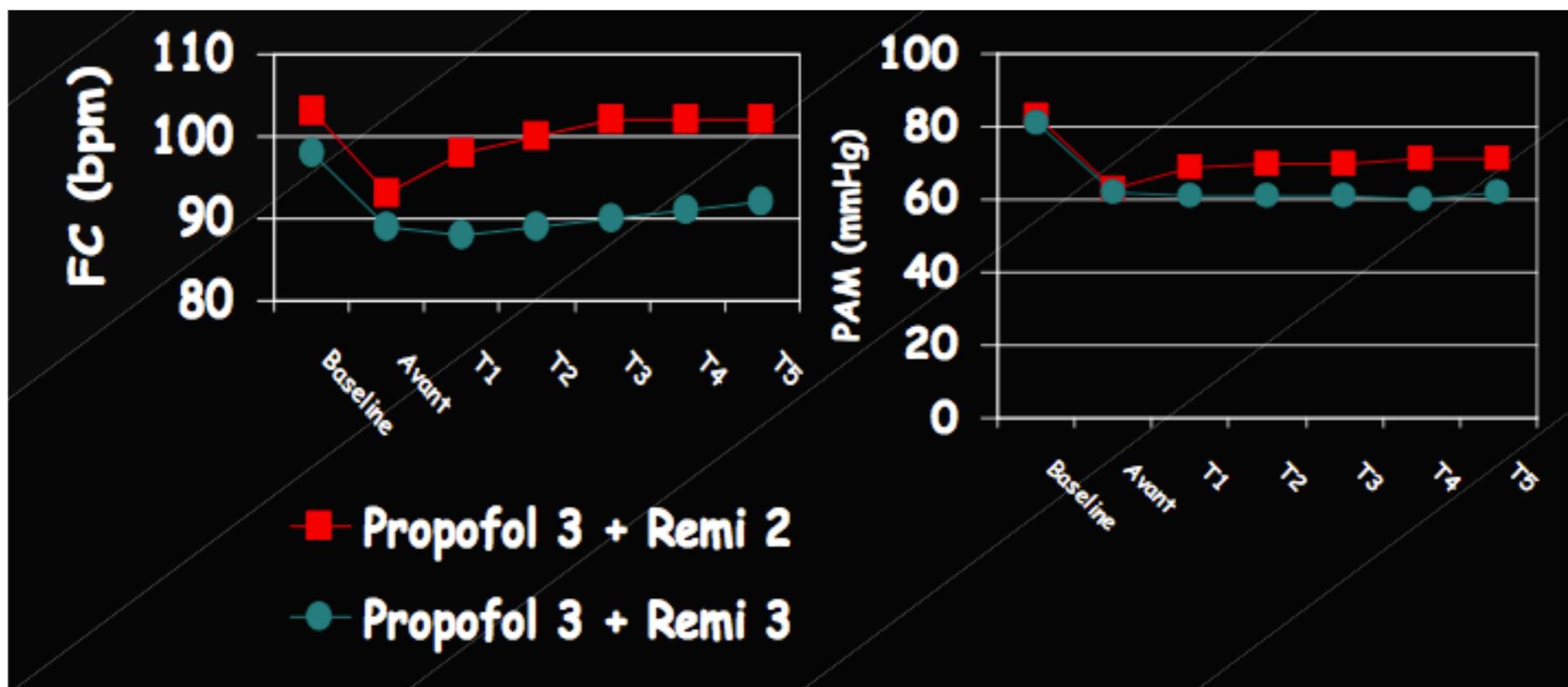


# Dose-response of remifentanil for tracheal intubation in infants



p > 98%: 3 µg/kg

# Intubieren ohne Muskelrelaxanzien

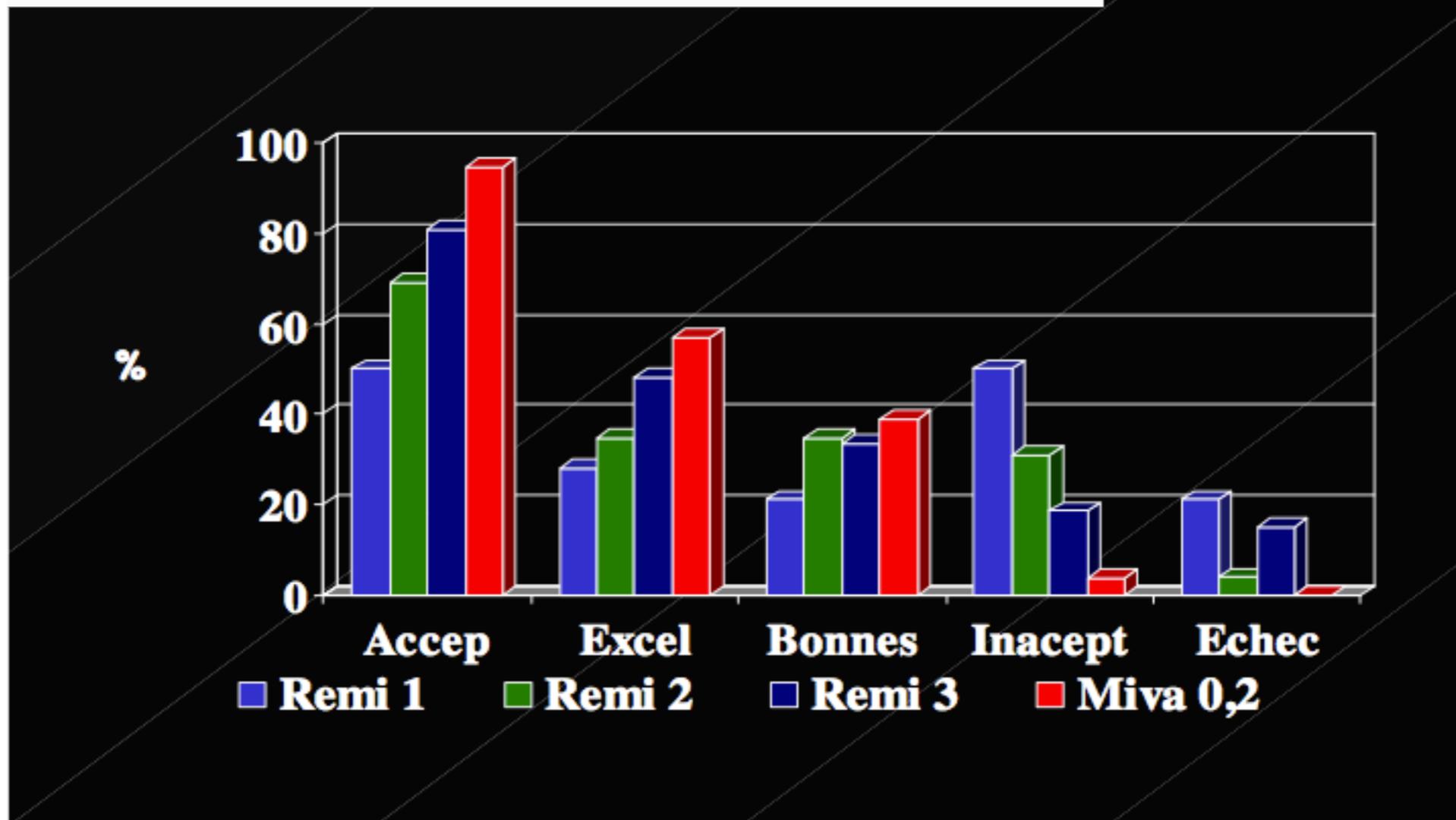


# Intubationsqualität & Larynxmorbidity

Anaesthesia, 2004, 59, pages 27-33

## Assessment of tracheal intubation in children after induction with propofol and different doses of remifentanyl

J. M. Blair,<sup>1</sup> D. A. Hill,<sup>2</sup> C. M. Wilson<sup>2</sup> and J. P. H. Fee<sup>3</sup>



# Intubieren mit Propofol (ohne Relaxanz)

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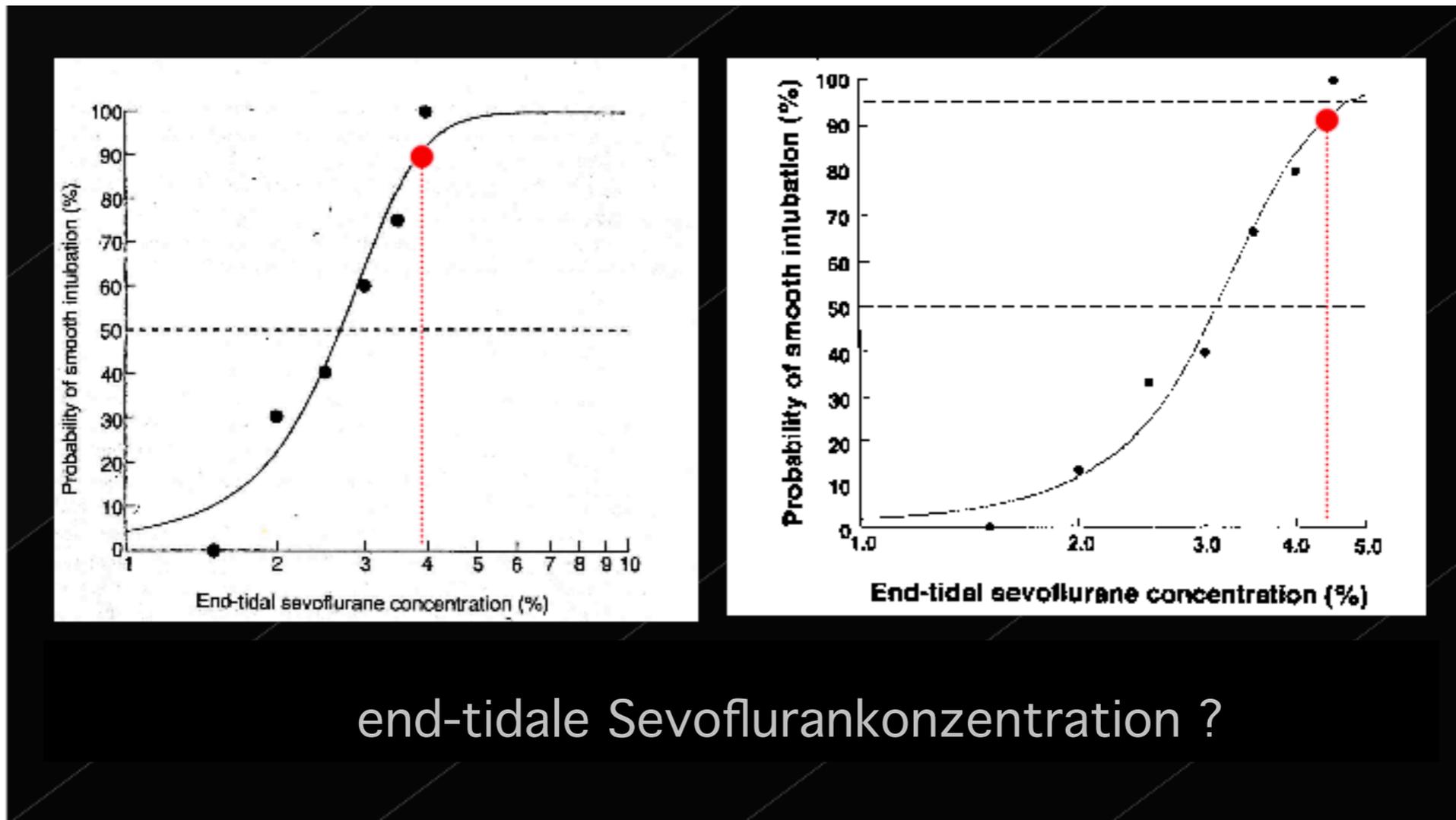
**Alternative wenn Muskelrelaxanz unmöglich**

# Intubieren mit Sevofluran

welche end-expiratorische Konzentration?

nach welcher Zeit?

# Intubieren mit Sevofluran



# Intubieren mit Sevofluran

Erfolgsquote	Einleitdauer (s)		Sevo end-tidal
	1 - 4 Jahre	4 - 8 Jahre	
50%	98(31 - 122)	133 (55 - 159)	3.3 (2.1 - 4.1)
80%	137 (95 - 159)	187 (153 -230)	4.9 (2.8 - 5.5)
90%	164 (140 - 226)	224 (192 -380)	5.9 (5.3 - 6.8)
95%	189 (162 - 351)	260 (217 - 614)	6.9 (5.5 - 7.5)

# Intubieren mit Sevoflurane

zu 95% gute Intubationsbedingungen

- 3,5 min EF von 5%
- 10 min EF von 4%
- 15 min EF von 2,6%
- 10 min EF von 2,5% (+ 66% N<sub>2</sub>O)

# Intubating conditions & adverse events during sevoflurane induction in infants

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**Table 2** Baseline data and anaesthetic induction characteristics. Data are presented as mean (SD). \* $P < 0.05$  vs the rocuronium group.  $E'_{\text{Sevoflurane}}$ , end-tidal concentration of sevoflurane;  $E'_{\text{CO}_2}$ , end-tidal carbon dioxide partial pressure

	Placebo (n=27)	Alfentanil (n=23)	Rocuronium (n=25)
Age (months)	12.4 (6.0)	11.3 (6.6)	11.9 (6.0)
Weight (kg)	8.6 (2.4)	8.8 (2.6)	8.8 (2.5)
Pulse oximetry (%)	99 (1)	99 (1)	99 (1)
Heart rate (beats $\text{min}^{-1}$ )	127 (15)	124 (18)	132 (18)
Mean arterial pressure (mm Hg)	59 (10)	58 (10)	61 (12)
Sevoflurane exposure time (min)	10.3 (3.2)	10.4 (2.9)	9.8 (1.9)
$E'_{\text{Sevoflurane}}$ just after intubation (%)	5.2 (1.1)	5.0 (0.8)	5.2 (0.7)
$E'_{\text{CO}_2}$ just after intubation (kPa)	6.6 (1.6)	7.2 (1.2)	6.4 (1.5)
Duration of tracheal intubation (s)	96 (128)*	66 (58)*	38 (28)

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**Table 3** Intubating conditions in different groups. Values are n (%). \* $P < 0.05$  vs the placebo group; # $P < 0.05$  vs the alfentanil group

Groups	Intubating conditions			
	Excellent	Good	Clinically acceptable (excellent + good)	Poor or clinically not acceptable
Placebo (n=27)	4 (15)	13 (48)	17 (63)	10 (37)
Alfentanil (n=23)	7 (30)	9 (40)	16 (70)	7 (30)
Rocuronium (n=25)	16 (64)*#	7 (28)	23 (92)*#	2 (8)

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**Table 4** Details of adverse events in each group. \* $P < 0.05$  vs the placebo group; # $P < 0.05$  vs the alfentanil group

	Placebo (n=27)	Alfentanil (n=23)	Rocuronium (n=25)
Respiratory events			
Laryngospasm or closed vocal cords	7	4	0
Bronchospasm	0	0	0
SpO <sub>2</sub> < 90%	4	3	0
Haemodynamic events			
Hypotension	0	6	0
Hypertension	0	0	0
Bradycardia	1	2	1
Tachycardia	1	0	3
Patients with respiratory events	9	4	0*#
Patients with haemodynamic events (n)	2#	8	4#
Patients with adverse events (n)	11	12	4*#

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**Alternative wenn Muskelrelaxanz unmöglich**

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**Nicht als Routineverfahren zu empfehlen!**

## Intubieren ohne Relaxanz?

Acta Anaesthesiol Scand 9/2011

....The technique without using muscle relaxant offers no clear benefit but imposes additional risks upon our patients.....

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Acta Anaesthesiol Scand 9/2011

....The technique without using muscle relaxant offers no clear benefit but imposes additional risks upon our patients.....

Laschat/Kaufmann/Wappler

**Tracheal Intubation of Healthy Pediatric Patients Without  
Muscle Relaxant: A Survey of Technique Utilization and  
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## Tracheal Intubation of Healthy Pediatric Patients Without Muscle Relaxant: A Survey of Technique Utilization and Perceptions of Safety

**Table 1.** For Intubation of Healthy Infants and Children, Percentage of Survey Responders Who Selected Each Technique as the One They Most Often Use

Intubation performed after	Infants	Children
IV muscle relaxant	60.9 ± 4.9	56.3 ± 3.0
IM muscle relaxant	0.7 (0.1–2.6)	0 (0–1.3)
IAWMR with IV placed first	27.6 ± 5.3	33.9 ± 5.5
IAWMR without IV placed first	10.8 ± 3.6	9.7 ± 3.5

IAWMR = inhaled anesthetic without muscle relaxation.

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IAWMR without IV placed first	10.8 ± 3.6	9.7 ± 3.5

IAWMR = inhaled anesthetic without muscle relaxation.

**Table 3.** Among Survey Responders Who Use IAWMR for Intubation of Healthy Infants and Children, Percentage Selecting a Particular Reason<sup>a</sup>

Reasons for using IAWMR	Infants	Children
MR not needed for intubation or for case	81.5 ± 5.1	80.8 ± 5.1
NDMRs last too long and prefer not to use succinylcholine	57.8 ± 6.3	56.5 ± 6.3
Lack an assistant to start IV at induction	19.4 ± 5.1	17.2 ± 4.7
Difficult venous access	28.4 ± 5.9	16.5 ± 4.5
Educational tool	6.9 ± 3.3	6.7 ± 3.1