Abstracts - foredragskonkurrence DASAIMs Årsmøde 2015

Abstract 10

Korresponderende forfatter Anne Kathrine Stæhr Rye
Email anne.kathrine.staehr@regionh.dk
Afdeling Anæstesiologisk afdeling
Hospital/institution Herlev Hospital
Medforfattere SD Gravitz, T Thevathasan, N Sasaki, MJ Meyer, T Kurth, MR Gätke, M Eikermann
Overskrift: Effects of Postoperative Residual Paralysis on Postoperative oxygenation, Hospital Length of Stay and Costs

INTRODUCTION
In this prospective observer-blinded cohort study we tested the hypothesis that postoperative residual paralysis is associated with impaired oxygenation, atelectasis, prolonged hospital length of stay (HLOS) and increased costs.

METHODS
Three thousand patients undergoing general anesthesia with non-depolarizing neuromuscular blockade were included in this study approved by the Institutional Review Board of the Massachusetts General Hospital, Boston. The study was registered at clinical trials.gov and another study based on this dataset has already been published.1 On arrival at the post-anesthesia care unit (PACU) the train-of-four (TOF) ratio and the ratio of peripheral oxygen saturation to fraction of inspired oxygen (S/F ratio, primary outcome) were assessed. The secondary outcomes included HLOS as well as incidence of atelectasis. With an exploratory intention we also analyzed effects on costs of hospital stay. Associations between TOF-ratio and outcomes were assessed by logistic, ordinal, and zero-truncated Poisson regression, including adjustments for a priori defined covariates (age, body mass index, ASA, duration of surgery, high-risk surgery, neostigmine). Post hoc, we examined the P for trend betwe en HLOS and degree of residual paralysis, assessed by a TOF-ratio below 0.8, between 0.8 and 0.9 and above 0.9, with the significance of the Pearson Partial Correlation Coefficient.

RESULTS
The number of patients with a TOF-ratio<0.9 was 592 (20%) (Table) and the median TOF-ratio among those was 0.84 [range: 0.27-0.90]. Patients with TOF-ratio<0.9 did not have a lower S/F ratio (odds ratio (OR) 0.88 [95% confidence interval (CI) 0.62-1.26]). The effect of residual paralysis on HLOS was dose (TOF-fade)-dependent (P for trend=0.009; incidence rate ratio (IRR) of TOF-ratio<0.9 compared to TOF-ratio>0.9: 1.14 [95% CI 1.08-1.20]; Figure). Postoperative residual paralysis was associated with a significantly higher incidence of atelectasis (OR 1.42 [1.01-1.99]) and leaded to a significant increase in hospital costs (IRR 1.13 [95% CI 1.13-1.13]).

DISCUSSION AND CONCLUSION
Residual paralysis did not impair the immediate postoperative oxygenation but was associated with a significant increase in HLOS and a higher incidence of atelectasis, which translated to higher hospital costs.

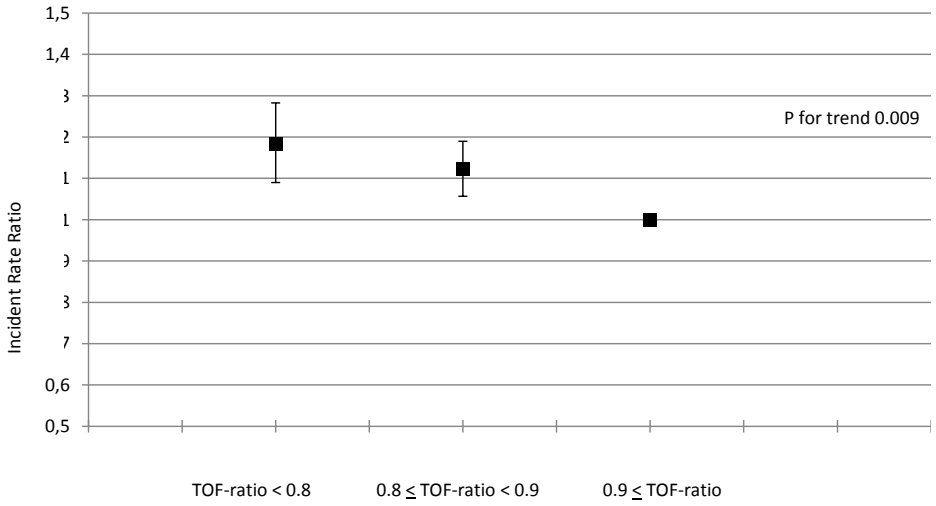
1) Sasaki N et al.: Effects of neostigmine reversal of nondepolarizing neuromuscular blocking agents on postoperative respiratory outcomes: a prospective study. Anesthesiology 2014; 121:959-68

Table 1. Clinical Characteristics of Patients

	TOF-ratio < 0.9 (n=592)	TOF-ratio ≥ 0.9 (n=2301)
Age (yrs)	57 [44-68]	57 [45-67]
Gender (male)	214 (36%)	1079 (47%)
BMI (kg/m^2)	28 [24-34]	28 [24-32]
ASA I/II/III/IV/V	11%/58%/30%/ 0.7%/0.2%	9%/64%/26%/ 0.3%/0.1%
ND-NMBAs (ED95/kg/h)	1.5 [1.1-2.2]	1.5 [1.0-2.2]
Duration of surgery (min)	121 [76-186]	120 [76-186]
High-risk surgery	238 (40%)	765 (33%)

Data are reported as median [IQR] or number (percentage).
TOF, Train-of-four; BMI, body mass index; ASA, American Society of Anesthesiologists physical status classification; ND-NMBAs, non-depolarizing neuromuscular blocking agent; High-risk surgery: vascular surgery, transplant surgery, neurosurgery, thoracic surgery, general surgery and burn surgery.

Figure 1. Association between TOF-ratio in 3 categories and Incident Rate Ratio of Postoperative Hospital Length of Stay



Abstract 11

Korresponderende forfatter	Charlotte V. Rosenstock
Email	charlotte.rosenstock@regionh.dk
Afdeling	Anæstesiologisk afdeling
Hospital/institution	Nordsjællands Hospital & Copenhagen Trial Unit, Centre for Clinical Intervention Research, Copenhagen University Hospital, Rigshospitalet
Medforfattere	A.K. Nørskov, L.H. Lundstrøm, J Wetterslev and the Danish Anaesthesia Database
Overskrift	Emergency cricothyrotomy in Denmark from June 2008 to March 2014 A cohort study of 452,461 patients registered in the Danish Anaesthesia Database

Introduction:
Cannot intubate Cannot ventilate (CICV) is reported to occur in 0,07 % of general anesthesia procedures. Emergency cricothyrotomy is the final option in managing CICV in difficult airway management algorithms, but is a seldom and rarely practiced procedure and therefore difficult to perform in an emergency high risk situation. The aims of this study were to identify all emergency cricothyrotomy procedures registered in the Danish Anaesthesia Database from June 1st 2008 to March 15th 2014 and secondly to describe the performed airway management.

Method:
This study is observational and therefore the Scientific Ethics Committee of Copenhagen County waived the need for individual patient consent. Data extraction was approved by the Danish Data Protection Agency and the steering Committee of DAD. In 2014, 75 % of all Danish departments of anesthesiology report data to the DAD. A cohort of 452,461 patients undergoing general anesthesia and attempted intubated was extracted from the DAD in the period 1/6-2008 to 15/3-2014. For all patients a preoperative airway management plan and actual airway management conditions are registered. Patients with a registered emergency cricothyrotomy were secondly retrieved for further analysis.

Results:
Thirty-one patients were registered with an emergency cricothyrotomy giving a prevalence of 1/14,596 = 0,07 ‰. The distribution of ASA class I-IV was 8/12/9/1 and unknown for one patient. Female/male ratio was 10/21, median (range) BMI was 24 (17-42) and median (range) age was 60 (31-89) years. 19 patients were scheduled for emergency surgery. Mask ventilation was anticipated difficult for five (16 %) patients and ten (32 %) patients were anticipated difficult to intubate. Thirteen patients were scheduled for intubation by direct laryngoscopy whereas ten patients were scheduled for a fiberoptic intubation. A total of 20 (64%) patients were registered with a CICV. Neuromuscular Blocking Agents were administered to19 patients. Intubation by direct laryngoscopy was the first chosen technique for nine patients, whereas fiberoptic intubation was the first chosen but failed technique for another nine patients. Cricothyrotomy was chosen as the first used technique in five pat ients indicating that these patients were already at risk of severe respiratory distress at induction of anesthesia. Cricothyrotomy failed in a total of five (16 %) patients, see Table 1 for further details.

Discussion:
The prevalence of emergency cricothyrotomy was 0,07 ‰. More than sixty percent of the patients were registered with a CICV. Cricothyrotomy failed in five patients illustrating the difficulty of this procedure and emphasizing the importance of maintaining difficult airway management algorithm knowledge and practice in difficult and high-risk procedures.

Table 1 Emergency cricothyrotomy in Denmark from June 2008 to March 2014

Patient	1 technique (attempts)	2 technique (attempts)	3 technique (attempts)	4 technique (attempts)	5 tecnique (attempts)	Can´t Ventilate Can´t intubate
1	Cricothyrotomy (1)					?
2	Cricothrotomy (1)	Proseal/LMA (1)				no
3	Other technique (1)	Cricothyrotomy (1)				yes
4	Fiberoptic (1)	Cricothyrotomy (1)				yes
5	Videolaryngoscope (1)	Cricothyrotomy (1)				yes
6	Dir Lar (3)	Intubation through LMA/fastrach(1)	Retrograde intubation (1)	Cricothyrotomy (1)		yes
7	Cricothyrotomy (1)					yes
8	Dir Lar (2)	Cricothyrotomy (1)				no
9	Dir Lar (1)	Other technique	Cricothyrotomy (1)			yes
10	Dir Lar(1)	Proseal /LMA (1)	Cricothyrotomy (1)			yes
11	Videolaryngoscope (1)	Cricothyrotomy (1)				no
12	Dir Lar (5)	Combitube (1)	Cricothyrotomy (1)	Tracheostomy-Fiberoptic (1)		no
13	Fiberoptic (2)	Cricothyrotomy (1)				yes
14	Fiberoptic (1)	Cricothyrotomy (1)	Dir Lar (1)	Other technique (1)		yes
15	Other technique (1)	Cricothyrotomy (1)				yes
16	Fiberoptic (1)	Other technique (1)	Cricothyrotomy (1)	0ther technique (1)	Videolaryngoscope (1)	yes
17	Fiberoptic (5)	Cricothyrotomy (1)				yes
18	Fastrach(1)	Cricothyrotomy (1)				no
19	Retrograde intubation (1)	Cricothyrotomy (1)				yes
20	Fiberoptic (1)	Cricothyrotomy (1)				no
21	Dir Lar (1)	Cricothyrotomy (1)				no
22	Cricothyrotomy (1)					no
23	Fiberoptic (2)	Cricothytomy (1)				no
24	Cricothyrotomy (1)					yes
25	Fiberoptic (1)	Cricothyrotomy (1)				yes
26	Dir Lar (1)	Videolaryngoscope (2)	Fiberoptic (1)	Cricothyrotomy (1)		no
27	LMA (1)	Videolaryngoscope (1)	Cricothyrotomy (1)	Other technique (1)		yes
28	Fiberoptic (1)	Cricothyrotomy (1)				yes
29	Videolaryngoscope (1)	Cricothyrotomy (1)				yes
30	Dir Lar (1)	Cricothyrotomy (1)				yes
31	Dir Lar (4)	Cricothyrotomy (1)				yes

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Korresponderende forfatter Nicolai Lohse
Email niclohse@gmail.com
Afdeling Anæstesiologisk Afdeling
Hospital/institution Hvidovre Hospital og HovedOrtoCentret, Rigshospitalet
Medforfattere Annika Wieslander, Mads Wissenberg, Lars Hove, Jacob Steinmetz
Overskrift Physician-staffed mobile emergency care units and survival after out-of-hospital cardiac arrest

Introduction:
The utility of physician-staffed mobile emergency care units (MECUs), compared to MECUs without physicians, is widely debated in Denmark. There is lack of good evidence on the topic. Some regions are scaling up and increasing the number of physician-staffed MECUs, while others have chosen to diminish or discontinue this service. We aimed to assess the effect of physician-staffed MECU implementation on survival after out-of-hospital cardiac arrest (OHCA). We hypothesized that implementation would be associated with better survival.

Methods:
Observational cohort study. Cardiac arrest patients were identified from the Danish Cardiac Arrest Registry. Study population included all persons with OHCA in the Capital Region during 2001-2012. Primary outcome was 30-day survival. Exposure was period before and after implementation of physician-staffed MECUs. The study population comprised two geographical locations: “Central Copenhagen” (former Region H:S) and “Greater Copenhagen” (former Copenhagen County). In Central Copenhagen, physician-staffed MECUs were operating throughout the study period. In Greater Copenhagen, physician-staffed MECUs were implemented on October 1st 2007. We compared 30-day survival before and after October 1st 2007. The location “Central Copenhagen” served as comparison to account for general changes in survival over time. We built a logistic regression model adjusted for age, sex, place (private home yes/no), Charlson Comorbidity Index, and period-l ocation interaction.

Results:
A total of 10,061 OHCAs were included: 5,340 (53.1%) before and 4,721 (46.9%) after MECU implementation; 5,056 (50.3%) in Central Copenhagen and 5005 (49.7%) in Greater Copenhagen. MECU physician involvement in Central Copenhagen was 88.0% in 2006 and 91.4% in 2012; increasing in Greater Copenhagen from 7.3% in 2006 to 92.4% in 2012. Thirty-day survival increased overall by 52% (from 7.13% before to 10.81% after 1st October 2007), see Table. The increase in Central Copenhagen was 36% (from 8.68% to 11.81%), while the 30-day survival increased by 84% (from 5.41% to 9.95%) in Greater Copenhagen. Adjusting for confounders, this observed effect modification was significant,

OR=1.38 (95% confidence interval 1.02-1.85), p=0.032.

Discussion:
Thirty-day survival increased after implementation of physician-staffed MECUs in Greater Copenhagen. This can have several explanations. Apart from the physician involvement, other system changes could have contributed such as improved response time leading to shorter time to first rhythm check, higher proportion of shockable rhythms, more personnel involved in the resuscitation of the patient, better in-hospital treatment, or improved layman education leading to more frequent cardiopulmonary resuscitation performed before arrival of medical staff.

Conclusion:
Survival after out-of-hospital cardiac arrest improved significantly after implementation of physician-staffed mobile emergency care units.

Table: 30-day survival, logistic regression analysis

Implementation of physician-staffed MECUs on 1 Oct 2007, N=10061	30-day survival (%)	Unadjusted		Adjusted*		Adjusted*		P-value interaction term
		OR	95% CI	OR	95% CI	OR	95% CI	
Period								
Before implementation (1/2001-9/2007)	7,13	1,00		1,00		1,00		
After implementation (10/2007-12/2012)	10,83	1,57	1.37-1.81	1,69	1.46-1.95	1,47	1.22-1.78	
Location								
Central Copenhagen	10,07	1,00		1,00		1,00		
Greater Copenhagen	7,67	0,74	0.64-0.85	0,73	0.64-0.85	0,61	0.49-0.76	
Period*Location interaction								
no		na		na		1,00		
yes						1,38	1.02-1.85	0,032

*adjusted for age, sex, private home (yes/no), and Charlson Comorbidity Index

MECU: mobile emeregncy care unit
OR: Odds Ratio
CI: confidence interval

Abstract 32

Korresponderende forfatter Lars Bjerregaard
Email lars.stryhn.bjerregaard@regionh.dk
Afdeling Enhed for Kirurgisk Patofysiologi og Lundbeckfond center for fast-track hofte- & knæalloplastik
Hospital/institution Rigshospitalet
Medforfattere Ulla Hornum, Charlotte Troldborg, Stina Bogø, Per Bagi and Henrik Kehlet.

Overskrift When to catheterise after fast-track total hip and knee arthroplasty – a RCT comparing bladder volumes of 500 vs. 800 ml. as catheterisation threshold

Introduction:
A bladder volume (BV) of 500 ml is a commonly used catheterisation threshold (CT) in postoperative urinary retention (POUR), but this threshold is without evidential support.1, 2 Here we present the first RCT to challenge this non-evidence based CT in fast track total hip (THA) and knee arthroplasty (TKA).
Our objective was to compare two BVs (500 vs. 800 ml) as CT, hypothesising that allowing BVs of 800 ml would reduce the need for postoperative catheterisation without increasing the incidence of voiding difficulties and urinary tract infections (UTI).

Methods:
We included 800 patients aged ≥ 18, planned for fast track THA or TKA and who had given informed written consent. 721 patients completed the study. The study was approved by the Ethics Committee (H-1-2015-024).
Postoperative (PO) bladder scans were performed at 2 hours intervals until the first voluntary micturition and intermittent catheterisation was performed in case of BV ≥ 500/800 ml. If needing more than 2 catheterisations, an indwelling catheter was placed for 24 hours.
All urologic complications and UTIs during admission were registered. All patients completed a preoperative questionnaire on voiding difficulties (International Prostate Symptom Score (IPSS)), which was repeated at the 30 days telephone follow-up.
Our main outcome was the need for PO catheterisation. Secondary outcomes were incidences of UTI and voiding difficulties within the 30 days PO.

Results:
The proportion of catheterised patients was significantly reduced in the 800 ml group (Table 1), with no differences in number of patients with UTI or total IPSS-scores (Table 2). Also, we found no significant differences between groups, when analysing the 7 questions of the IPSS individually (all $p > 0.19$).

Discussion:
POUR is a common complication in THA and TKA, but with a CT of 500 ml we may unnecessarily catheterise too many patients. Based on our results, it is safe to allow transient BVs up to 800 ml and hereby reduce the need for PO catheterisation.

A recent RCT including 1840 mixed surgical patients, compared a BV of 500 ml vs. a CT based on the patient's maximal preoperative bladder capacity (Average 611 ml, SD 199) and found the latter to reduce PO catheterisation from 11.8 to 8.6%, without signs of harmful effects.3 These results are fully consistent with our findings.

Conclusions:
Our results show that increasing the CT to 800 ml reduces the need for postoperative catheterisation, without increasing the incidence of voiding difficulties and UTI. This large RCT may serve as basis for future evidence based guidelines on perioperative urinary bladder management in fast track THA and TKA. Also, our results may be applicable to other patient populations, suffering from postoperative urinary retention of non-obstructive origin.

1. Bjerregaard LS et al. Acta Orthop 2014; 85: 8-10.
2. Bjerregaard LS et al. Acta Orthop 2015; 86: 183-188.
3. Brouwer TA et al. Anesthesiology 2015; 122: 46-54.

Table 1. Number of patients catheterised before their first voluntary, postoperative micturition.

	500 ml. group, n = 355	800 ml. group, n = 366	*p*
Catheterised (Total)	**114 (32.1)**	**49 (13.4)**	**0.000000002**
Catheterised because of symptomatic POUR	0	6 (1.6)	
Spinal anaesthesia (catheterised patients)	106 (29.9)	45 (12.3)	
Repeated intermittent catheterisation	**16 (4.5)**	**3 (0.8)**	**0.002**
Indwelling catheter (proceeded by intermittent catheterisation x 2)	**2 (0.6)**	**0**	**0.242**

Data are presented as counts (%).

Table 2. Number of patients with urinary tract infection within the 30-day follow-up and differences in IPSS-scores compared between the two groups.

	500 ml. group, n = 355	800 ml. group, n = 366	*p*
UTI (Total)	**7 (2.0)**	**8 (2.2)**	**1.0**
Catheterised patients	2 (0.6)	2 (0.5)	
Non-catheterised patients	5 (1.4)	6 (1.6)	
UTI more than once	**2 (0.6)**	**2 (0.5)**	**1.0**
Catheterised patients	2 (0.6)	0	
Non-catheterised patients	0	2 (0.5)	
Differences in total IPSS-scores, Median (IQR) (Postoperative score – preoperative score)	**0 (-2-1)**	**0 (-3-1)**	**0.966**
Missing	8 (2.3)	11 (3.0)	

Data are presented as counts (%) unless otherwise specified.
IPSS, International Prostate Symptom Score; IQR, Inter Quartile range.

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Korresponderende forfatter Øivind Jans, PhD, MD
Email oeivind.jans@rh.regionh.dk
Afdeling Section of Surgical Pathophysiology, 4074
Hospital/institution Copenhagen University Hospital, Rigshospitalet
Medforfattere 1) Christian Skovgaard Nielsen, 2)Dr. Øivind Jans, PhD, MD, 3)Thue Oersnes, MD, 4)Nikolaj Bang Foss, MD, Consultant, DMSc. 5)Anders Troelsen, MD, PhD, DMSc, Professor, 6)Henrik Husted, Consultant, DMSc, PhD, ass. Professor
Overskrift Combined Intra-articular and Intravenous Tranexamic Acid Reduces Blood Loss in Total Knee Arthroplasty – a doubleblind placebo controlled randomized trial.

Introduction
Total knee arthroplasty (TKA) is associated with perioperative blood loss resulting in pain, swelling, anemia, and the risk of allogeneic blood transfusion. Both systemic and topical administration of tranexamic acid (TXA) has been proven to reduce blood in loss several RCT´s though routine use of systemic TXA is considerably more common. However, the additional benefit of topical TXA in addition to systemic TXA has not previously been investigated. Thus, we aimed to evaluate if combined topical and systemic TXA administration reduced total blood loss compared to systemic TXA alone.

Methods
Randomized, double-blind, placebo-controlled trial in 60 patients scheduled for TKA. The trial was approved by the Danish Health and Medicines Authority (EudraCT2013-003169-33) and the Regional Ethics Committee of Denmark (H-3-2013-134). Patients were assigned to receive either 1) combined TXA administration 1 g intravenously (IV) during induction of anaesthesia + intra-articular (3g TXA diluted in 100 ml saline 0.9%) prior to wound closure (TXA IA + IV) or 2) 1 g TXA IV alone + 100 mL saline intra-articular (TXA IV + placebo). IA TXA was administrated through a puncture needle penetrating the knee capsule positioned prior to closure of the capsule and thereby visualized in the joint space.

The primary outcome was 24 h calculated blood loss and the secondary outcomes were blood loss on 2nd postoperative day, thromboembolic complications and transfusion rate. No tourniquet or postoperative drainage was used. Blood loss was calculated by hemoglobin differences using th e Gross formula.

Results:
Data on the primary outcome was available for all 60 included patients. 53.3 % were females. Mean age was 64.3 (SD ±8.2) years and mean duration of surgery was 52.8 (SD±10.4) minutes. 24 h blood loss was 466 (SD±313) mL in the TXA IV + IA vs. 743 (SD±358) mL in the TXA IV + placebo group, treatment effect 277 (95% CI 103 – 451; p = 0.002) mL. 2nd day blood loss was 644 (±382) mL in the TXA IV + IA vs. 1017 (±519) mL in the TXA IV + placebo group, treatment effect 373 (95% CI 132 – 614; p = 0.003) mL. No thrombo-embolic complications were observed within 90 days postoperatively. One patient in the IV + placebo group received transfusion of 4 units of red blood cells during admission.

Discussion/Conclusion:
The combined administration of systemic and intra-articular TXA resulted in a clinically relevant reduction in blood loss of 37% both 24 h and 2nd day after surgery compared to intravenous TXA alone. No thromboembolic events were observed.

Abstract 54

Korresponderende forfatter	Matias Vested Madsen
Email	matias.vested.madsen@regionh.dk
Afdeling	Anæstesiologisk Afdeling
Hospital/institution	Herlev Hospital
Medforfattere	Anne Kathrine Staehr-Rye, Olav Istre, Henrik Halvor Springborg, Jacob Rosenberg, Jørgen Lund, Mona Ring Gätke

Overskrift	Postoperative shoulder pain after laparoscopic hysterectomy with deep neuromuscular blockade and low intraabdominal pressure –a randomised controlled trial

Background
Postoperative shoulder pain remains a significant problem after laparoscopy. Pneumoperitoneum with insufflation of CO2 is speculated to be the most important cause. Reduction of pneumoperitoneum may, however, compromise surgical overview. Recent studies indicate that use of deep neuromuscular blockade (NMB) improves surgical conditions during a lower pneumoperitoneum. We aimed at investigating if low pneumoperitoneum (8 mmHg) and deep NMB compared to standard pneumoperitoneum (12 mmHg) and moderate NMB would reduce the incidence of shoulder pain and improve recovery after laparoscopic hysterectomy.

Methods
The Danish Medicines Agency and the Regional Ethics Committee, the Capital Region of Denmark approved this study (NCT01722097). The study was randomised, controlled, and double-blinded. A total of 99 patients scheduled to laparoscopic hysterectomy were included and randomised to either deep NMB and 8 mmHg pneumoperitoneum or moderate NMB and 12 mmHg pneumoperitoneum. Patients received standardised pain regimen (gabapentin, etodolac, paracetamol, sufentanil, and infiltration of local anesthetics in the incisions). Primary outcome was pain assessed on a 100 mm VAS scale during hospital stay through fourteen days after operation. Other outcomes were pain (shoulder-, incisional-, abdominal - and overall pain) estimated as area under the curve from preoperatively till 4 and 14 days after operation, number of days before resumption of daily activities, duration of surgery, duration of postoperative stay, use of opioids within 24 hours postoperatively, incidence of nausea and vomiti ng and use of anti-emetics within 24 hours postoperatively.

Results
In group deep NMB and 8 mmHg pneumoperitoneum, 14 of 49 patients (28.6 %) had shoulder pain during the 14 postoperative days whereas in group moderate NMB and pneumoperitoneum 12 mmHg the incidence was 30 of 50 patients (60%). Absolute risk reduction was 0.31 (95% CI: 0.12-0.48) (P=0.002). We found no differences in area under the curve for VAS scores, consumption of opioids, incidences of nausea and vomiting, consumption of antiemetics, time to recovery, length of hospital stay, or duration of surgery (Table 1).

Discussion
An explanation of that we did not see any differences in pain outcomes besides the occurrence of shoulder pain could be that patients were already sufficiently treated with the standardised multimodal pain regimen including pulmonary recruitment maneuvers at end of surgery. Furthermore, laparoscopy was performed at a relatively low pneumoperitoneum (12 mmHg). The multimodal pain regimen and a pneumoperitoneum of 12 mmHg may have blurred a possible analgesic effect of the intervention with pneumoperitoneum of 8 mmHg in combination with deep NMB on the other pain outcomes than shoulder pain.

Conclusion
Deep NMB and pneumoperitoneum 8 mmHg compared to moderate NMB and pneumoperitoneum 12 mmHg reduced the incidence of shoulder pain after laparoscopic hysterectomy.

Table 1. Use of opioids and recovery after laparoscopic hysterectomy

	Group 8-Deep		Group 12-Mod		P value for Comparison between groups
	n	Median (range)	n	Median (range)	
Use of oxycodone within 24 h (mg)	49	25 (0-60)	50	20 (0-70)	0.309
Use of oxycodone within 14 days (mg)	49	30 (0-220)	50	25 (0-120)	0.370
Resumption to daily activities (days)	48	10 (2-14)	47	8 (2-14)	0.167
Length hospital stay (hours)	49	20 (4-66)	50	21 (6-28)	0.745
Duration of surgery (minutes)	49	65 (42-228)	50	70 (42-148)	0.624

Groups are compared using Mann Whitney U test