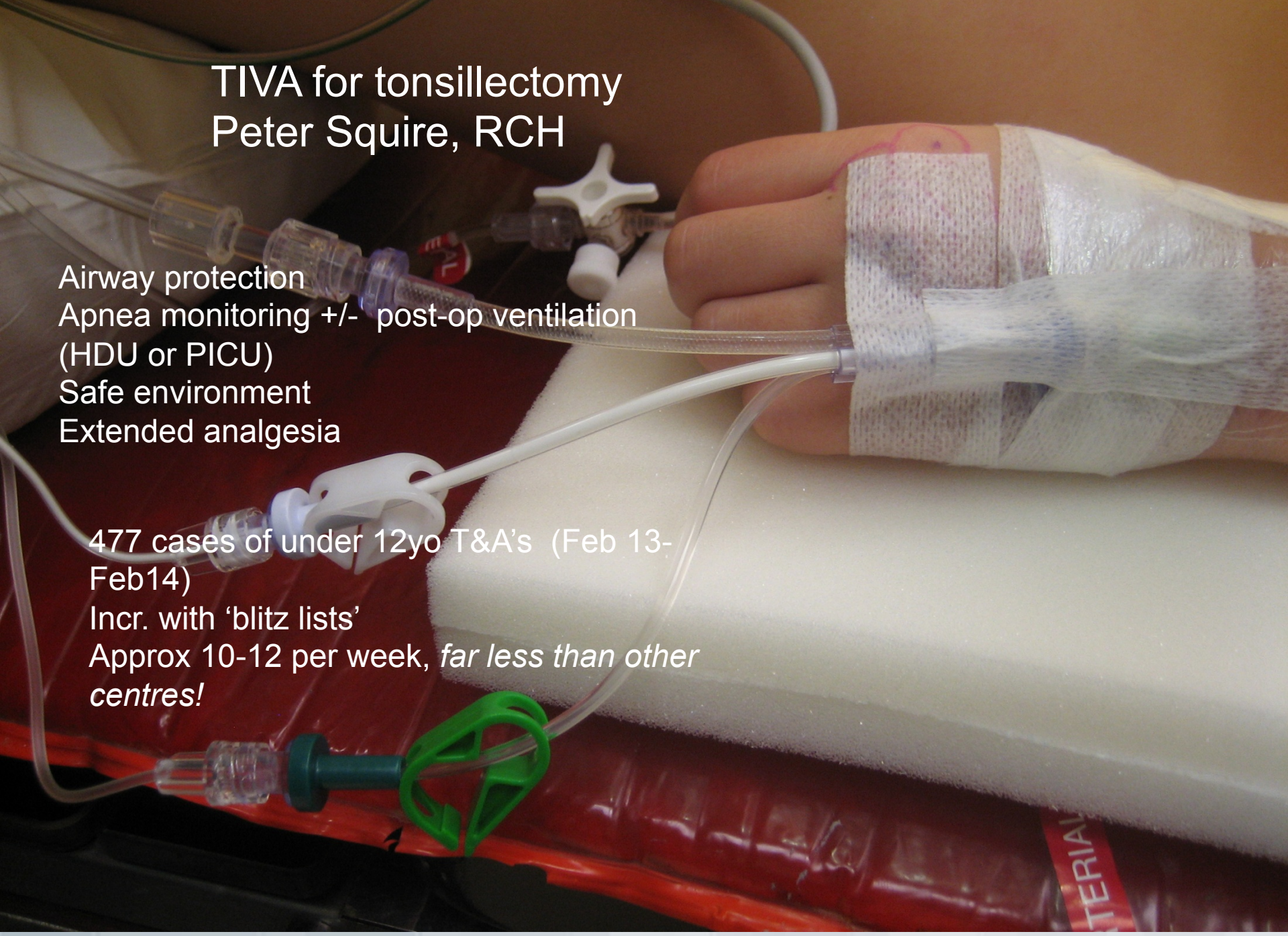


TIVA for tonsillectomy
Peter Squire, RCH

Airway protection
Apnea monitoring +/- post-op ventilation (HDU or PICU)
Safe environment
Extended analgesia

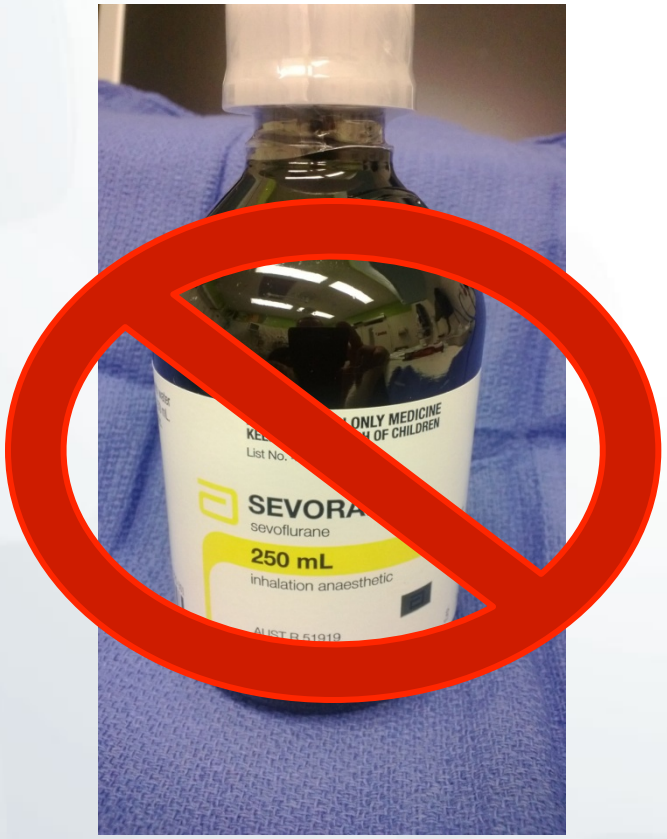
477 cases of under 12yo T&A's (Feb 13-Feb14)
Incr. with 'blitz lists'
Approx 10-12 per week, *far less than other centres!*

Advantages of Sevo

- “You just breathe it”
- Treats needle-phobic parents
- Doesn’t need EMLA or Angel
- You don’t have to prepare it
- You can assess the degree of airway obstruction
- ‘Relatively’ quick offset
- Gives you 101 chances to get the cannula in!

Disadvantages of Sevo

- “It stinks”
- It pollutes
- Requires a vaporiser
- Makes you chuck (PONV)
- Makes you mad (Emergence Agitation)
- Gives you laryngospasm
- Puts the surgeon to sleep
- Malignant Hyperthermia
- Rhabdomyolysis



Malignant Hyperthermia vs Rhabdomyolysis

British Journal of Anaesthesia **104 (4):** 487–9 (2010)
doi:10.1093/bja/aeq035 Advance Access publication February 26, 2010

BJA

PAEDIATRICS

Case Report

Perioperative cardiac arrest in a patient with previously undiagnosed Becker's muscular dystrophy after isoflurane anaesthesia for elective surgery†

T. C. Poole[1]*, T. Y. J. Lim[2], J. Buck[2] and A. S. Kong[1]

Central core disease (MH)
Known spontaneous Rhabdomyolysis
Muscular dystrophy
Duchenne's

Benefits:
Post-operative nausea and vomiting

A meta-analysis of nausea and vomiting following maintenance of anaesthesia with propofol or inhalational agents

J. R. Sneyd, A. Carr, W. D. Byrom* and A. J. T. Bilski*

Department of Anaesthesia, Derriford Hospital, Derriford Road, Plymouth PL6 8DH, UK
** Zeneca Pharmaceuticals, Mereside, Alderley Park, Macclesfield, Cheshire, UK*

European Journal of Anaesthesiology 1998, 15, 433-5
70 trials (57 adult, 13 children)
4074 vomiting as end-point; 3516 nausea; 742 n and v

"3.5 and 5.7-fold reductions in vomiting in adults and children when propofol used "

PONV (ctd)

BJA 2002; 88(5):659-68 **Volatile anaesthetics may be the main cause of early but not delayed postoperative vomiting: a randomized controlled trial of factorial design C.C Apfel et al**

5 way factorial design (gender, type of surgery, anaesthetic maintenance, opiod use, antiemetic use)

1180 patients (593 children) elective ENT or strabismus surgery

Strongest risk factor for vomiting was use of volatile anaesthetics compared with propofol

(Odds ratio for Iso and Sevo were 3.4 and 2.8)

BJA 2002; Apfel et al (ctd)

Early post-op period (0-2 hrs) showed volatiles as also being the clear risk factor (40% PONV cw 10% PONV with propofol)

(Adjusted Odds ratios: Iso 19.8, Sevo 14.5)

Depends somewhat on degree of exposure

"Irrespective of volatile type this factor alone was *several orders of magnitude* stronger than all other factors (including antiemetics) in early post-op period"

Anesth Analg 2003; 97:62

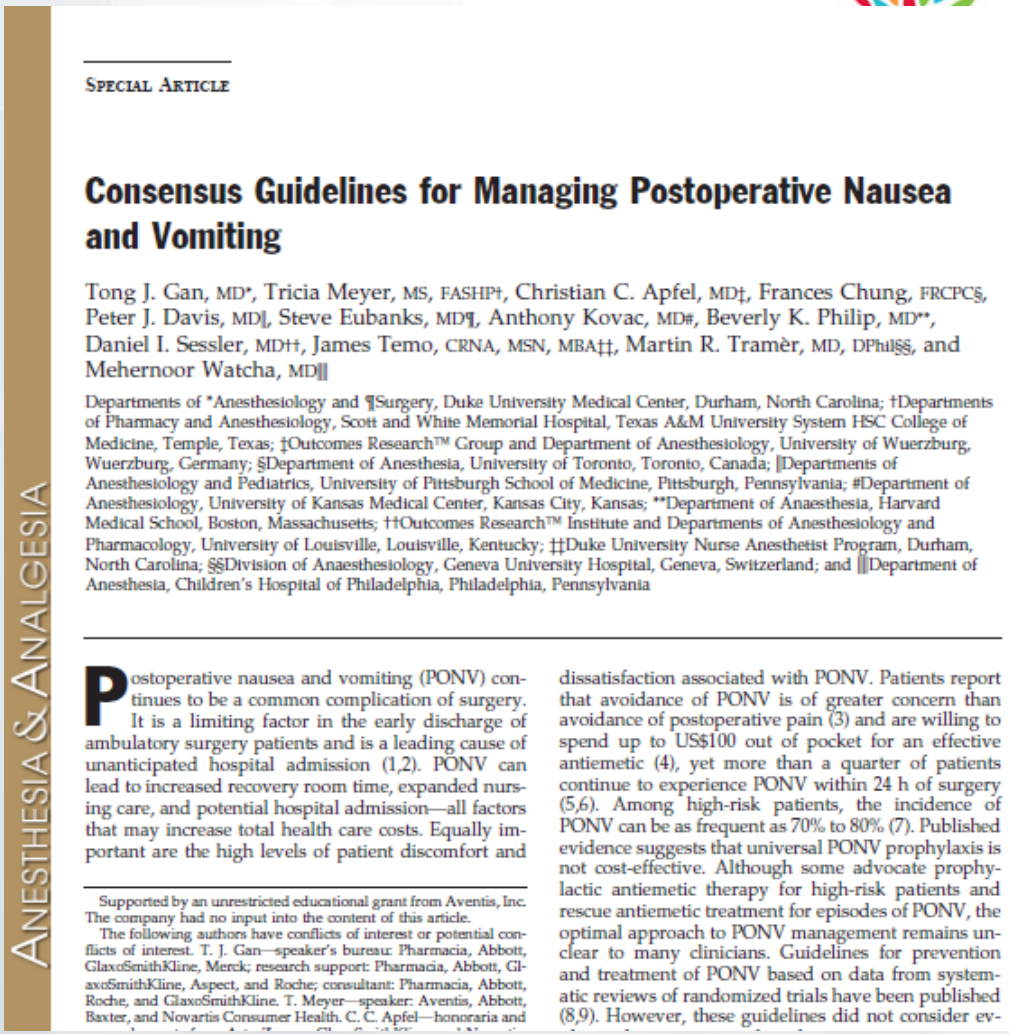
"PONV is debilitating, costly and prevalent"

2X incr vomiting in children

Adenotonsillectomy, squint repair, herniae, orchiopexy and penile surgery

Use of Propofol and avoiding volatiles was most efficacious measure (1A evidence)

Should we be extending the benefit to paediatric day-case?



ANESTHESIA & ANALGESIA

SPECIAL ARTICLE

Consensus Guidelines for Managing Postoperative Nausea and Vomiting

Tong J. Gan, MD*, Tricia Meyer, MS, FASHP†, Christian C. Apfel, MD‡, Frances Chung, FRCPC§, Peter J. Davis, MD‖, Steve Eubanks, MD¶, Anthony Kovac, MD#, Beverly K. Philip, MD**, Daniel I. Sessler, MD††, James Temo, CRNA, MSN, MBA‡‡, Martin R. Tramèr, MD, DPhil§§, and Mehernoor Watcha, MD‖‖

Departments of *Anesthesiology and ¶Surgery, Duke University Medical Center, Durham, North Carolina; †Departments of Pharmacy and Anesthesiology, Scott and White Memorial Hospital, Texas A&M University System HSC College of Medicine, Temple, Texas; ‡Outcomes Research™ Group and Department of Anesthesiology, University of Wuerzburg, Wuerzburg, Germany; §Department of Anesthesia, University of Toronto, Toronto, Canada; ‖Departments of Anesthesiology and Pediatrics, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania; #Department of Anesthesiology, University of Kansas Medical Center, Kansas City, Kansas; **Department of Anaesthesia, Harvard Medical School, Boston, Massachusetts; ††Outcomes Research™ Institute and Departments of Anesthesiology and Pharmacology, University of Louisville, Louisville, Kentucky; ‡‡Duke University Nurse Anesthetist Program, Durham, North Carolina; §§Division of Anaesthesiology, Geneva University Hospital, Geneva, Switzerland; and ‖‖Department of Anesthesia, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania

Postoperative nausea and vomiting (PONV) continues to be a common complication of surgery. It is a limiting factor in the early discharge of ambulatory surgery patients and is a leading cause of unanticipated hospital admission (1,2). PONV can lead to increased recovery room time, expanded nursing care, and potential hospital admission—all factors that may increase total health care costs. Equally important are the high levels of patient discomfort and dissatisfaction associated with PONV. Patients report that avoidance of PONV is of greater concern than avoidance of postoperative pain (3) and are willing to spend up to US$100 out of pocket for an effective antiemetic (4), yet more than a quarter of patients continue to experience PONV within 24 h of surgery (5,6). Among high-risk patients, the incidence of PONV can be as frequent as 70% to 80% (7). Published evidence suggests that universal PONV prophylaxis is not cost-effective. Although some advocate prophylactic antiemetic therapy for high-risk patients and rescue antiemetic treatment for episodes of PONV, the optimal approach to PONV management remains unclear to many clinicians. Guidelines for prevention and treatment of PONV based on data from systematic reviews of randomized trials have been published (8,9). However, these guidelines did not consider ev-

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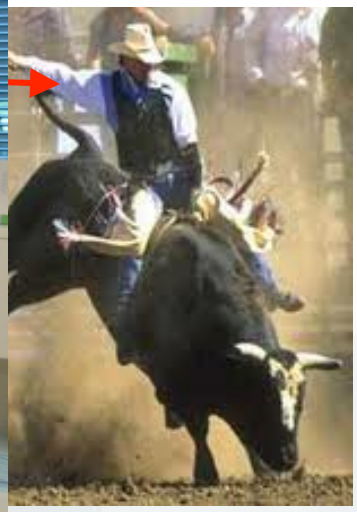
Benefits:
Post Anaesthesia Emergence Delirium (PAED)



6-60 % (depend
measured)

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Emergence Agitation After Sevoflurane Versus Propofol in Pediatric Patients

Shoichi Uezono, MD, Takahisa Goto, MD, Katsuo Terui, MD, Fumito Ichinose, MD, Yoshiki Ishguro, MD, Yoshinori Nakata, MD, MBA, and Shigeho Morita, MD

Department of Anesthesiology, Teikyo University and Ichihara Hospital, Chiba, Japan

ANESTHESIA & ANALGESIA

16 retinoblastoma kids
1-5 yo
All had Sevo induction
Randomised to Sevo or Propofol
Had alternate agent for next exam

Table 2. Recovery Characteristics

	Propofol	Sevoflurane
Time to extubation (min)	16 ± 7	13 ± 4
Time to eye opening (min)	32 ± 16	19 ± 8†
Duration of PACU stay (min)	43 ± 10	29 ± 6*
Time to first oral intake (min)	139 ± 71	167 ± 79
Total incidence of agitation (%)	0 (0)	6 (38)†
Duration		
≤5 min	0	2
5–10 min	0	3
≥10 min	0	1
Incidence of emesis (%)	0	2 (13)
Parent satisfaction score	5 (1)	4 (1.3)†

....good study but small numbers!

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Study design	Population	Premedication	Analgesia	EA incidence
Sevoflurane only				
Sevoflurane vs propofol induction/halothane maintenance[10]	322 children Age 3-12 y Day surgery or ENT surgery	None	Alfentanil, fentanyl, or regional blocks	Sevoflurane 25.7% Propofol/halothane 9.4%
Sevoflurane vs sevoflurane induction, isoflurane maintenance[6]	128 children Age 1-6 y Subumbilical surgery	None	Penile, caudal, or ilioinguinal/iliohypogastric block	Sevoflurane 51.8% Sevoflurane/isoflurane 32.1%
Sevoflurane only[21]	68 children Age 1-6 y Circumcision	Midazolam 0.5 mg/kg, or clonidine 2 or 4 µg/kg	Penile block and rectal paracetamol 30 mg/kg	Midazolam 60% Clonidine 2 µg/kg 40%, 4 µg/kg 25%
Total intravenous anesthesia (TIVA)				
Sevoflurane vs propofol TIVA[13]	53 children 2-36 mo Ambulatory surgery	None	Fentanyl 2 µg/kg or caudal block	Sevoflurane 23.1% Propofol 3.7%
Sevoflurane vs propofol TIVA[15]	186 children Age 2-11 y ENT surgery	None	Fentanyl 2 µg/kg	Sevoflurane 20%-42% Propofol 5%-11%
Sevoflurane vs propofol TIVA[16]	88 children Age 2-6 y MRI	None	None	Mean PAED scale score significantly lower for propofol group
Sevoflurane vs propofol TIVA[17]	50 children Age 3-10 y Tonsillectomy	None	Alfentanil 20 µg/kg, acetaminophen 20 mg/kg, or ibuprofen 10 mg/kg, and local infiltration of site	Sevoflurane 46% Propofol 9%
Sevoflurane vs propofol TIVA[9]	16 children Age 1-5 y Eye surgery	Midazolam 0.5 mg/kg PO	Acetaminophen 30 mg/kg prn	Sevoflurane 38% Propofol 0%
Propofol as adjunct to sevoflurane				
Propofol 1 mg/kg vs saline[5]	80 children Age 2-6 y Strabismus surgery	Midazolam 0.5 mg/kg PO	Paracetamol 15 mg/kg IV	Propofol 19.5% Saline 47.2%
Propofol 1mg/kg vs saline[14]	84 children Age 2-7 y MRI	None	Nitrous oxide	Propofol 4.8% Saline 26.8%

Table 3. Emergence Agitation (EA) Studies Divided by Anesthetic Technique With EA Incidence

ENT indicates ear, nose, and throat; PAED, Pediatric Anesthesia Emergence Delirium; MRI, magnetic resonance imaging; prn, as

AANA Journal Dec 2010 Vol 78, p471

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Benefits:
Laryngospasm/ Bronchospasm

THE LANCET

Risk assessment for respiratory complications in paediatric anaesthesia: a prospective cohort study

Britta S von Ungern-Sternberg, Krisztina Boda, Neil A Chambers, Claudia Rebmann, Chris Johnson, Peter D Sly, Walid Habre

Lancet 2010; 376; p773

Prospective multivariate analysis

9297 questionnaires

Anaesthesia maintenance: sevoflurane vs propofol				
Bronchospasm				
Sevoflurane	6221	123 (2%)	1·34 (0·83–2·16)	0·26
Propofol	1289	19 (1%)	1·00	..
Laryngospasm				
Sevoflurane	6221	251 (4%)	2·60 (1·66–4·08)§	..
Propofol	1289	20 (2%)	1·00	<0·0001¶

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Cost of anaesthetic

Fentanyl (100 mcg) 57¢
Dexamethasone (8mg) 88¢
Tramadol (100mg) 77¢
N.Saline (500ml) $1.27
IV Paracetamol (500 mg) $ 2.34
Remifentanil (1mg) $3.30
Granisetron (1 mg) $7.25
Clonidine (150 mcg) $9.20
Parecoxib (40 mg) $16.60
Isoflurane bottle (250 ml) $88
Sevoflurane bottle (250 ml) $142.50

Propofol (200mg) 77¢

Volatile consumption

Agent	MW	MAC % (Datex default for 3yr old pt)	Volume volatile / litre gas flow @ 1 MAC	Volume of 1ml of volatile at 20oC	portion of a ml of volatile per ltr FGF @ 1 MAC	Cost of bottle	Volume bottle	Cost per ml	Cost of 1 MAC in 1 l FGF per minute	Cost of 1 MAC for 1 hour
Sevoflurane	200	2.65	26	182	0.143	147	250	$0.59	$0.08	$5.04
Isoflurane	184.5	1.5	15	195	0.077	80	250	$0.32	$0.02	$1.48
Desflurane	168	7.8	78	208	0.375	235	240	$0.98	$0.37	$22.03

Volume of sevo at 8% per l FGF	Volume of 1ml of volatile at 20oC	portion of a ml of volatile per ltr FGF	Cost of bottle	Volume bottle	Cost per ml	Cost of 8% Sevo for litre FGF per minute	Cost of 8% Sevo per minute for 6l FGF
80	182	0.440	147	250	$0.59	$0.26	$1.55

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Taking TIVA outside RCH

Dr.Balvindar Kaur
Staff Anaesthetist

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Health for Humanity

The Royal Children's Hospital Melbourne

Surgical non profit mission working in the Obras Hospital, Antigua Guatemala

Performed over 180 surgeries in 10 days of operating

Over 50 palate and lip repairs with an average of 4-8 cases a day in 2

The Set Up and Recipe

SET UP

- Mostly IV inductions
- T-piece connected to patient
- 2mg/kg propofol, 10mcg/kg remifentanil
- Propofol/remi mixture of 10mg/ml; 2.5-5mcg/ml
- 250-300mcg/kg/min
- Spont vent on Ayre's T-piece circuit

ADVANTAGES

- Smooth wake up
- No need to rely on anaesthesia machine-old, adult ventilator
- Minimal airway irritation and no incidence of laryngospasm
- Preferred wake up by recovery staff who had limited paediatric exposure


Photos by Joe Delvicario


Photos by Joe Delvicari