NAP5
&
awareness in obstetrics

Nuala Lucas

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- MBRRACE assesor
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- Where are we now?

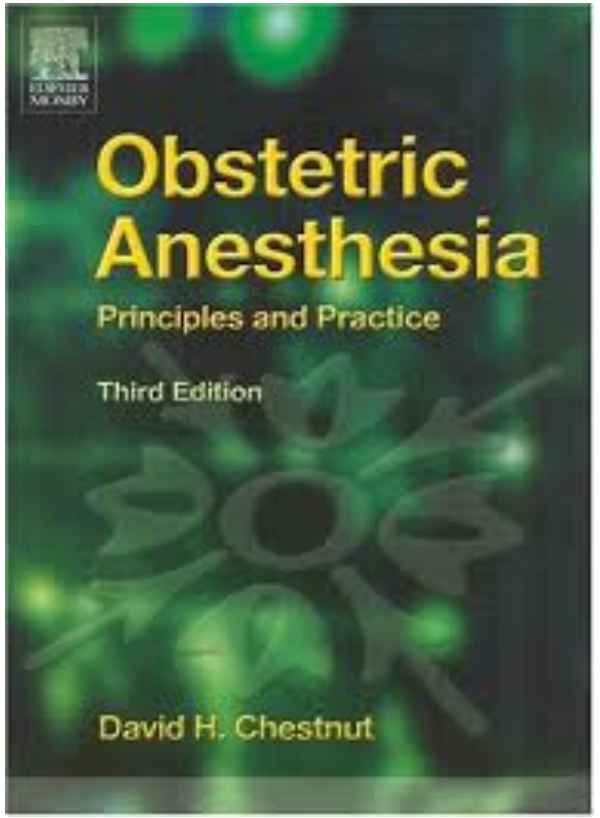
Fifth National Audit Project
of the Royal College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland

- NAP5

- Where do we go from here?

GA in obstetrics – where are we now?

- Pre-oxygenation
- Thio/suxamethonium
- Cricoid pressure/ETT
- 50:50 O_2/N_20 with volatile
- Opioid after delivery



The Obstetric GA

Brit. J. Anaesth. (1959), 31, 152

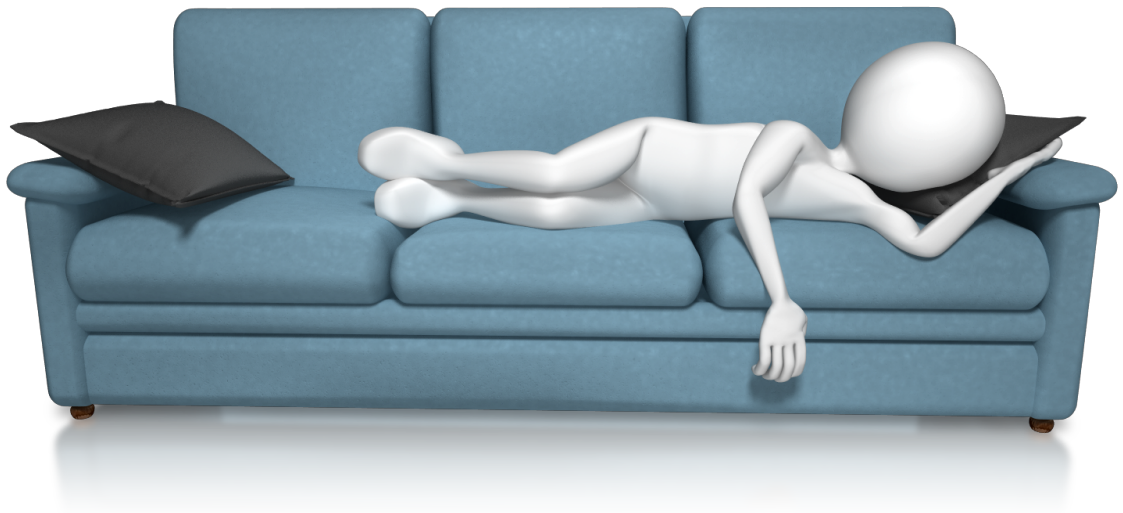
GENERAL ANAESTHESIA FOR OPERATIVE OBSTETRICS

With Special Reference to the use of Thiopentone and Suxamethonium

BY

R. J. HAMER HODGES, J. R. BENNETT,* M. E. TUNSTALL† AND R. F. KNIGHT

The Obstetric Unit, St. Mary's Hospital, Portsmouth



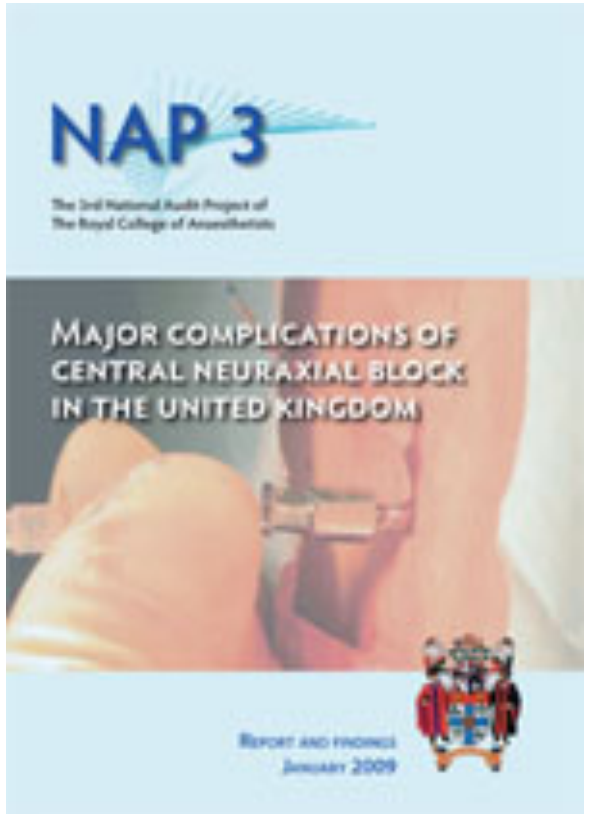
Rapid Induction/Intubation for Prevention of Gastric-Content Aspiration

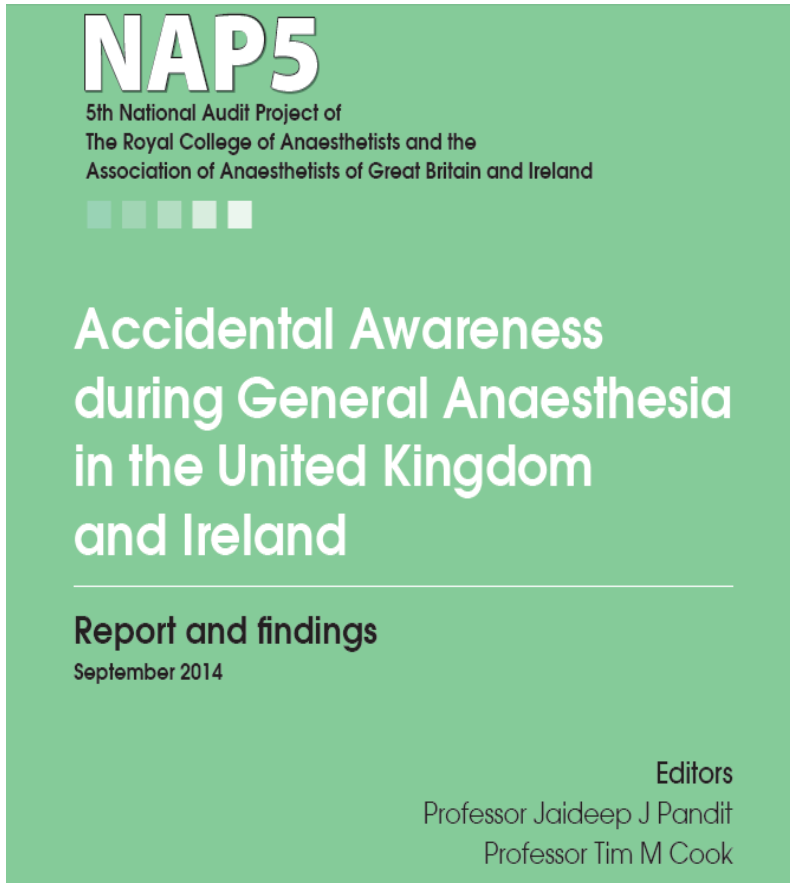
WILLIAM J. STEPT, M.D.

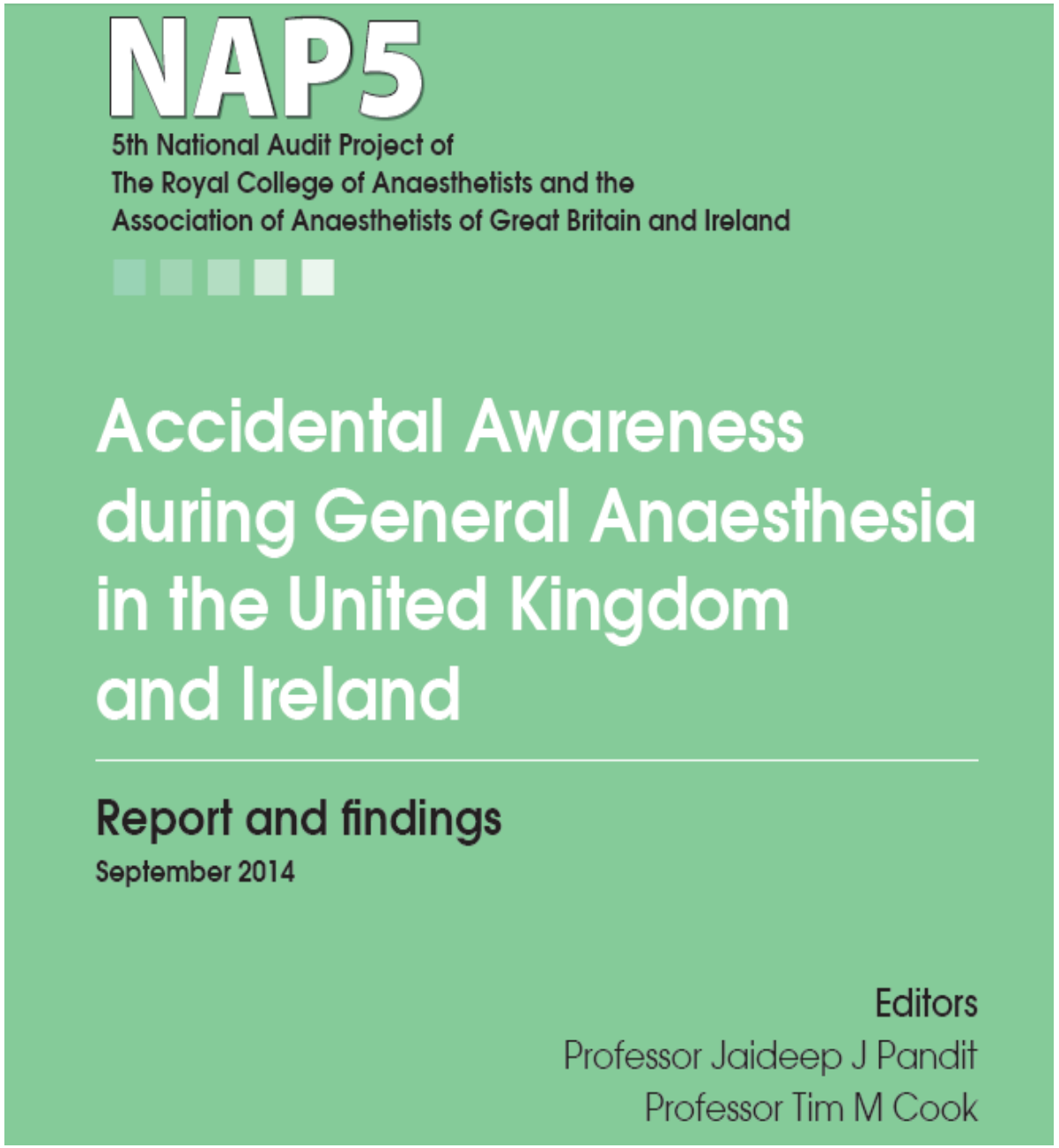
PETER SAFAR, M.D.

Pittsburgh, Pennsylvania*

National Audit Projects - UK







- 268 pages
- 64 recommendations!

NAP5

- Joint collaboration

- A year long national service evaluation of patient reports of Accidental Awareness during General Anaesthesia (AAGA) in the UK & Ireland

NAP5

<u>Why awareness?</u>

Many studies are old & precede 'modern anaesthesia'

- *newer drugs*
- *reduction in use of NMBA*
- *TIVA*
- *depth of anaesthesia monitors*

No large cohorts of 'aware patients'

- *most big studies 10-20 patients*

NAP5

- Aim

  To identify all *reports* of *AAGA* over one year and to learn as much as possible from those reports, both quantitatively and qualitatively.

  To look for themes and to learn from both reports of *AAGA* and actual *AAGA* events

NAP5

- Definition

> An *AAGA report* occurs when
>
> a patient[1], makes a new statement, report or complaint implying that awareness was experienced[2] while the patient was expected to be therapeutically unconscious

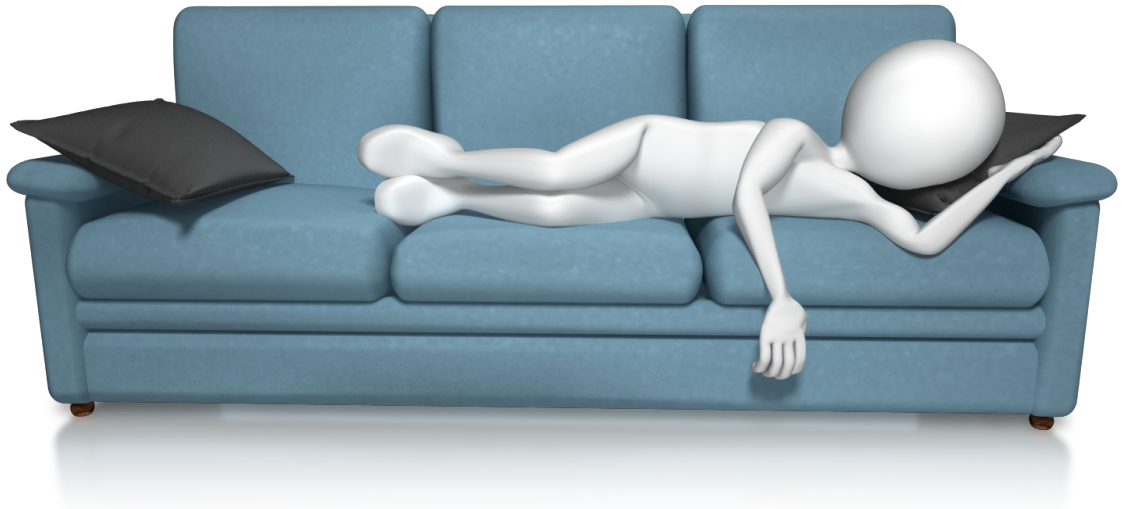
[1]or their carer or legal representative or a healthcare worker on their behalf

[2] this could range from an innocent passing comment to a member of staff, without concern on part of the patient, to a formal legal complaint or letter that is very specific in its description

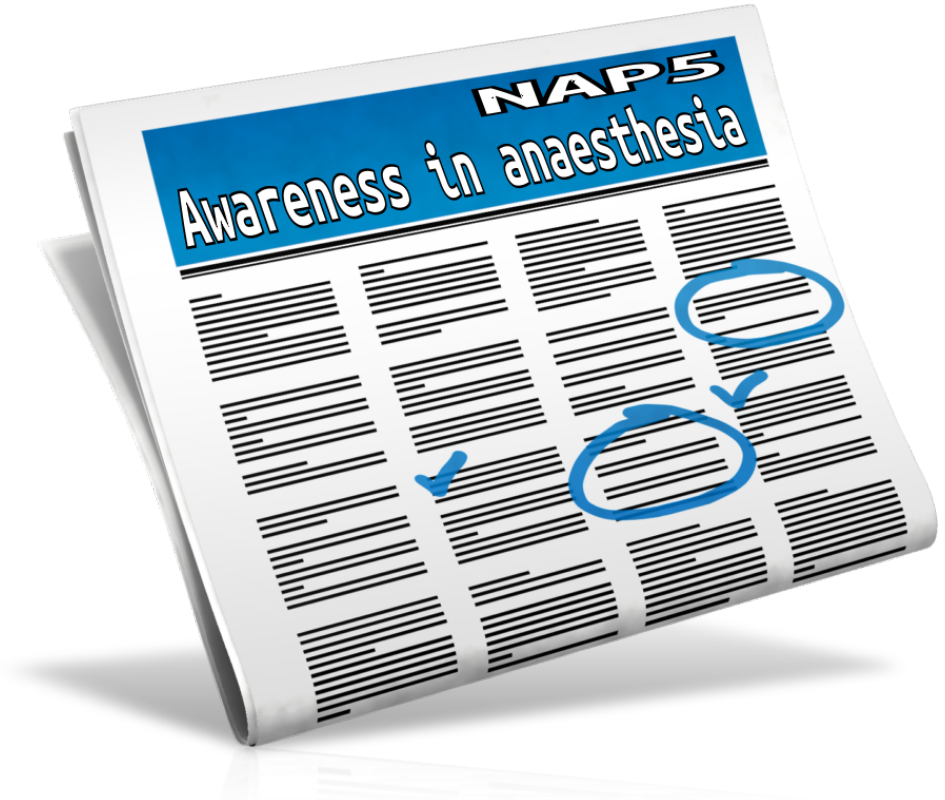
A warning!

300 reports

- 141 Prob/poss
- 7 drug error
- 7 ICU
- 32 sedation



- The estimated incidence of patient reports of *AAGA* was ~1:20,000 anaesthetics
- Considerable variation in incidence when subtypes of anaesthetic techniques or subspecialties were taken into account
  - *AAGA* when neuromuscular blockade was used was ~1:8,000
  - when no paralysis was involved this was ~1:136,000
- Incidence of reports from cardiothoracic anaesthesia ~1:8,600
- Incidence of reports of *AAGA* after *GA* CS section ~1:670



- Risk factors
  - Drug factors: neuromuscular blockade, thiopental, total intravenous anaesthesia techniques

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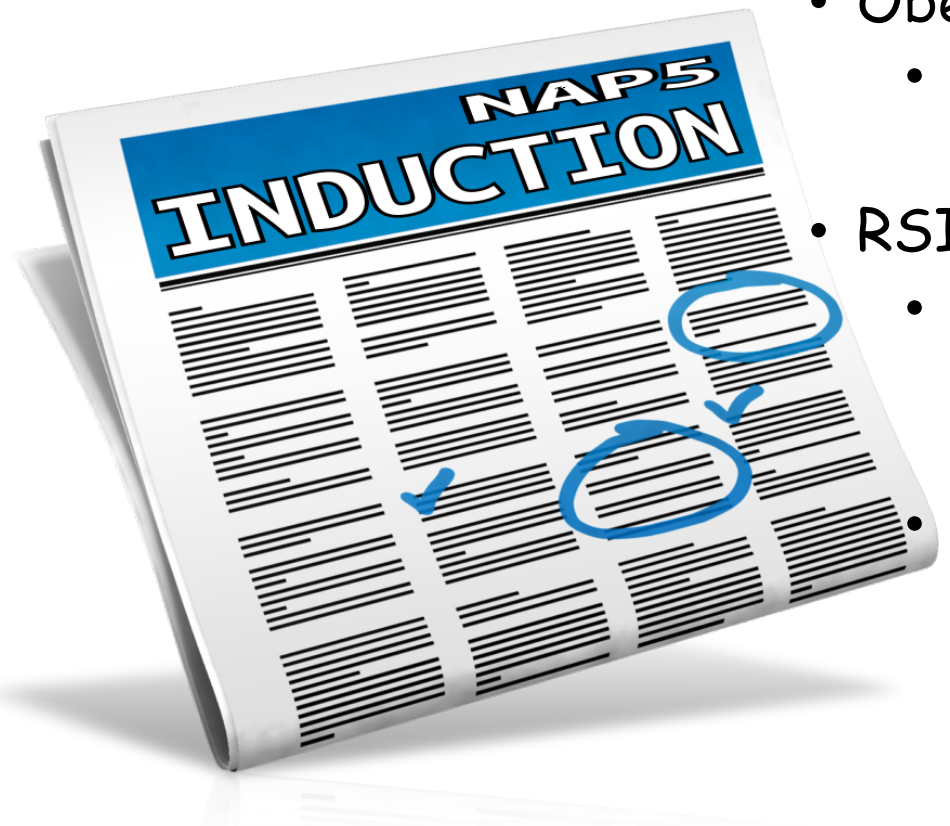
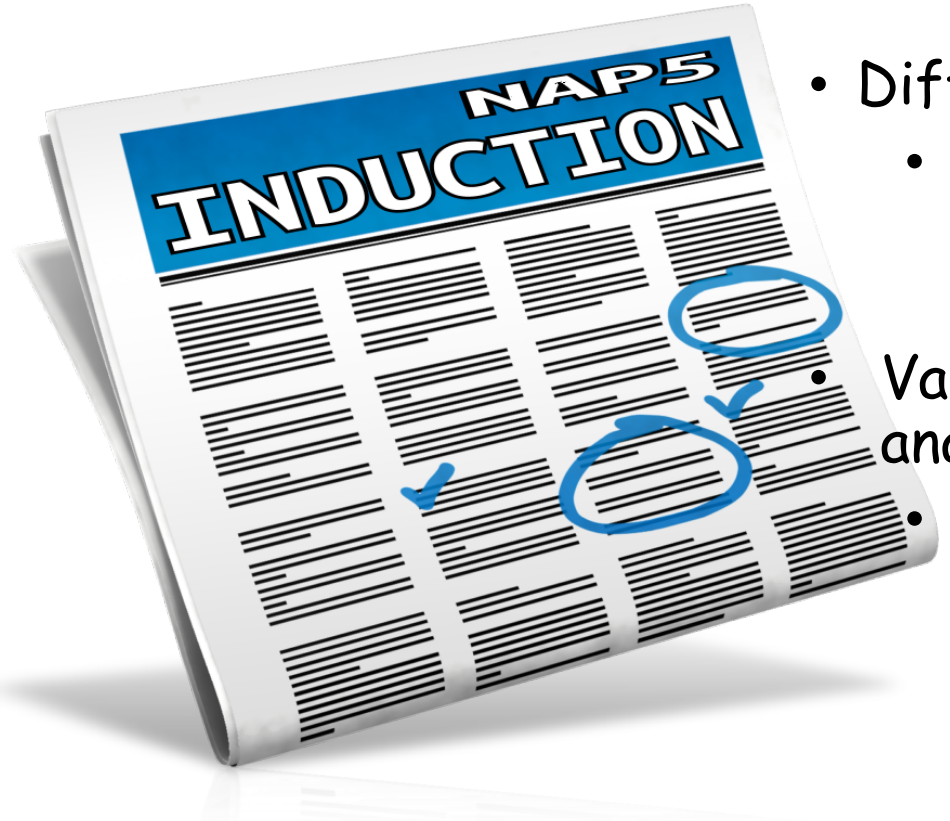
  - Subspecialties: obstetric, cardiac, thoracic, neurosurgical
  - Organisational factors: emergencies, out of hours operating, junior anaesthetists



- Obesity
  - As compared with the AS, there was an excess of obese patients in *AAGA* at induction
- RSI
  - High numbers of unmodified RSI cases reported to NAP5
  - Elements of RSI can predispose to *AAGA* 'classic' RSI = no co-administration of opioid & no scope for assessing that the prejudged dose of induction agent has been adequate



- Difficult airway management
  - 30% reports at induction occurred during protracted or 'difficult' airway management
- Vaporisers - prolonged 'gap' in administration of anaesthetic on transfer ('mind the gap')
  - 8% occurred as a consequence of failing to turn on the vaporiser

- Most were caused by problems that arose at induction or towards the end of anaesthesia, a 'gap', or too early cessation of anaesthetic
- Pain was more often experienced in this phase than at induction or emergence

- 74% there were elements of inadequate care identified
  - Errors with a vaporiser
  - **An intentionally (but inappropriately) low dose of anaesthesia**
  - **Inappropriately early cessation of anaesthesia**

A middle-aged very obese patient underwent urgent surgery at night. Induction was with fentanyl 100µg, thiopental 500mg and suxamethonium 100mg. There was unexpected difficulty with intubation and after repeated intubation attempts, during which no further drugs were administered, the case was abandoned and the patient awoken. The patient heard discussion about intubation difficulty, felt instruments in his mouth and was unable to move.

A young healthy patient underwent urgent abdominal surgery. While the senior trainee anaesthetist was waiting for the patient the theatre co-ordinator changed the vaporiser for a new 'trial vaporiser' without informing the anaesthetist. Meanwhile the anaesthetist was called to an emergency. On returning, anaesthesia was induced without a further machine check. Following uneventful induction a regional block was performed and the heart rate and blood pressure were observed to be elevated so more opioid was administered. At incision heart rate increased further and at this point the vaporiser was checked and found to be empty. Midazolam and propofol were immediately given to deepen anaesthesia and the vaporiser filled. The patient reported hearing voices, being unable to move and feeling someone "…cleaning their tummy and then a tube going in…" The patient received an offer of counselling.

- 20% of reports received by NAP5 occurred during emergence
  - 85% of these patients experienced distress of paralysis while awake
  - Panel judged 88% of cases as being potentially preventable with
    - appropriate use of a nerve stimulator
    - better communication
    - maintenance of anaesthesia until full reversal of neuromuscular blockade

- In a third of cases communication failure within the team highlighted poorly-judged selection, dose, or timing of NMB

NAP5 – drug errors

- 10% of reports to NAP5
  - NMB given without prior anaesthesia
  - subsequent psychological distress greater in this group than in any other class of reports
  - all were judged preventable

- *Major organisational & individual latent factors that made such events more likely*
  - similar looking ampoules
  - poorly organised operating lists
  - high workload, distraction and hurriedness

Recommendations - general

National

- Be aware
- Better training & education in TIVA
- Better training in DOA
- Nerve stimulators mandatory

Organisational

- Strategies to avoid drug errors
- Organisation & Planning of lists
- Anaesthesia checklist

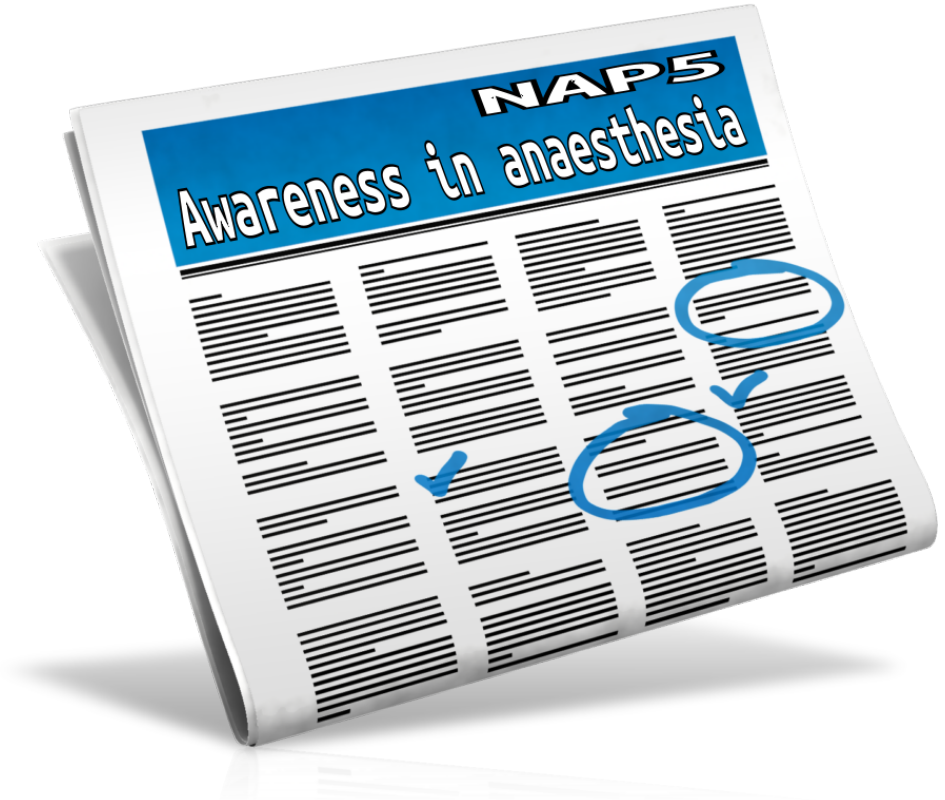
Personal

- Personal responsibility when AAGA occurs
- Caution with intentional underdosing at induction to avoid CVS instability
- Transferring an anaesthetised patient from AR theatre is a period of risk
- Recognise that residual paralysis at emergence is interpreted by patients as AAGA

ANAESTHETIC COMPONENTS OF THE WHO CHECKLIST: AC-WHO

- ☑ A: Airway
- ☑ B: Breathing
- ☑ C: Circulation
- ☑ D: Drugs
- ☑ E: Effective team

- **Airway**
  - Is the airway (anaesthetic) management plan clear?
  - Is the airway secure?
- **Breathing**
  - Is the circuit intact and connected?
  - Is the correct gas mix on (O_2 %)?
  - Is there adequate lung ventilation?
  - Is it suitably monitored?
- **Circulation**
  - Is the venous access appropriate and secure?
  - Is the circulation suitably monitored?
- **Drugs**
  - Is there suitable supply of anaesthetic?
  - Is it suitably monitored?
  - Are emergency, reserve and other drugs available?
- **Effective team**
  - Are suitably trained staff present and identified?
  - Has the management plan been communicated?



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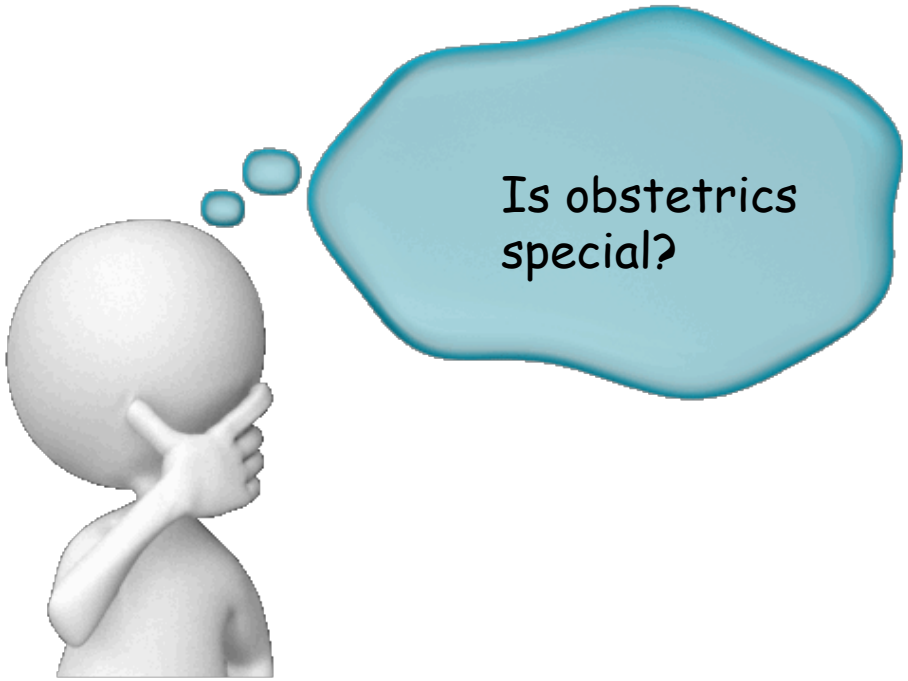
NAP5 – obstetrics

- 14 cases of awareness by obstetric patients (10%)
- Obstetrics accounted for 0.8% GA's given

	Activity Survey denominator	Modified HES denominator
Incidence of AAGA – all obstetric cases	1 in 1 200	1 in 1 640
Incidence of AAGA – Caesarean sections	1 in 670	1 in 900

NAP5 – obstetrics

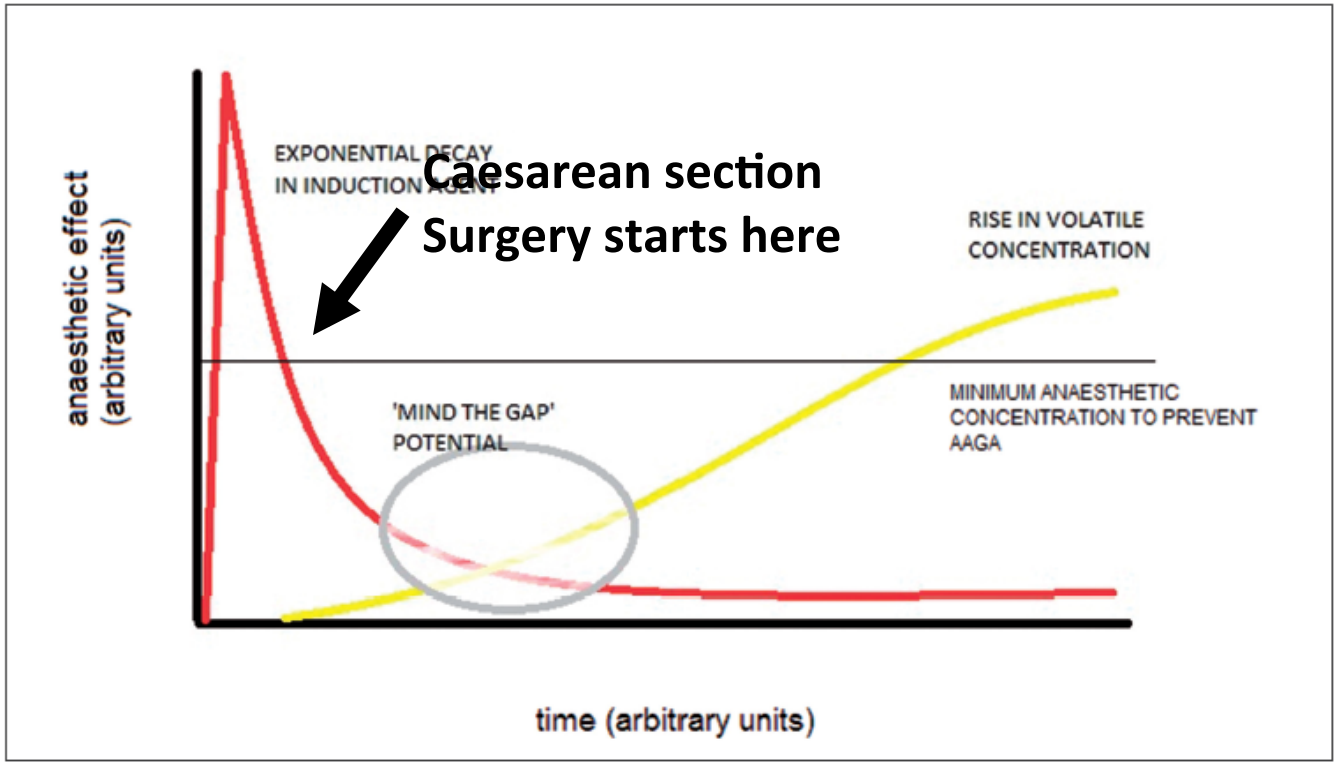


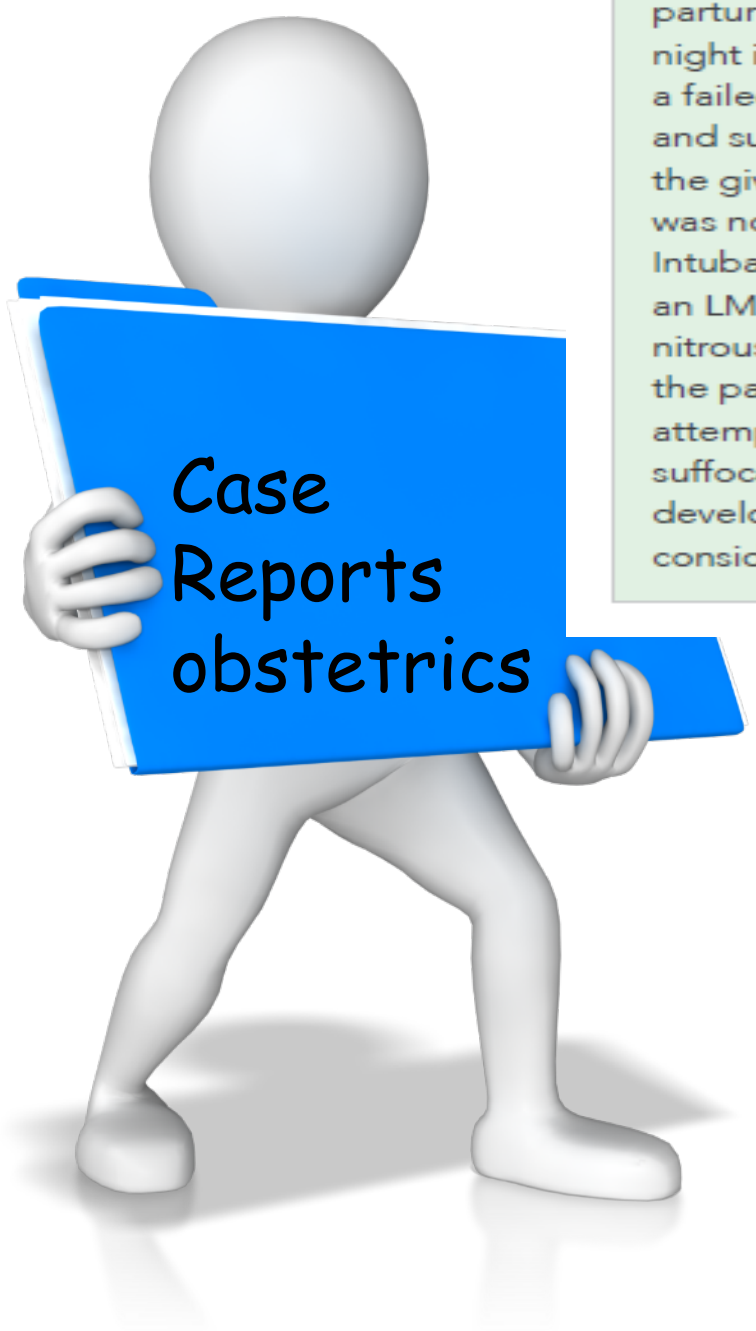
- In obs the time between reports of AAGA & incidence of AAGA appear less marked than in other areas of practice
  - ?Post-op follow-up of CS is more rigorous
- In majority of cases the patient reported the episode on the same or the next day

Features of AAGA in obstetrics

	Number	&age
Non-elective	11	79%
Airway difficult	5	36%
Obesity	4	29%
Low dose of thiopentone	7	50%
No nitrous	6	43%
No end tidal monitoring	4	29%

The obstetric 'gap'





A solo anaesthetist was asked to anaesthetise an obese parturient for a Category 1 Caesarean section, late at night in a unit remote from the main hospital. Following a failed spinal, anaesthesia was induced with thiopental and suxamethonium. The induction agents backtracked up the giving set despite the use of an anti-reflux valve. There was no one available to prepare more induction agent. Intubation was difficult with multiple attempts made. Finally an LMA was inserted and sevoflurane in 50% oxygen and nitrous oxide was used to maintain anaesthesia. On waking the patient was very distressed and reported feeling the attempts at intubation and a feeling of both paralysis and suffocation during bag-mask ventilation. She subsequently developed a new anxiety state following what she considered to be a near-death experience.

An unwell patient with pre-eclampsia considered severe enough to preclude neuraxial blockade was anaesthetised by a consultant for a category 2 Caesarean section out of hours. The anaesthetist had spent several hours pre-operatively stabilising the blood pressure with anti-hypertensives. The unit's protocol had recently changed to recommend antibiotic therapy before skin incision, so cefuroxime was drawn up ready for administration. For induction, the anaesthetist administered magnesium, fentanyl, rocuronium and in error, cefuroxime, instead of thiopental. After the cords were sprayed with lidocaine before intubation, the lack of hypnosis was noted. Thiopental 375mg was then given. The anaesthetist questioned the patient in recovery who recalled that she had been aware of the laryngoscope being inserted and wondered 'if she should have been asleep for this bit'. She was not worried by the experience as she trusted the clinicians who had been looking after her for several hours.

RECOMMENDATION 16.1

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GA IN OBSTETRICS = INCREASED RISK AAGA
Discuss as part of informed consent

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RECOMMENDATION 16.2

Consideration should be given to reducing the risk of AAGA in healthy parturients by (a) the use of increased doses of induction agents (b) rapidly
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CHANGES TO GA TECHNIQUE

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opoids (e) maintaining uterine tone with uterotonic agents to allow adequate concentrations of volatile agents to be used.

RECOMMENDATION 16.3

Before induction, the anaesthetist should have decided
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PLAN FOR MAINTENANCE OF ANAESTHESIA DURING AIRWAY DIFFICULTIES

RECOMMENDATION 16.4

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FAILED REGIONAL IS A RISK FACTOR FOR OTHER COMPLICATIONS

RECOMMENDATION 16.5

Anaesthetists should regard the presence of
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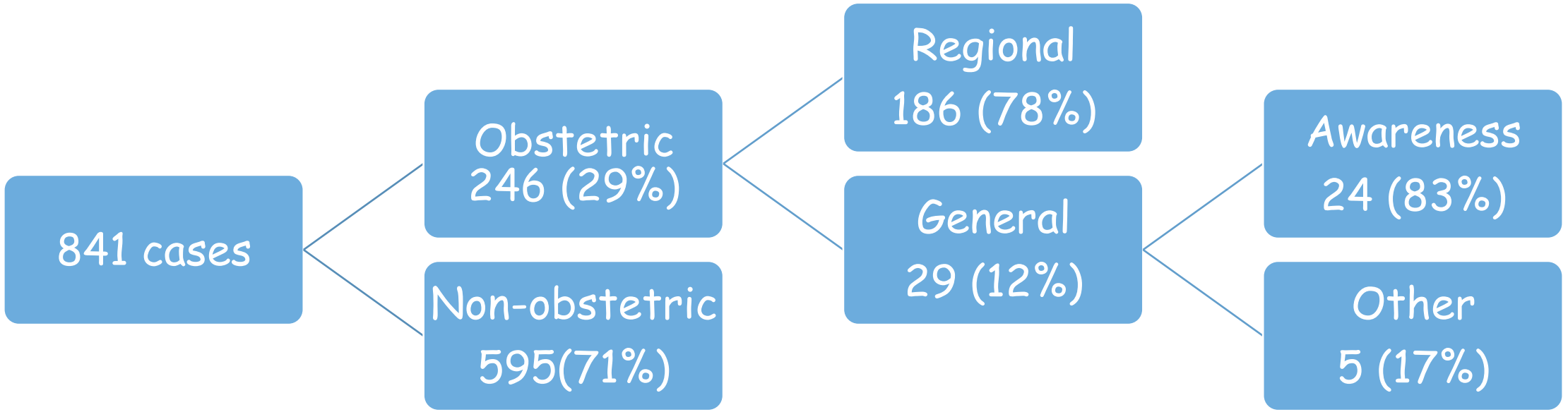
Using propofol for induction mitigates the risk of this drug error.

CAUTION WITH ANTIBIOTIC SYRINGES

General anaesthesia in obstetrics – where do we go from here?

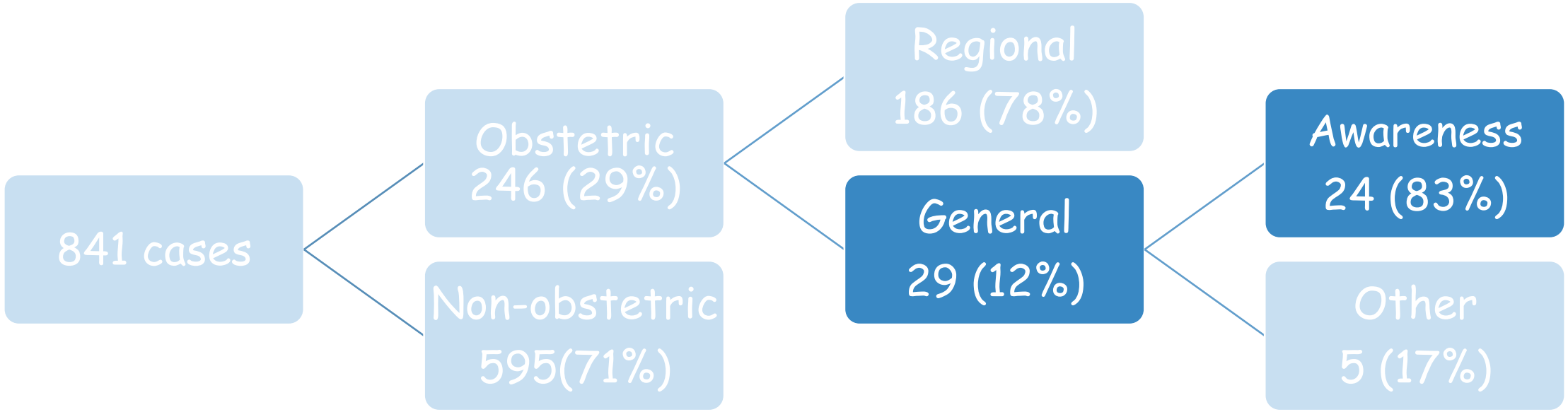
A cause for concern?



Ashpole, Anaesthesia 2010

A cause for concern?

Closed Claim Analysis 1995-2007



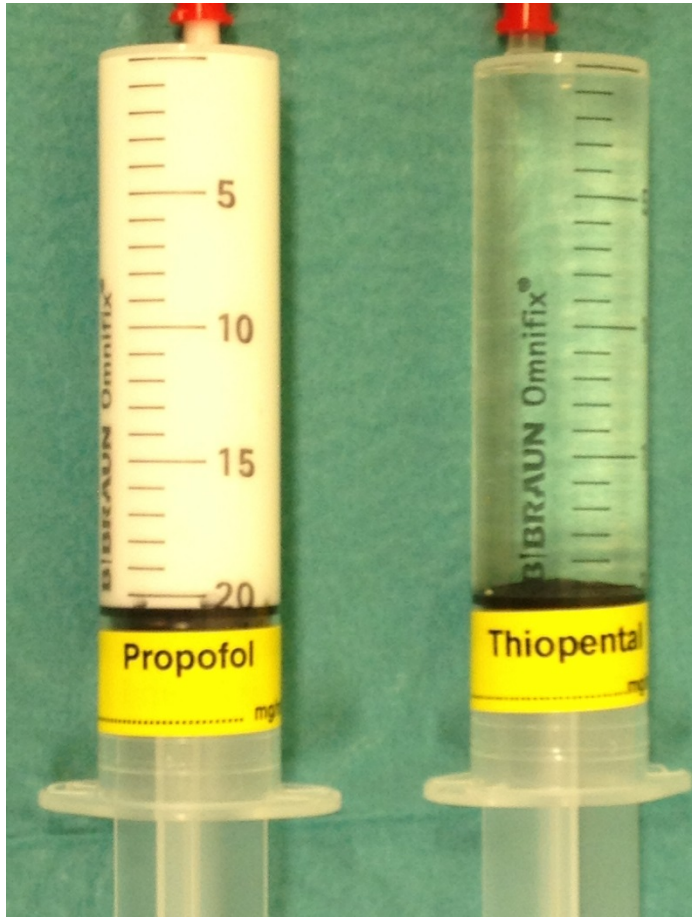
Ashpole, Anaesthesia 2010

The ideal induction agent for CS

Ensure anaesthesia

Minimise fetal depression

Propofol vs thiopentone



- Propofol arrived 1980's
- Now ubiquitous
  - Except obstetric anaesthesia

ORIGINAL ARTICLE

ELSEVIER

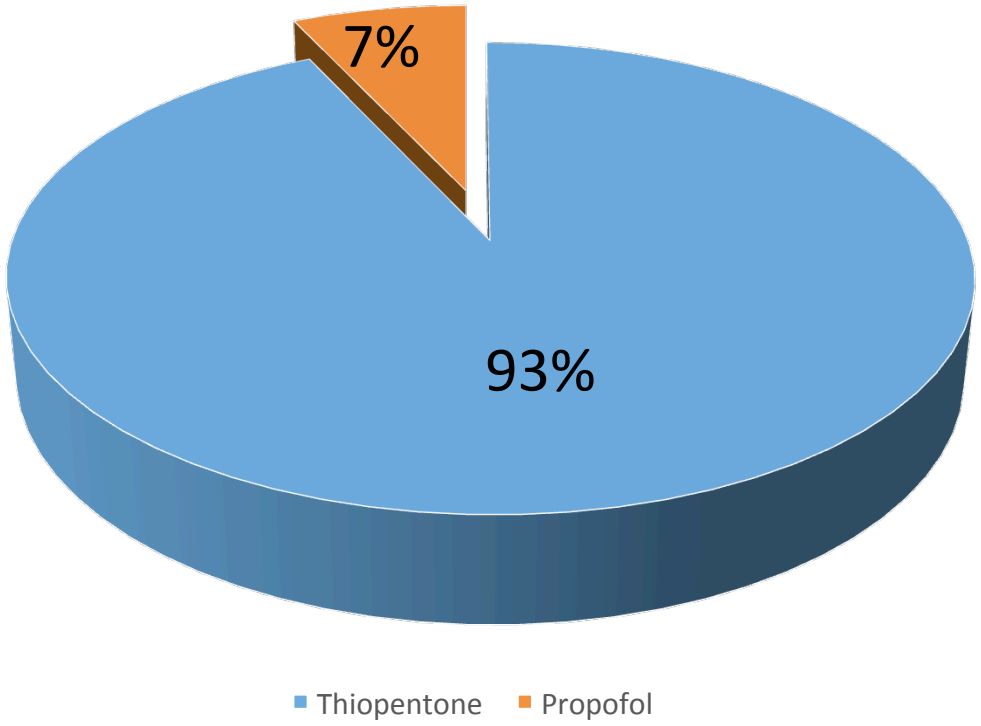
www.obstetanesthesia.com

Choice of anaesthetic agents for caesarean section: A UK survey of current practice

H. Murdoch,[a] M. Scrutton,[b] C.H. Laxton[a]

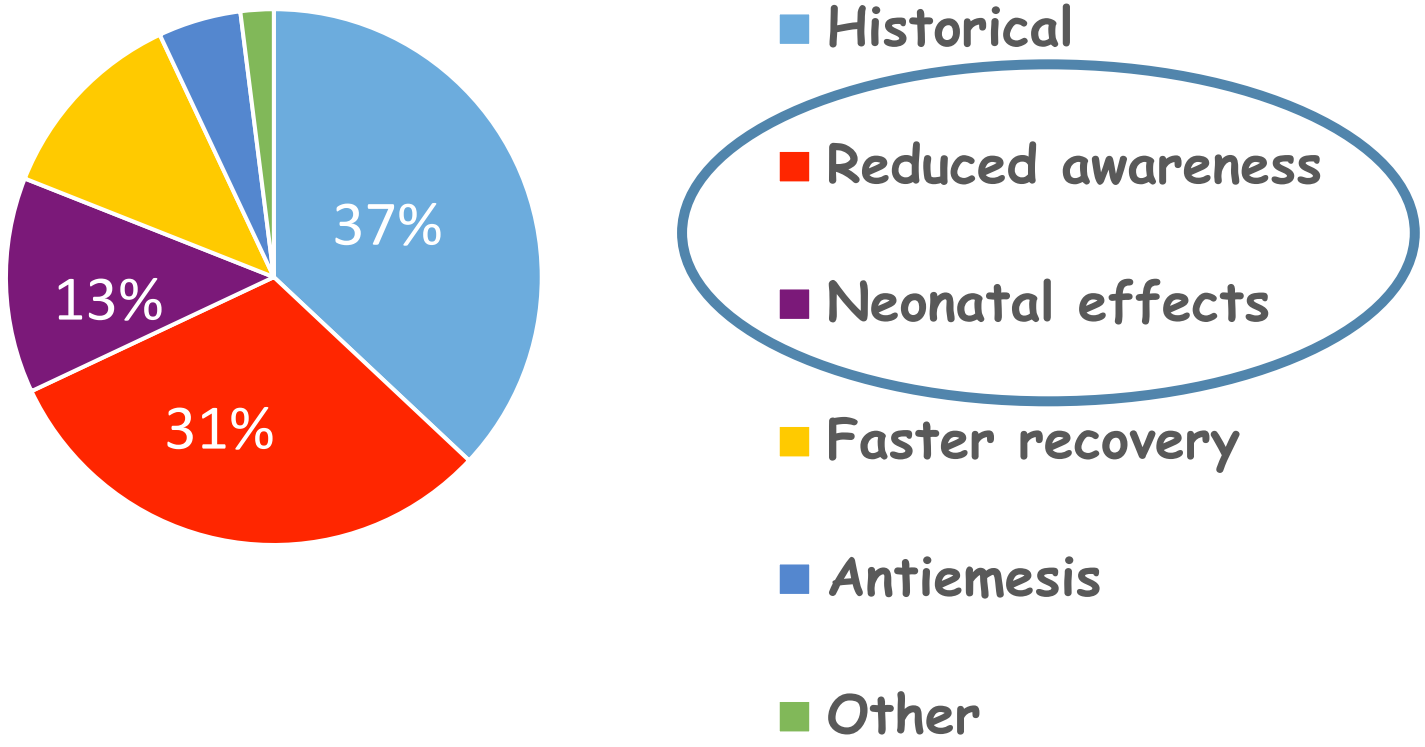
[a] *Department of Anaesthesia, Southmead Hospital,* [b] *Department of Anaesthesia, St. Michael's Hospital, Bristol, UK*

Choice of induction agent for GA in obstetrics



Why thiopentone?

Rationale for current induction choice



	Awareness	Neonatal effects
Celleno, BJA 1989	No difference	
Dailland, Anesthesiology 1989	⇧ with propofol	
Moore Anaesthesia 1989	?⇧ with thiopentone	
Valtonene Anaesthesia 1989	No difference	
Gregory Can J Anesth 1990	No difference	
Capogna IJOA 1991	No difference	
Yau Anaesthesia 1991	No difference	
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Gin BJA 1993	No difference	

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Rucklidge, IJOA 2013

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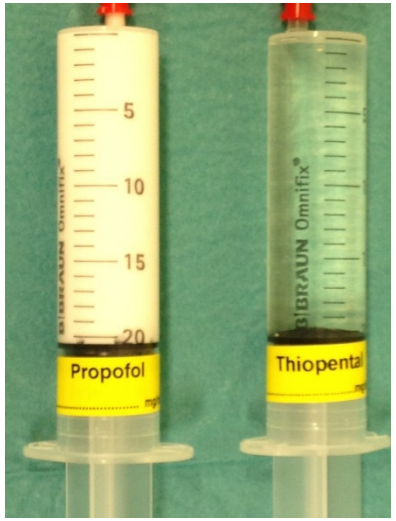
What about the pharmacokinetics?



Distribution half lives:
Thiopentone 3-5 minutes
Propofol 2-8 minutes

Anything else?

Anaesth Intensive Care 2004; 32: 28-30

Bispectral Index During Modified Rapid Sequence Induction Using Thiopentone or Propofol and Rocuronium

M. Y. SIE*, P. K. GOH†, L. CHAN‡, S. Y. ONG§
Department of Anaesthesiology, University Malaya Medical Centre, Kuala Lumpur, Malaysia

Compared BIS values in 40 patients after a modified rapid sequence induction using thiopentone 4 mg/kg or propofol 2 mg/kg with rocuronium 0.6 mg/kg as muscle relaxant.

Endotracheal intubation was performed at 60 seconds from induction of anaesthesia and BIS values were recorded for three minutes after induction

Results of BIS values recorded pre-induction and at 60, 90, 120, 150 and 180 seconds after induction

BIS reading	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Propofol					Number of patients					
T=0s										20
T=60s			3	7	9	1				
T=90s		1	1	8	5	3	2			
T=120s		1		10	7		2			
T=150s		1		11	3	3	2			
T=180s			3	5	6	2	4			
Thiopentone										
T=0s										20
T=60s		3	4	4	4	2	1	2		
T=90s		1	2	5	2	4	3	3		
T=120s				5	5		8	2		
T=150s			1	2	3	2	7	5		
T=180s				2	3	2	6	7		

Results of BIS values recorded pre-induction and at 60, 90, 120, 150 and 180 seconds after induction

BIS reading	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	
Propofol											
T=0s											20
T=60s											
T=90s											
T=120s											
T=150s											
T=180s											
Thiopentone											
T=0s											20
T=60s											
T=90s											
T=120s											
T=150s											
T=180s											

'The BIS scores we have measured suggest that thiopentone 4 mg/kg is more likely to be associated with lighter planes of anaesthesia and consequent risk of awareness than propofol 2 mg/kg, particularly if intubation is delayed or prolonged.'

Thiopental & MBRRACE

- 'In a number of deaths, comment was made on the seemingly excessive dose of thiopental (and occasionally, propofol) used as anaesthetic induction agents in severely ill women, for example with septic or haemorrhagic shock. This might represent poor recognition of women's critical status or perhaps a relative unfamiliarity of anaesthetists (especially trainees) with thiopental….'

Other problems

- Familiarity
- Licensing
- Supply
- Costs

Brit. J. Anaesth. (1959), 31, 152

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With Special Reference to the use of Thiopentone and Suxamethonium

BY

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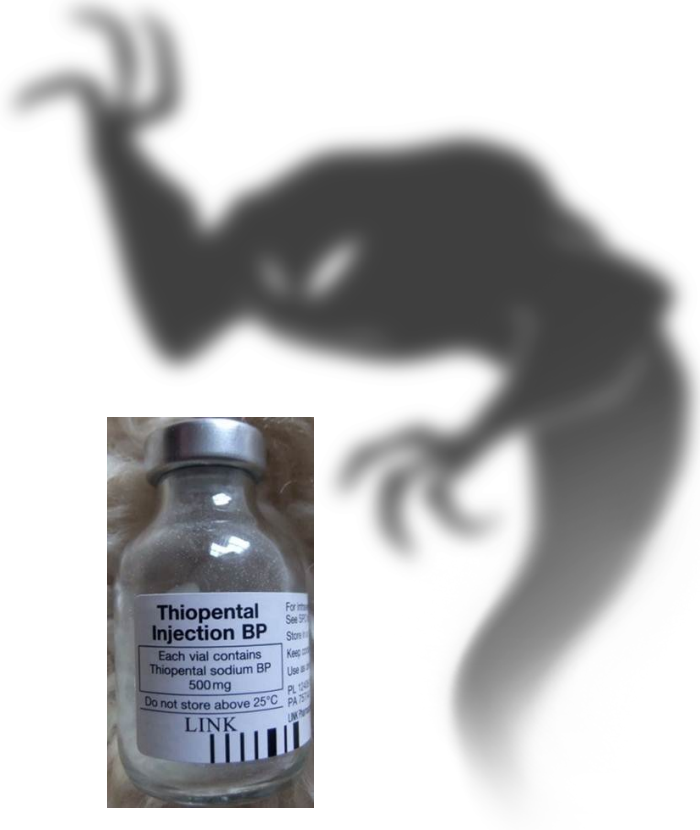
General anaesthesia in obstetrics – where do we go from here?

- Is it the end of the line for thiopentone?



General anaesthesia in obstetrics – where do we go from here?

- Time to update our technique
  - Muscle relaxant?
- Time to repeat research

& re-evaluate our approach to RSI?

Titrated dose vs precalculated bolus?

Suxamthonium vs rocuronium?


Tack

Survey on the adequacy of depth of anaesthesia with bispectral index and isolated forearm technique in elective Caesarean section under general anaesthesia with sevoflurane

F. Zand, S. M. R. Hadavi*, A. Chohedri and P. Sabetian

BJA 2014; 112:871-8

	Laryngoscopy	Intubation	Skin Incision
IFT Responses	41%	46%	23%

- BIS commonly <60
- No evidence of recall