

# NAP5 in Ireland



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## HEADLINE

24.1 The 5th National Audit Project (NAP5) received eleven reports of accidental awareness during general anaesthesia (AAGA) from Ireland. The smaller size of NAP5 in Ireland compared to the UK project, means that numerical analyses are associated with large confidence intervals. Notwithstanding this, the numerical analyses and thematic patterns in NAP5 in Ireland are remarkably similar to those in NAP5 in the UK. The Irish data, in addition to its own merit, provides some validation of the UK data.

## BACKGROUND

24.2 Through the involvement of the Association of Anaesthetists of Great Britain and Ireland, Ireland joined the United Kingdom for NAP5. Although there are some similarities with respect to content of training and a common language, the health service structure is very different in Ireland. There is therefore potential, to this limited extent, to assess variations in incidence or presentation and outcome of AAGA in different healthcare systems.

24.3 All 46 acute public hospitals in Ireland took part in the NAP5 project, and infrastructure were as that for the UK, as described in Chapter 5, Methods.

24.4 Approval in Ireland was received from the Department of Health, and the project was endorsed by the Health Service Executive (HSE) National Quality and Patient Safety Directorate. The requirement for ethical approval was waived.

24.5 The NAP5-Ireland baseline survey (Jonker et al., 2014) elicited eight new reports of AAGA in 2011. The estimated number of general anaesthetics in Ireland from an Irish Activity Survey (Jonker et al., 2014) was ~187,000, and this yielded an annual incidence of AAGA of ~1:23,000 general anaesthetics. Taking into account the (Poisson)

confidence intervals, this was comparable to the ~1:15,000 estimated during the UK Baseline survey (Pandit et al., 2013 a and b).

24.6 We are not aware of any previous studies of AAGA in Ireland.

## NAP5 CASE REVIEW AND NUMERICAL ANALYSIS

24.7 There were 11 cases of AAGA reported in Ireland: five in Class A (Certain/probable) and one in Class B (Possible), two cases involving drug errors (Class G), one case of Sedation (Class C) and two Statement Only cases.

24.8 Specific depth of anaesthesia monitoring was used in ~9% of general anaesthesia cases in the Activity Survey, but none was used in any of the AAGA reports in Ireland.

### Certain/probable and Possible (Class A and B) reports

24.9 Six reports were classed as Certain/probable or Possible AAGA. All but one (a report of possible AAGA in a child <5yrs) were reports from adults.

- 24.10 Two cases occurred during or soon after induction: one after a rapid sequence induction with thiopental for an elective Caesarean section (after failed attempts at neuraxial blockade), and the other due to failure to turn on the vaporiser to maintain anaesthesia after intravenous induction.
- 24.11 Four reports were of patient experiences of AAGA after surgery had commenced.
- 24.12 Neuromuscular blockade was administered to five of the six patients (83%). The patient that did not receive neuromuscular blockade was reported to have not moved during the procedure.
- 24.13 Three cases involved experiences of paralysis and distress (Michigan 4D), one pain and distress (Michigan 3D; a patient who received no NMB) and two of tactile perceptions (Michigan 2) of which one was with distress and another without.
- 24.14 None of the AAGA cases involved TIVA.
- 24.15 Human factors (as described in Chapter 23) contributed to AAGA in four of the Certain/probable and Possible cases. Reason's error-types (Reason 1995) are in parentheses for illustration.
- 'Mind the gap' errors – delayed or omitted maintenance drugs (routine and optimising violations).
  - Inadequate dosage of induction agents due to errors of judgement (situational violation).
  - Under-dosing during maintenance due to inattention or judgement errors with contributory factors of supervision and staff experience.

A patient undergoing an elective procedure, was intubated and ventilated, but the anaesthetic trainee forgot to turn on the inhalational agent. After some time the patient started bucking and the airway was suctioned during surgery before the trainee realised the mistake and turned on the volatile.

A patient underwent an urgent operation and later recalled having their eye examined, being paralysed, and being unable to communicate. The Local Co-ordinator suggested that a relatively low dose of propofol had been used for induction.

A patient undergoing an elective Caesarean section with general anaesthesia after a failed attempt at regional anaesthesia, reported she was aware of: something in her mouth, taping of eyes, draping and muffled voices. She was unable to move, her arms were strapped down, and she could not see.

A child described having pain during lumbar puncture and bone marrow aspiration, and was upset at the thought of having the procedure again on a subsequent visit by the same anaesthetist. The consultant was not present in the room at the time of procedure and cited the inexperience of the trainee in paediatric anaesthesia as a contributory cause.

### Class G reports: Drug Error

- 24.16 There were two reports of drug errors that resulted in reports of AAGA. Human factors were involved in both: an unwanted syringe of suxamethonium that had been left on the work surface by another anaesthetist in one, and distraction due to teaching of junior staff cited in another.
- 24.17 The theme of prompt communication with the patient to provide reassurance was evident.
- 24.18 In one case, a neuromuscular blocker was inadvertently administered instead of a non-steroidal anti-inflammatory via intravenous infusion. The anaesthetist noticed when the patient went to recovery, that the patient's breathing was irregular and that they could not follow commands. The anaesthetist concluded that the patient was accidentally given a neuromuscular blocker towards the end of surgery and stopped the infusion that was on-going at the time.
- 24.19 In both cases patients experienced paralysis and distress but had low, long-lasting sequelae (modified NPSA 1).

A patient was given suxamethonium in error (instead of fentanyl) for a procedure planned to be done under sedation. The anaesthetist immediately recognised the problem and reassured the patient, stating words to the effect "I know what has happened and I can fix it". The patient experienced paralysis and a fear of dying – in fact, of having had a stroke. The patient suffered flashbacks over the next couple of days, but overall psychological impact has been low. No formal support was needed and the patient was especially grateful for communication during the episode.

### Class C: Sedation

- 24.20 One patient stated that they 'woke up' briefly in the middle of surgery performed with regional anaesthesia and sedation. The patient felt anxious but settled after the anaesthetist explained that they shouldn't be unconscious. Communication was pointed out as main reason for the difference between the patient's expectation and the anaesthetic plan.

**Statement Only**

24.21 Two reports of AAGA were made without any documentation or further information. One report was 45 years after the incident and the patient still experienced fear of hospitals.

**Summary of incidences**

24.22 Table 24.1 illustrates the various incidences based on reports of AAGA that can be estimated, notwithstanding the very low overall numbers. Note that the upper limit of the Poisson confidence interval for  $n = 1$  is  $n = 5$ , so these incidences are, at worst, five times higher than those quoted. The upper limit of the confidence interval when  $n=5$  or 6 is  $n = 12$  or 13, so these respective incidences are at worst, approximately doubled. These incidences by themselves, based on very small numerators (and hence wide confidence limits), have limited value but comparison with the UK data has merit (Chapter 6, Results).

**DISCUSSION**

24.23 There were too few reports of AAGA in Ireland to examine detailed sub-correlations with age, sub-specialties, phase of anaesthesia, etc. to make firm recommendations.

24.24 Nonetheless, the six reports of Certain/probable or possible AAGA in Ireland yield an estimate for incidence of reports of AAGA that is comparable to the UK (see Chapter 6; Results).

24.25 The overall incidences in Table 24.1 above perhaps seem to suggest that AAGA is a little less common than in the UK, but the Poisson confidence intervals are much wider, making comparisons of unlikely statistical significance.

For example, the 95% upper confidence limit of Certain/probable and Possible AAGA is 1:14,400, very similar to the UK incidence of 1:19,600 (see Chapter 6, Results).

24.26 There are however, other possible reasons why the estimate of incidence of AAGA may be lower than in the UK:

- The Irish data includes only the public hospitals, but 39% of surgical cases are undertaken in the independent/private sector, a much higher proportion than in the UK (Jonker et al., 2014). If there is unequal distribution of AAGA reports across the public and private sectors, this might make the data in Table 24.1 under-estimates.
- All of the Irish AAGA reports were made to anaesthetists, and in contrast to the UK, none to other healthcare workers such as General

**Table 24.1.** Estimated 'incidences' for reported AAGA arising out of reports to NAP5 in Ireland. The first column shows the  $n$  from NAP5; the second column shows the relevant  $n$  from the Irish Activity Survey

	Irish Activity Survey estimate, $n$	Incidence	%
Incidence of AAGA of all types of reports to NAP5 ( $n=11$ )*	219,700	1: 20,000	0.005
Incidence of AAGA Certain/probable ( $n = 5$ )	187,000	1: 37,400	0.003
Incidence of AAGA Certain/probable or possible ( $n = 6$ )	187,000	1: 31,200	0.003
Incidence of AAGA when NMB used** ( $n = 5$ )	77,115	1: 15,500	0.006
Incidence of AAGA when no NMB used** ( $n = 1$ )	109,885	1:110,000	0.001
Incidence of AAGA reports that were during sedation by anaesthetists ( $n = 1$ )	32,700	1: 32,700	0.003
Incidence of AAGA with Caesarean section ( $n = 1$ )	17,400	1: 17,400	0.005
Incidence of AAGA in cardiothoracic anaesthesia ( $n = 1$ )	5,200	1: 5,200	0.020
Incidence of AAGA in paediatric anaesthesia ( $n = 1$ )	46,100	1: 46,100	0.002

\* includes all categories of AAGA

\*\* includes all Certain/probable and Possible cases, and cases of syringe swaps or drug error

Practitioners or psychiatrists/psychologists.  
This may indicate under-reporting in the Irish database.

- (c) It appears that use of TIVA (albeit non-TCI techniques) is associated with a higher incidence of reported AAGA (Chapter 18, TIVA). Only 2.3% of general anaesthetics in Ireland (Jonker et al., 2014) are conducted using TIVA, compared with 7.5% in the UK.
- (d) The use of specific pEEG based depth of anaesthesia (DOA) monitoring is three times as high in Ireland (7.7% of all general anaesthetics) as in the UK (2.9%). There were no cases of AAGA in the Irish data where DOAs had been used, and it could be argued that this is because their use was generally sufficiently high to be preventative.

24.27 However, many of the themes identified in UK NAP5 report were also present in the Irish cases, namely: rapid sequence induction, use of neuromuscular blockade and 'mind the gap' events.

24.28 In summary, the smaller number of general anaesthetics in the public sector in Ireland, coupled with the paucity of AAGA cases makes numerical analysis limited, but many similar themes are evident as in the UK and the numerical analyses are entirely consistent with UK findings, each providing a degree of validation.

## REFERENCES

Brice DD, Hetherington RR, Utting JE: A simple study of awareness and dreaming during anaesthesia. *British Journal of Anaesthesia* 1970; **42**:535–42.

Jonker WR, Hanumanthiah D, O'Sullivan EP, Cook TM and Pandit JJ. A national survey (NAP5-Ireland baseline) to estimate an annual incidence of accidental awareness during general anaesthesia in Ireland. *Anaesthesia* doi: 10.1111/anae.12776. [Epub ahead of print].

Jonker WR, Hanumanthiah D, Ryan T, , Cook TM and Pandit JJ, O'Sullivan EP. Who operates when, where and on whom? A survey of anaesthetic-surgical activity in the Republic of Ireland as denominator of NAP5. *Anaesthesia* doi: 10.1111/anae.12763. [Epub ahead of print].

Mashour GA, Kent C, Picton P, et al. Assessment of intraoperative awareness with explicit recall: a comparison of 2 methods. *Anesthesia & Analgesia* 2013; **116**:889–91.

Pandit JJ, Cook TM, Jonker WR, O'Sullivan E [2013a]. A national survey of anaesthetists (NAP5 Baseline) to estimate an annual incidence of accidental awareness during general anaesthesia in the UK. *Anaesthesia* 2013; **68**:343–53.

Pandit JJ, Cook TM, Jonker WR, O'Sullivan E [2013b]. A national survey of anaesthetists (NAP5 Baseline) to estimate an annual incidence of accidental awareness during general anaesthesia in the UK. *British Journal of Anaesthesia* 2013; **110**:501–509.

Reason J. Understanding adverse events: human factors. *Quality & Health Care* 1995; **4**:80–89.