CHAPTER
4

NAP5 Executive Summary and Recommendations

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INTRODUCTION

3.1 In a 2007 *British Medical Journal* poll, general anaesthesia was voted the third greatest advance in medicine (after sanitation and antibiotics; see www.bmj.com/content/334/7585/111.2. Before the discovery of general anaesthesia, submitting to surgery was greatly feared, so was often avoided; indeed much surgery was technically impossible. General anaesthesia changed that, facilitating unconsciousness during peak surgical stimulus, and comprehensively and safely, advancing surgery.

3.2 This NAP5 Report focuses on failure of general anaesthesia – that is when general anaesthesia is intended yet the patient remains conscious. Accidental awareness during general anaesthesia (AAGA) ranks high among concerns of both patients and anaesthetists. It is one of the most common concerns for patients to discuss before surgery, and both patients and anaesthetists rank it high in outcomes to avoid during anaesthesia, to the point that, after death, 'awareness with pain' is the outcome anaesthetists most wish to avoid.

3.3 The NAP5 study is, by a considerable margin, the largest ever study of the topic in the world. We believe its findings are robust as a result of its size (capturing data from every public hospital in the UK and Ireland) and depth (involving detailed prospectively acquired reports and multidisciplinary structured analysis of their content and themes). First and foremost, NAP5 is a report *for patients* as it is based entirely on patients' reports of their experiences. Yet our aim is also that it will have an impact on national, institutional and individual practice of anaesthesia, so that the incidence of AAGA can be significantly reduced, and where it occurs it can be recognised and managed in such a way as to mitigate any longer term effects on patients.

3.4 This Executive Summary can only scratch the surface of the details contained within the full Report and is intentionally brief. We hope those responsible for procuring or organising anaesthetic services will take serious note of its contents and recommendations.

OBJECTIVES OF NAP5

3.5 In many ways, NAP5, like the preceding National Audit Projects, aims simply to shine a bright light on the topic of AAGA and explore it in greater depth than has hitherto been possible. There was an expectation that at least the following might be explored:

- How many patients (in a defined national population) spontaneously report AAGA?
- How do these patients present: when, to whom and how?
- To what extent can risk factors be identified (including but not limited to those suggested in the literature)?
- What do patient stories tell us about patients' experiences and expectations soon after an episode of AAGA (and do these change with time)?
- Is specific depth of anaesthesia monitoring used and does it alter incidence of AAGA?

3.6 The overarching purpose of addressing these questions was:

- To develop strategies for prevention of AAGA.
- To identify an optimal process for managing cases of explicit awareness.
- To acquire further knowledge of AAGA that can be used by anaesthetists when informing patients and consenting for anaesthesia.

The main findings and recommendations are summarised below.

NAP5 METHODOLOGY

3.7 NAP5 is the 5th in a series of National Audit Projects, managed by the Royal College of Anaesthetists (RCoA), which study important complications of anaesthesia over a period of several years. The topic of AAGA was selected for NAP5 after an open call for proposals, peer review and shortlisting. For NAP5, the RCoA was joined by the Association of Anaesthetists of Great Britain and Ireland (AAGBI), meaning that for the first time the two largest organisations in the specialty in the UK worked together on such a project. The project has also, for the first time, expanded into Ireland with the support of the AAGBI and the College of Anaesthetists in Ireland. The project was endorsed by all four Chief Medical Officers.

3.8 A nationwide network of local co-ordinators across all the UK National Health Service hospitals (and separately in Ireland) anonymously reported all new patient reports of AAGA to a central secure on-line database over a calendar year. The database collected detailed information about the event, the anaesthetic and surgical techniques and any sequelae. These reports were then categorised by a multidisciplinary panel, using a formalised process of analysis. The main (mutually exclusive) categories included Certain/probable (Class A), Possible (B), Sedation (C), ICU (D), Unassessable (E), Unlikely (F), Drug Errors (G) and Statement Only (SO). The structured analysis also classified patient experience and sequelae. The large number of reports collected and analysed in this manner enabled a detailed and unique exploration of quantitative and qualitative themes within the dataset. The NAP5 methodology is proposed as an important means to assess new reports of AAGA in a standardised manner. Parallel censuses of UK and Irish anaesthetic activity enabled us to calculate the incidence of patient reports of AAGA overall (in each country separately), in various anaesthetic subspecialties and to determine risk factors for AAGA.

OVERVIEW OF NAP5 RESULTS

Reports

3.9 NAP5 received more than 400 contacts from individuals wishing to report cases of AAGA. Delay in reporting ranged from none to up to 62 years after the event. After sifting and exclusions 300 reports were reviewed in full: these included 141 Certain/probable or Possible cases of AAGA; 17 cases of awake paralysis due to drug error; 7 cases of AAGA in ICU and 32 reports of AAGA after sedation. The 141 Certain/probable and Possible reports were the basis of our most in-depth analysis. Other categories were analysed separately.

Incidence

3.10 The estimated incidence of patient reports of AAGA was ~1:19,000 anaesthetics. However, this incidence varied considerably in different settings. The incidence was ~1:8,000 when neuromuscular blockade was used and ~1:136,000 without it. Two high risk surgical specialties were cardiothoracic anaesthesia (1:8,600) and Caesarean section (~1:670).

Psychological experiences of AAGA

3.11 There was a wide range of patient experiences (from the trivial to something akin to feelings of torture) and a wide range of psychological consequences (from none to life-changing). Most reports were short in duration, the vast majority lasting <5 minutes. While almost half the reports described recall in a neutral way, focussing on a few isolated aspects of the experience, the other half experienced distress at the time of the experience. In some cases, distress was overwhelming and described in terms of dying. Distress was particularly likely when patients experienced paralysis.

Longer-term psychological effects

3.12 Longer-term psychological effects were identified in approximately half of patients reporting AAGA. Overall, 41% of patients reporting AAGA experienced moderate or severe longer term sequelae. The experience most strongly associated with subsequent psychological sequelae was distress at the time of the event. This in turn was strongly associated with a sensation of paralysis. The majority of patients reporting paralysis developed moderate or severe longer term sequelae. Conversely, understanding what was happening, or what had happened, seemed to mitigate immediate and longer-term psychological distress.

3.13 Cases of early reassurance during an episode of AAGA, or of early support, were often followed by good outcomes. In a minority of cases denial of events by clinicians or unsympathetic early management was seen, and this was associated with psychological sequelae. Active early support may offer the best prospect of mitigating the impact of AAGA, and a structured pathway to achieve this is proposed.

Phase of anaesthesia

3.14 In contrast to previous case reports and series, NAP5 identified almost two-thirds of AAGA experiences arising in the dynamic phases of anaesthesia (induction and emergence).

Induction

3.15 Induction accounted for half of all reports. Half of these involved urgent or emergency anaesthesia. Contributory factors included the use of thiopental, rapid-sequence induction, obesity, neuromuscular blockade, difficulties with airway management, and interruption in anaesthetic delivery when transferring the patient from anaesthetic room to theatre (termed the 'gap'). Despite often brief patient experiences in this phase, distress was common. Simple changes in practice and a checklist to prevent interruption of anaesthetic delivery would eliminate many of these events.

3.16 We recommend the use of an 'anaesthetic checklist' (easily integrated with the World Health Organisation Safer Surgery checklist) to be used after transfer of the patient, to prevent incidents of AAGA arising from human error, monitoring problems, circuit disconnections and other 'gaps' in delivery of anaesthetic agent.

Maintenance

3.17 This accounted for one-third of reports, though many were caused by problems that arose at induction or towards the end of anaesthesia (e.g. a 'gap', or too early cessation of anaesthetic). Pain was more often experienced in this phase than at induction or emergence. In 25% of maintenance cases, no cause could be determined, and in this group resistance to anaesthetic drugs is a plausible explanation.

Emergence

3.18 Almost a fifth of the reports occurred at emergence. In almost all cases patients experienced residual paralysis and found this distressing. This was commonly caused by poor management of neuromuscular blockade combined with failure to ensure full return of motor capacity before turning off anaesthetic agents. Failure to use a nerve stimulator was judged causal or contributory in half of the reports. Improved knowledge of drug action and better monitoring of neuromuscular function would likely eliminate the majority of such events.

Risk factors

3.19 Risk factors were determined by comparing distributions in the reported cases with distributions in the NAP5 national census of anaesthetic activity (Activity Survey). The following were identified:

- Drug factors: neuromuscular blockade, thiopental, total intravenous anaesthesia techniques.
- Patient factors: female gender, age (younger adults but not children); obesity, previous AAGA and possibly difficult airway management.
- Subspecialties: obstetric, cardiac, thoracic, neurosurgical.
- Organisational factors: emergencies, out of hours operating, junior anaesthetists.

3.20 The following were not risk factors for AAGA: ASA physical status, race, nitrous oxide.

Total intravenous anaesthesia (TIVA)

3.21 AAGA was approximately twice as likely during TIVA as during volatile anaesthesia, but this 'headline figure' hides important detail. TIVA in the operating theatre was usually administered by target controlled infusion (TCI), but this was rare outside theatres. In-theatre failure to deliver the intended dose of propofol (disconnection, tissued drip, etc) was an important cause of AAGA. Many AAGA cases during TIVA involved use of non-TCI techniques (e.g. manual infusions, fixed rate infusions, intermittent boluses). High risk situations were conversion of a volatile anaesthetic to TIVA and transfer of paralysed patients outside theatres; inadequate dosing using non-TCI regimens was common. Three quarters of cases were considered preventable. All anaesthetists are likely to need to use TIVA, particularly in sites/circumstances when a volatile cannot be administered, and need to be skilled in its administration: these results suggest that is not currently the case.

Neuromuscular blockade (NMB)

3.22 Use of neuromuscular blockade was a highly significant risk factor for AAGA, and its use was associated with sensations of paralysis and distress, and those in turn with longer term psychological sequelae. Fewer than half of UK general anaesthetics include an NMB but 93% of reports to NAP5 concerned patients who had received an NMB.

3.23 The cases of 'AAGA' reported to NAP5 were overwhelmingly cases of unintended awareness in patients who were unable to move because of the effects of a neuromuscular blocking drug but who had received inadequate anaesthetic agent to produce loss of consciousness. It is worth reconsidering the problem of AAGA as one of 'unintended awareness during neuromuscular blockade'.

Depth of anaesthesia monitoring

3.24 Specific depth of anaesthesia (DOA) monitors are rarely used during general anaesthesia in UK practice (processed EEG in 2.8% of general anaesthetics and isolated forearm technique in 0.03%). Although DOA monitoring was over-represented in the AAGA cases (4.3%), it appears to be used in a 'targeted fashion': in the Activity Survey DOA monitoring was used in ~1% of cases of volatile without NMB and in ~23% of cases with TIVA and NMB. Only one report of AAGA in association with DOA monitoring was followed by adverse psychological sequelae. The overall findings are supportive of the use of DOA monitoring during TIVA with NMB (including cases where TIVA is used for transfer).

3.25 End-tidal anaesthetic gas monitoring is an alternative to DOA monitoring, but in ~75% of reports to NAP5 it would likely have been impractical or ineffective at preventing AAGA.

Obstetric anaesthesia

3.26 Obstetric cases account for 0.8% of general anaesthetics in the NAP5 Activity Survey but ~10% of NAP5 reports of AAGA, making it the most markedly over-represented of all surgical specialties. Almost all reports occurred after Caesarean section and at induction or early during surgery. Obstetric general anaesthesia includes most of the risk factors for AAGA including use of thiopental, rapid sequence induction, neuromuscular blockade, in a population with a relatively high incidence of obesity and difficult airway management, and high rates of emergency surgery. Surgery starting almost immediately after induction of anaesthesia requires special care to avoid AAGA. There was some evidence that obstetric patients more readily report AAGA when it occurs than in those other settings and this merits further investigation.

Cardiothoracic anaesthesia

3.27 The incidence of reports of AAGA after cardiothoracic anaesthesia was higher than for other specialties at 1 in 8,600. Most reports involved either brief interruption of drug delivery (caused by human error or technical problems), or use of intentionally low anaesthetic doses in high risk patients. These specialties should continue to be considered higher risk for AAGA.

Paediatric anaesthesia

3.28 The incidence of reports of AAGA in children in NAP5 is significantly lower than the previously reported incidence in prospective studies which used a Brice-type questionnaire (~1:60,000 versus ~1:135 respectively). Reports of AAGA in children were often delayed for many years until adulthood. These may be received earlier by parents but not transmitted further, though the reasons for this are unclear. Serious long term psychological harm and anxiety states are rare, but do occur after AAGA in children. Children should be believed and treated sympathetically.

Intensive Care (ICU)

3.29 A small number of cases of AAGA were reported during intended general anaesthesia in critically ill patients in ICU. Themes included underestimating anaesthetic requirements in sick, obtunded or hypotensive patients. Problems also arose when low dose propofol infusions were used to maintain anaesthesia for procedures or transfers. All patients were paralysed during their AAGA and experienced distress or psychological harm. Most cases were judged to be preventable.

Drug error

3.30 Cases of brief awake paralysis as a result of drug errors accounted for approximately 10% of reports to NAP5. These led to a neuromuscular blocking drug being administered without prior anaesthesia. The types of experiences and the consequences for the patient are indistinguishable from AAGA. It is notable that the distress during the patient experiences and the subsequent psychological distress were greater in this group than in any other class of reports: all were judged preventable.

3.31 These cases were rich in organisational and individual latent factors that made such events more likely. These included ill considered policies for drug management, similar looking ampoules, poorly organised operating lists, high workload, distraction and hurriedness. Prevention of such events requires action from national organisations (e.g. to improve drug labelling and packaging), organisations (e.g. to ensure safe management of operating lists) and individuals (e.g. to develop

clear personal strategies for drug preparation – particularly neuromuscular blockers).

'AAGA' and sedation

3.32 Approximately 20% of reports of AAGA to NAP5 followed intended sedation rather than general anaesthesia. The rate of 'reports of AAGA' following sedation by anaesthetists (~1:15,000) appears to be as high as after general anaesthesia. In reports of AAGA after sedation, the experiences and the psychological sequelae were similar in nature, though perhaps less in severity than AAGA after general anaesthesia. Reports of AAGA after sedation represent a failure of communication between anaesthetist and patient and should be readily reduced or eliminated by improved communication, management of expectations and consent processes.

Consent

3.33 NAP5 has implications for obtaining informed consent for anaesthesia and sedation. Pre-operative consent for anaesthesia was rarely documented and AAGA rarely discussed. The data from NAP5 provide a wealth of information about the nature of AAGA, the relative risk of different types of anaesthesia, and its consequences. Anaesthetists can use this data to inform their approach to consent. Whether anaesthetists wish to use incidences from NAP5 or elsewhere in the literature to describe the risk of AAGA is a professional decision, and is discussed in depth in the Report.

3.34 Pre-operative information should include details about AAGA risk and potential experiences. For sedation, consent should clearly distinguish sedation from general anaesthesia, and should indicate that amnesia is more a side effect than an aim of sedation and therefore is not guaranteed.

Medicolegal issues

3.35 Only a small minority of reports of AAGA to NAP5 were associated with a complaint (~10%) or initiation of litigation (~5%), though because of delayed claims this may be an underestimate. However, in only 22% of reports were judged to have received 'wholly good' care both during and after anaesthesia. In 78% of cases where intra-operative care was considered less than good, the AAGA was judged preventable, indicating considerable potential for litigation.

3.36 Anaesthetists defending a claim will rely on a careful record of rational and justifiable conduct. The NAP5 methodology provides a template, which might usefully inform the investigation of claims or serious incidents related to AAGA.

Human Factors (HF)

3.37 NAP5 identified Human Factor contributors in the majority of reports of AAGA, even though the NAP process is not well suited to robust analysis of such factors. Preventing awareness by addressing human factors goes beyond simply examining the final 'action error' that leads to relative under-dosing of drugs, and should consider the many latent factors that impact on this. This is particularly so for AAGA caused by drug errors.

NAP5 in Ireland

3.38 NAP5 ran as a linked but parallel project in Ireland. The number and type of reports of AAGA in Ireland has remarkable similarities to the UK. The Irish experience, in a country with different organisation of public and private healthcare and notable differences in the adoption of DOA monitoring, is a useful comparison to the UK. The outputs of NAP5 in Ireland and their similarity both numerically and qualitatively to the outputs from the UK can be seen as a form of validation of the UK project.

RECOMMENDATIONS

Recommendations appear at the end of most of the chapters in this Report. Below they are re-ordered to provide guidance broadly at national, institutional and personal level (acknowledging there is overlap of these responsibilities and a need for co-ordinated action to achieve them).

NATIONAL

Recommendation 1

The relevant anaesthetic organisations should work with the NHS and other public bodies to develop an ongoing database of AAGA reports (using processes similar to those of NAP5) to encourage the process of learning from events, and as an essential basis for further investigation of research questions emanating from NAP5.

Recommendation 2

The relevant anaesthetic organisations should consider including nerve stimulators as 'essential' in monitoring guidelines whenever neuromuscular blocking drugs are used.

Recommendation 3

The relevant anaesthetic organisations should engage with industry to seek solutions to the problem of similar drug packaging and presentation.

Recommendation 4
All anaesthetists should be trained in the maintenance of anaesthesia with intravenous infusions.

Recommendation 5
The relevant anaesthetic organisations should establish a set of standards and recommendations for best practice in the use of TIVA.

Recommendation 6
Anaesthetists should be familiar with the principles, use and interpretation of specific depth of anaesthesia monitoring techniques (i.e. the available EEG-based monitors and the isolated forearm technique). Relevant anaesthetic organisations should include this monitoring in their core training programs.

Recommendation 7
In regard to monitoring depth of anaesthesia, the relevant anaesthetic organisations should develop pragmatic protocols or algorithms for the use of all available information about depth of anaesthesia (including information from pEEG monitors) to guide anaesthetic dosing.

INSTITUTIONAL

Recommendation 8
All reports of AAGA should be treated seriously, even when sparse or delayed, as they may have, or have had, serious psychological impact. If reported to someone else, every attempt should be made to refer the case to the anaesthetist responsible.

Recommendation 9
Healthcare or managerial staff receiving a report of AAGA should (a) inform the anaesthetist who provided the care; (b) institute the NAP5 Awareness Support Pathway (or similar system) to provide patient follow up and support. Anaesthetic departments should have a policy to manage reports of AAGA, and a named professional should be assigned to manage each case.

Recommendation 10
Anaesthetists and organisations should ensure that operating lists are planned in an objective manner that explicitly includes adequate time to ensure safe conduct of anaesthesia, and that will reduce pressures and scope for distractions.

Recommendation 11
Hospitals should take ampoule appearance into account to avoid multiple drugs of similar appearance. Hospital policies should direct how this risk is managed. This may require sourcing from different suppliers.

Recommendation 12
An anaesthetic checklist should be conducted before the start of surgery to confirm (amongst other things) delivery of adequate anaesthesia. This might usefully be incorporated into the WHO checklist.

Recommendation 13
The surgical team should formally confirm with the anaesthetist that it is appropriate to start surgery, before doing so.

Recommendation 14
Patients should be provided with information about risks of anaesthesia and this should include risks of AAGA (which can be written information provided before anaesthesia).

Recommendation 15
Patients should be informed of the possibility of brief experience of paralysis, especially where neuromuscular blockade is used, on induction and emergence. Although desirable to avoid these symptoms, a warning would prepare the patient for a relatively common experience in the context of AAGA.

Recommendation 16
There should be documentation that the risks and benefits of the anaesthetic technique have been discussed, including appropriate information about the risk of AAGA. Pre-operative written material may be an efficient way to achieve this.

Recommendation 17
All reports of AAGA should be carefully assessed mapping details of the patient report against the conduct of anaesthetic care, using a process like that outlined in NAP5.

Recommendation 18
All anaesthetists should be educated in human factors so they can understand their potential impact on patient care and how environments, equipment and systems of work might impact on the risk of, amongst other things, AAGA.

Recommendation 19
Investigation of and responses to episodes of AAGA – especially those involving drug error – should consider not only action errors but also the broader threats and latent factors that made such an event more or less likely.

PERSONAL

Recommendation 20
If AAGA is suspected intra- or peri-operatively, anaesthetists should speak to patients at the time of AAGA to reassure them that they know of their predicament and are doing something about it.

Recommendation 21
Conversation and behaviour in theatres should remain professional, especially where there is a situation where or concern, that AAGA is a risk (e.g. RSI, prolonged intubation, transfer). Adverse impact of any recall may be mitigated where the patient is reassured by memories of high quality care.

Recommendation 22
The anaesthetist who provided the anaesthesia care at the time of a report of AAGA should respond promptly and sympathetically to the patient, to help mitigate adverse impacts.

Recommendation 23
Standard induction doses for intravenous agents should be used as a reference in dosing. Deviating greatly from these requires justification and where appropriate, explanation to the patient.

Recommendation 24
During routine induction, loss of consciousness after induction should be verified by loss of response to verbal command and simple airway manipulation (e.g. jaw thrust) before undertaking further anaesthetic interventions, including the administration of neuromuscular blocking drugs.

Recommendation 25
Formal airway assessment is a mandatory component of anaesthesia. If a difficult airway is anticipated, a clear management strategy must be communicated to anaesthesia assistants and to the surgical team. A patient with a difficult airway must also be considered to be at higher risk of AAGA at the time of induction, and (unless it is planned to secure the airway awake or sedated) this risk should generally be communicated to the patient as part of the process of consent.

Recommendation 26
When airway management difficulties become prolonged the anaesthetist should decide whether to awaken the patient or to continue to try to secure the airway; if the latter, general anaesthesia must be continued. This is more logically done by administration of an intravenous agent.

Recommendation 27
Anaesthetists should exercise caution when using thiopental for RSI. This caution should include appreciation of the need to have additional doses of induction agent for possibly prolonged airway management.

Recommendation 28
Obesity should be considered a risk factor for AAGA at induction, especially if RSI is planned. Care is required to ensure adequate but not excessive dosing.

Recommendation 29
Intentional underdosing of anaesthetic drugs at induction to avoid cardiovascular instability is appropriate in some circumstances, but the risk of AAGA should be considered and where it is unavoidable:

(a) The higher risk of AAGA should be communicated to the patient.
(b) Invasive monitoring should be considered to allow accurate early use of vasopressor drugs to enable adequate doses of anaesthetic agents to be administered safely.
(c) Specific depth of anaesthesia monitoring should be considered.

Recommendation 30
Anaesthetists should regard transferring an anaesthetised patient from anaesthetic room to theatre (and by logical extension all patient transfers) as a period of risk for AAGA. There are several interventions that can mitigate this risk; among these is the use of a suitable checklist as proposed by NAP5.

Recommendation 31
If AAGA is suspected during maintenance, then prompt attention should be paid to increasing analgesia, as well as deepening the level of unconsciousness. As recommended elsewhere, verbal reassurance should be given to the patient during this time.

Recommendation 32
Anaesthetists should exercise great caution in interpreting the outputs of pEEG- based depth of anaesthesia monitoring as indicating adequate anaesthesia, in the face of unexpectedly low administered anaesthetic concentrations.

Recommendation 33
In addition to communication throughout surgery, there should be formal confirmation from the surgeon to the anaesthetist and other theatre staff that surgery has finished. This point should be at the actual completion of all interventional procedures (including dressings, post-surgical examinations, etc) and could be usefully linked to the sign-out section of the WHO checklist.

Recommendation 34
Anaesthetists should recognise that residual paralysis at emergence is interpreted by patients as AAGA. When recognised, it should be managed using the same Recommendations in this Report as apply to AAGA arising in other phases of anaesthesia, with the same level of psychological support.

Recommendation 35
When planning an awake extubation, this should be explained to the patient as part of the consent process, including the possibility of recall of the tube in the airway and difficulty in moving or breathing at this time.

Recommendation 36
The nerve stimulator should be used to establish motor capacity. An adequate response to nerve stimulation (e.g. return of a 'train of four' ratio of >0.9, or other suitable measures) is a minimum criterion of motor capacity. Anaesthetists should use additional signs such as spontaneous breathing and motor response to command before full motor capacity is judged restored.

Recommendation 37
All patients who have less than full motor capacity as a result of pharmacological neuromuscular blockade should remain anaesthetised.

Recommendation 38
Anaesthetists should regard an 'awake extubation' (as stressed in the DAS Extubation Guidelines) as an undertaking in a patient who primarily has full motor capacity, and secondarily is co-operative to command. Being 'awake' alone does not fulfil any safe conditions for tracheal extubation.

Recommendation 39
The possibility of pseudocholinesterase deficiency should be considered whenever using mivacurium or suxamethonium. Where suspected, anaesthesia should be maintained until full recovery from neuromuscular blockade is confirmed. Genetic testing should be arranged.

Recommendation 40
During emergence, speaking to patients to explain what is happening provides important reassurance about potentially unusual sensations such as tracheal intubation or partial paralysis.

Recommendation 41
Given the potentially serious consequences of paralysis unopposed by general anaesthesia even for brief periods, anaesthetists should plan the use of neuromuscular blockade very carefully assessing whether it is needed at all, and if so then whether needed throughout surgery, and to what depth of blockade.

Recommendation 42
Care should be exercised in the handling of syringes of neuromuscular blocking drugs prepared 'in case' of need: inadvertent administration may have catastrophic results.

Recommendation 43
If neuromuscular blockade is planned, then anaesthetists should ensure consent and explanation outlines the possibility of feeling weak or unable to move, for example at the start or end of the anaesthetic.

Recommendation 44
Anaesthetists should develop clear personal strategies in the preparation of drugs that minimise or avoid scope for drug error. This includes the recognition that preparation of drugs for use is a potentially high-risk activity, during which distractions should be avoided. This applies particularly to neuromuscular blocking drugs.

Recommendation 45
Where a drug error leading to accidental paralysis has occurred, then at all times, verbal reassurance to the patient should be provided, explaining that the team knows what has happened, that any paralysis is self-limiting and that the patient is safe. Then the first priority is to induce anaesthesia promptly. It is difficult to conceive of any justification for keeping a paralysed patient conscious. The next priority is to reverse the paralysis as soon as is practicable.

Recommendation 46
Anaesthetists should regard obstetric patients, particularly those undergoing caesarean section, as being at increased risk for AAGA. This risk should be communicated appropriately to patients as part of the consent process.

Recommendation 47
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 attaining adequate end-tidal volatile levels after induction without delay.
(c) Use of nitrous oxide in adequate concentrations.
(d) Appropriate use of opiates.
(e) Maintaining uterine tone with uterotonic agents to allow adequate concentrations of volatile agents to be used.

Recommendation 48
Before induction of the obstetric patient, the anaesthetist should have decided what steps to take if airway management proves difficult, with maternal wellbeing being the paramount consideration, notwithstanding the presence of fetal compromise. An additional syringe of intravenous hypnotic agent should be immediately available to maintain anaesthesia in the event of airway difficulties, when it is in the mother's interest to continue with delivery rather to allow return of consciousness.

Recommendation 49
Anaesthetists should regard failed regional technique leading to the need for general anaesthesia for obstetric surgery to be an additional risk (for AAGA and other complications).

Recommendation 50
Anaesthetists should regard the presence of antibiotic syringes during obstetric induction as a latent risk for drug error leading to AAGA. The risk can be mitigated by physical separation, labelling or administration of antibiotics by non-anaesthetists. Using propofol for induction mitigates the risk of this drug error.

Recommendation 51
When using total intravenous anaesthesia, wherever practical, anaesthetists should ensure that the cannula used for drug delivery is visible and patient at all times.

Recommendation 52
Depth of anaesthesia monitoring should be considered in circumstances where patients undergoing TIVA may be at higher risk of AAGA. These include use of neuromuscular blockade, at conversion of volatile anaesthesia to TIVA and during use of TIVA for transfer of patients.

Recommendation 53
If AAGA is suspected, immediate verbal reassurance should be given to the patient during the episode to minimise adverse consequences, as well as additional anaesthetic to limit the duration of the experience.

Recommendation 54
Anaesthetists should minimise the risk of any period of neuromuscular blockade without anaesthesia by the appropriate use of a nerve stimulator coupled with end-tidal volatile agent monitoring. Where the latter is absent or irrelevant (such as in TIVA), then specific depth of anaesthesia monitoring may be necessary.

Recommendation 55
Anaesthetists should recognise that neuromuscular blockade constitutes a particular risk for AAGA. Use of a specific form of depth of anaesthesia monitor (e.g. pEEG or IFT) is logical to reduce risk of AAGA in patients who are judged to have high risk of AAGA for other reasons, and in whom neuromuscular blockade is then used.

Recommendation 56
If specific depth of anaesthesia monitoring is to be used (e.g. pEEG or IFT) then it should logically commence, if feasible, before/at induction of anaesthesia and continue until it is known that the effect of the neuromuscular blocking drug has been reversed sufficiently.

Recommendation 57
Anaesthetists should ascertain the degree of information that is required by a patient about the risks of AAGA, over and above that contained in information leaflets. An explanation of risks should be coupled with information about how those risks will be mitigated.

Recommendation 58
Anaesthetists should form an opinion on the magnitude of risks of AAGA to quote, based on the evidence available in the literature, making clear how any estimate quoted was obtained (e.g. spontaneous report vs active questioning).

Recommendation 59
Anaesthetists should provide a clear indication that a pre-operative visit has taken place, identifying themselves and documenting that a discussion has taken place.

Recommendation 60
Sedationists should make efforts to ensure that the patient understands the information they are given about sedation, specifying that sedation may not guarantee unawareness for events or guarantee amnesia.

Recommendation 61
Patients undergoing elective procedures under sedation should be provided with written information well in advance of the procedure. This should emphasise that during sedation the patient is likely to be aware, and may have recall, but that the intention is to improve comfort and reduce anxiety. It should be stressed that sedation is not general anaesthesia.

Recommendation 62
On the day of the procedure, sedation should be described again from the patient's perspective, using terminology such as that suggested in NAP5 as a guide.

Recommendation 63
The anaesthetist(s) who provided the anaesthesia care at the time of a report of AAGA should respond promptly and sympathetically to the patient, to help mitigate adverse impacts.

Recommendation 64
Anaesthetists should keep clear, accurate anaesthetic records, which will help provide a defence to a claim of negligence. Equally, where a lapse has occurred, the accuracy of record-keeping in documenting the lapse should mitigate further adverse outcomes for the anaesthetist, hospital and patients, as it will serve as a focus for learning.