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.

Recommendations

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.

Recommendations

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.

Recommendations

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.