

Introduction



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The nature of human consciousness is one of the fundamental questions of biology. Anaesthetists have long had the means to suspend, or temporarily abolish consciousness and restore it safely. But the means have been empirical, discovered by chance. Hence when those means fail, as they do in the phenomenon of 'accidental awareness during general anaesthesia' (AAGA), the cause of that failure is not readily understood, as there is no generalised 'theory of anaesthesia' underpinning understanding of the whole process. This is perhaps why historically, when faced with a report of AAGA, there was a tendency to disbelieve the patient's account.

Nevertheless the process of general anaesthesia *can and does fail* and AAGA *can and does arise*, as is compellingly demonstrated in the words of Sandra in Chapter 2 of this NAP5 Report. Its long term consequences can be most dreadful, as later pages of this Report describe. The staff response of disbelief exacerbates the adverse impact as experienced by Sandra and still seen in some NAP5 vignettes. A form of 'collective denial' is perhaps reflected in our finding in the NAP5 Baseline Survey (Chapter 26) that only 12 of ~360 hospitals in the UK have any specific guidelines to manage AAGA if it arises.

All this must change, and – as Sandra has hoped in Chapter 2 – part of the purpose of this NAP5 Report is to present an apology on behalf of the profession to all those patients who have hitherto been let down by a collective failure to understand or accept the condition of AAGA. We hope and anticipate that this is historic, and one of the key elements of this Report is to disseminate knowledge of what we have now learned, in a systematic way, about patient experiences, and offer a more standardised support pathway for those who report AAGA.

In addition to constructive patient support, the NAP5 project has interrogated several hundred reports of AAGA, enabling us to gain a clearer understanding of how it might arise. From first principles, AAGA could arise because of either:

- (a) Failure to deliver sufficient anaesthetic agent to the body.
- (b) Individual patient resistance to an otherwise sufficient dose of anaesthetic agent.

Discussion of the first group of causes forms the bulk of this Report. This encompasses 'technical failures' during the conduct of anaesthesia, including interruptions in supply of agent, drug errors, low-dosing regimens, etc. In turn, these have more fundamental causes in 'human factors' issues, including pressures of poorly organised or overbooked surgical lists, distractions, and issues of education and training. It is perhaps disappointing to discover that, even in the 21st century, at least 75% and possibly 90% of all the AAGA cases we examined were probably preventable by the application of existing knowledge and experience. Taking our cue from the 'timeout' of the WHO Safer Surgery checklist (now standard in all UK and Irish hospitals), we propose adoption of a very simple anaesthesia-specific checklist as an *aide memoire* that we anticipate will help prevent a significant proportion of AAGA cases, namely those arising from a natural 'gap' in delivery of anaesthesia during transfer or movement of a patient (notably from anaesthetic room to theatre).

It is apparent that reminders are needed to reinforce good practice in some areas. Chief amongst these is the proper management and monitoring of neuromuscular

blockade. Monitoring is not really required to always ensure profound muscle relaxation for surgery, but is essential to ensure complete recovery from blockade *before* the return of consciousness. We also emphasise the need to continue anaesthesia during attempts to manage an unexpectedly difficult airway, and we offer the reminder that an 'awake' tracheal extubation *primarily* requires the patient to be completely reversed from neuromuscular blockade, and only *secondarily* requires the patient to be 'awake'. These are not new suggestions for relatively common scenarios – for example, they were in part the subject of NAP4 – but reinforcement of good practice seems necessary.

The second group of potential causes of AAGA – inherent resistance to anaesthetic – is intriguing and should be considered seriously. Although some resistance may be temporary 'physiological' resistance to general anaesthesia (e.g. due to anxiety) or 'pharmacological' (e.g. due to concomitant drugs that increase anaesthetic requirement or metabolism) there is also the intriguing possibility of intrinsic, perhaps genetic, resistance.

Historically, it was proposed that anaesthetic agents, unlike other drugs acting on specific protein channel receptors, exerted their action by rather non-specific bulk physico-chemical effects on the lipid in cell membranes. It has also been generally assumed that 'general anaesthesia' is a binary phenomenon (i.e. awake/anaesthetised), and that therefore, the mechanism of anaesthetic drugs is like 'flicking a switch' between the two brain states. The first concept perhaps constrained anaesthetists into developing unique models for how anaesthetic drugs work, set apart from the rest of pharmacology. The second perhaps promoted the lazy assumption that all that was required to understand 'anaesthesia' (and, by implication, be a complete anaesthetist), was to learn how to 'flick the switch', rather than 'understand the machine'. Over time we are moving away from both these concepts and NAP5 may contribute.

NAP5 is, we believe, the largest ever prospective study on the topic of AAGA in the world. Some who read this Report may focus particularly on quoted incidences of patient reports of AAGA and the discrepancy between these and incidences derived from Brice questionnaires. While this numerical analysis (and the inevitable discussion) is important, we hope that readers will also see beyond this and explore the comparative data and qualitative learning within the report. More perhaps than any previous National Audit Project, NAP5 is a patient-focused project, dealing as it does entirely with patient reports of AAGA. These are our starting point and our currency throughout the project. We hope the numerous patient stories – captured both by data and in

vignettes – will provide a focus on this important topic for anaesthetists, patients and administrators.

It is our intention that the NAP5 Report leads to changes in anaesthetic practice, that it stimulates research and that it generates discussion. The NAP5 report therefore contains important and pragmatic practice recommendations. However, readers will also sense an encouragement to challenge many established 'tenets of anaesthesia' especially in the research implications we have made. For instance, what is the place of thiopental in modern practice? What are the non-essential components of a rapid-sequence induction? Anaesthesia *might* work primarily through binding to protein channel receptors, rather than on lipid membranes (proteins, susceptible to influence by genetic factors). Anaesthesia *might* be a group of diverse brain states, all compatible with the patient undergoing surgery, each created by different drug combinations. It is worth, even briefly, considering these notions, if only as drivers for research. Other research implications are provided to encourage discussion and debate and to illustrate the huge gaps in knowledge that remain. We hope others will be inspired to formulate research proposals that we have not considered. We especially hope that colleagues will take forward our proposals in their own work: they are not our exclusive domain.

Together with 64 explicit recommendations for clinical practice (directed at national organisations, healthcare institutions and individual anaesthetists), we hope this NAP5 Report will greatly reduce the incidence of AAGA and also, importantly, provide processes and strategies to help mitigate any adverse consequences for patients who experience it. We believe the increased knowledge about AAGA derived from NAP5 will be of benefit to patients and anaesthetists when addressing the topic as part of the consent process.

Finally, we thank all those who have contributed to this report: most especially the patients who reported their experiences and the individual anaesthetists and Local Coordinators who brought those stories, sometimes vividly, to our attention. We commend this Report to the specialty.