7 The baseline survey: perspectives and experiences of perioperative anaphylaxis before NAP6


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Key findings

- 11,104 anaesthetists (77% crude response rate) from 341 (96%) hospitals responded to the survey.
- Most had immediate access to guidelines for anaphylaxis treatment (87%) and established referral pathways for investigation (82%), but a minority reported access to designated treatment packs (37%) or an anaphylaxis lead (35%).
- During their career, 76% of respondents had seen a case of perioperative anaphylaxis (1: 7.25 years of practice) and 4% reported a death (1: 311 years of practice), equivalent to 2.3% of events being fatal.
- Agents most frequently perceived to cause anaphylaxis were antibiotics, particularly penicillins, and neuromuscular blocking agents, notably rocuronium.
- Suxamethonium and penicillins were avoided by a higher proportion of respondents than would be predicted by the proportion of anaphylactic events attributed to these drugs, while the converse was true for atracurium and teicoplanin.

Introduction

Anaphylaxis is a severe, life-threatening generalised hypersensitivity reaction (Johansson 2003) and is one of the most hazardous emergencies encountered in the perioperative setting. Despite its importance, there is limited published information on UK anaesthetists' perspectives and experiences of perioperative anaphylaxis.

In 2009, the Association of Anaesthetists of Great Britain and Ireland (AAGBI) published guidance on suspected perioperative anaphylaxis (Harper 2009). This document recommended that anaesthetists should refer affected patients to a specialist allergy centre for investigation via a locally agreed referral pathway. A recent multicentre audit suggested that these patients were not being appropriately referred for investigation (Savic 2015a). In addition, the guideline advised anaesthetists to report cases of perioperative anaphylaxis to a national database, such as that of the Medicines and Healthcare products Regulatory Agency (MHRA). It would also be expected that cases would be reported via the local hospital incident-reporting system.

The perception of anaphylaxis risk is likely to influence anaesthetic practice, but little is known about which agents anaesthetists associate with being at high risk of inducing anaphylactic reactions. The limited prevalence studies available have indicated that the most frequently implicated causative drugs are antibiotics and neuromuscular blocking agents (NMBAs) (Mertes 2009), but little is known about what precautions anaesthetists take to avoid anaphylactic reactions and the degree, if any, to which perceived anaphylaxis risk drives clinical practice. Current perioperative practice increasingly exposes patients to chlorhexidine and newer drugs, such as sugammadex, and it is unclear how much risk these agents pose in view of emerging evidence of their association with anaphylaxis (Moka 2015, Takazawa 2014). The use of an antibiotic 'test dose' is actively discouraged in published guidelines, but the degree to which this practice persists has not previously been examined.

The National Audit Projects are a series of service evaluations examining major complications related to anaesthesia, and run by the Royal College of Anaesthetists (Thomas 2016). The 6th National Audit Project (NAP6) is designed to prospectively examine quantitative and qualitative aspects of severe perioperative anaphylaxis. NAP6 comprises four components: a baseline survey of anaesthetists; a survey of specialist allergy clinics; a year-long, anonymised case reporting phase; and lastly a survey of anaesthetic activity and exposure to potential perioperative allergens. This chapter describes the baseline anaesthetic survey.

The survey was undertaken in order to understand current practice and compliance with published guidance. It explores current systems for reporting, referral and management of cases of suspected perioperative anaphylaxis. The survey also examines anaesthetists' practices, perceptions of causative agents, and experiences of severe perioperative anaphylaxis. The baseline survey was not intended to characterise the incidence of perioperative anaphylaxis, which is investigated by the separate case reporting phase of NAP6.

Methods

The NAP6 project was confirmed to be a service evaluation by the National Research and Ethics Service and therefore formal ethical approval was not required. The project was endorsed by all UK Chief Medical Officers and approved by UK statutory patient data security bodies.

All 356 participating hospitals in England, Wales and Northern Ireland appointed a volunteer Local Coordinator (LC) anaesthetist, who was responsible for reporting the number of anaesthetists within their centre, and who took responsibility for advertising and disseminating the survey and recording completion rates. The survey was in the form of a hospital-based 'organisational survey' sent to the LC at each centre and an electronic questionnaire for individual anaesthetists that was accessible from 5 November 2015 until 11 January 2016 (see Appendix 1).

Respondents were asked to provide details of departmental systems for reporting and referral of perioperative anaphylaxis, and to describe their attitudes and perceptions of high-risk causative agents and of any avoidance practices. Anaesthetists were also asked to record details of suspected agents, referrals and outcomes of any cases of suspected perioperative anaphylaxis that they had treated in the previous year. For this purpose, anaphylaxis was defined as a hypersensitivity reaction with severe hypotension and/or bronchospasm and/or swelling with actual or potential airway compromise, and excluding minor reactions or harmless transient cutaneous flushing as an isolated feature.

To avoid double reporting, respondents were requested to specify those cases for which they had been the most senior anaesthetist involved in the case, and separately, those cases where they had been called to assist with management.

Continuous data were described using median (IQR [range]) and categorical data using 95% confidence intervals for Poisson distribution. Due to the observational nature of the survey, no statistical comparison was required.

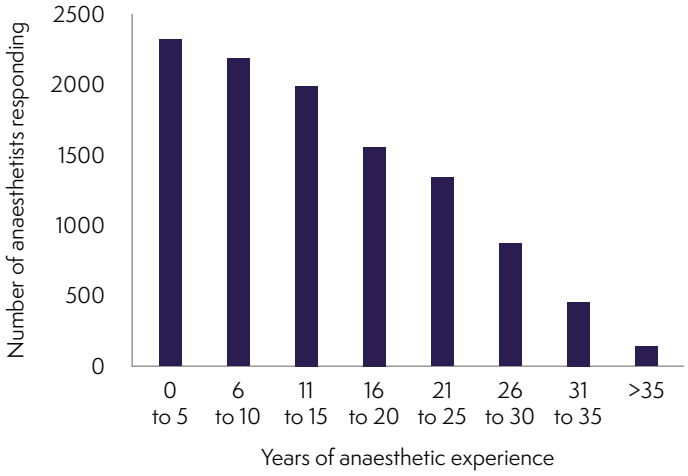
Since the response rate was high, no adjustment was made for missing data due to non-responders. Unanswered questions in the dataset were highlighted as missing values rather than discarding the entire response or using imputation, which was not appropriate for this survey.

For estimating the number of new cases of perioperative anaphylaxis included in this survey, we used the responses to question 1, which referred to cases directly under the respondents' care. For all other questions we used the reports of all cases of anaphylaxis that the respondents had attended (ie. attendances at anaphylaxis events), either as the primary anaesthetist or assisting a colleague. We used data from NAP5 in 2013 (3,598,500 anaesthetic interventions, including 2,766,600 general anaesthetics) as the denominator for the number of anaesthetic interventions delivered in the UK (Sury 2014). This was adjusted for the survey response rate, to estimate the reported incidence of perioperative anaphylaxis in the twelve months preceding the survey. It is recognised that retrospective recall is not as reliable as prospective data collection, and therefore the main focus of this survey was not to calculate incidence but rather to assess attitudes and practice ahead of the prospective data collection period of the NAP6 project.

Results

Responses were received from 341 hospitals (96%). The organisational survey identified 14,795 anaesthetists working in the UK – 8,522 Consultants, 1,761 SAS/trust grade doctors and 4,512 anaesthetists in training. The median number of years of anaesthetic experience was 13.0 (7.0-21.0 [0-40]), including 634 (6%) anaesthetists with less than one year's experience (Figure 1). The crude sum for the total number of years of anaesthetic experience was 154,689. A total of 11,104 anaesthetists completed the survey (77% crude response rate).

Figure 1. Number of years of anaesthetic experience of respondents, showing a positive skew to shorter career experience



Departmental organisation

A total of 9,617 (87%) of anaesthetists reported having immediate access to guidelines for the treatment of anaphylaxis, and 4,161 (37%) reported a designated 'anaphylaxis treatment pack' being available in their department. The majority of respondents (9,137, 82%) knew where to refer cases of anaphylaxis for further investigation, 7,511 (68%) were aware of a specific departmental pathway, and 3,893 (35%) reported having a departmental lead for anaphylaxis.

Personal experiences

Respondents reported 1,734 cases of suspected perioperative anaphylaxis under their direct supervision in the preceding twelve months and that they assisted in the care of a further 2,237 cases, indicating that on average 2.3 anaesthetists attend each case of perioperative anaphylaxis.

Of the combined attendances at anaphylaxis cases, 49% were known by the anaesthetist to be confirmed as anaphylaxis, 57% were managed in an intensive care or high-dependency unit, and 2% led to death. There was inconsistency of reporting suspected cases to relevant databases: 47% to local hospital critical incident systems and 14% to the Medicines and Healthcare products

Regulatory Agency (MHRA). Eighty-one per cent of cases were referred for specialist allergy investigation by an anaesthetist, 10% by other clinicians and 9% were not referred for further investigation (Table 1). Reasons for not referring the patient for allergy investigation were specified for 1.9% of cases: event judged not to be anaphylaxis (0.8%), the allergy was already known (0.4%), the patient refused or was not fit enough for investigation (0.2%), or that the reaction had happened too recently for the referral to have been made (0.3%).

Table 1. Type of healthcare professionals referring cases of suspected perioperative anaphylaxis in 2014-15 for specialist allergy investigation

Healthcare professional referring case	Number of attendances at a case of anaphylaxis in 2014-15, n (%)
Responding anaesthetist	1,253 (32)
Another anaesthetist	1,960 (49)
General practitioner	88 (2)
Other	309 (8)
Not referred	361 (9)

Drugs and other agents suspected of triggering anaphylaxis

The agents suspected of triggering reactions reported over the preceding twelve months are shown in Table 2. Neuromuscular blocking agents (NMBAs) and antibiotics were each suspected of causing ≈40% of events and together accounted for 77% of suspected causative agents.

Table 2. Distribution of suspected causative agents in suspected episodes of perioperative anaphylaxis attended by anaesthetists in 2014-15

Suspected Agent	Proportion of responses (%)
Neuromuscular blocking agent	38.5
Antibiotic	38.3
Dyes or contrast medium	6.7
Chlorhexidine	3.9
Analgesic	3.3
IV fluid (including colloids)	2.8
Latex	1.5
Induction agent	0.9
Anti-emetics	0.9
Blood products	0.6
Reversal agents	0.5
Local anaesthetics	0.5
Other drugs	1.6

Risk perceptions

The agent most commonly cited by the respondents as having the highest risk of being associated with anaphylaxis was rocuronium, followed by suxamethonium and penicillin. Four per cent of respondents named a single drug, 11% named two drugs and 77%, three drugs.

Avoidance of drugs and other agents

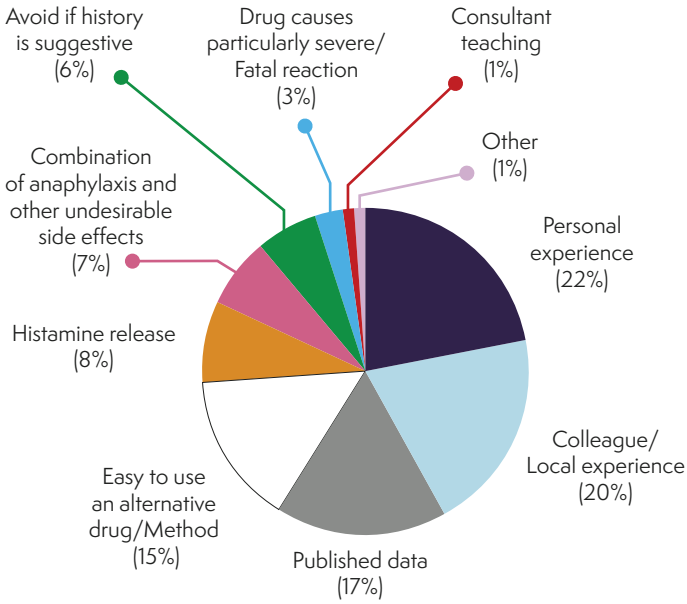
Twenty-six per cent of anaesthetists reported trying to avoid at least one agent perioperatively due to a perception that these drugs carried a high risk of causing anaphylaxis (Table 3). Of those reporting avoidance behaviour, 62% reported avoiding one drug, 30% two drugs and 8% three drugs. The most frequently avoided agents were NMBAs (67.3%), intravenous fluids (12.4%), and antibiotics (10.15%). Intravenous fluids showed the highest 'risk perception ratio' (ratio of the proportion of anaesthetists reporting avoidance of agent to the proportion of anaesthetists reporting a recent reaction to that agent) at 4.4, while chlorhexidine, suspected of causing 1 in 25 reactions, was infrequently reported as being avoided – risk perception ratio of 0.03.

Table 3. Proportion of responses reporting avoidance of an agent due to perceived risk of perioperative anaphylaxis, by class of agent (%) compared to proportion of responses referring to agents suspected of causing perioperative anaphylaxis in the preceding twelve months and as a risk/perception index

Agent	Proportion of responses reporting avoiding agent due to perceived high risk of anaphylaxis (%)	Proportion of responses attributing a suspected anaphylaxis reaction to the causative agent (%)	Risk perception ratio
Neuromuscular blocking agents	67.3	38.5	1.7
Intravenous fluids (including colloids)	12.3	2.8	4.4
Antibiotics	10.2	38.3	0.3
Induction agents	2.5	0.9	2.8
Analgesics	2.3	3.3	0.7
Latex	1.9	1.4	1.4
Dyes or contrast medium	1.5	6.7	0.2
Other drugs	1.0	1.6	0.6
Reversal agents	0.4	0.4	1.0
Anti-emetics	0.3	0.9	0.3
Local anaesthetics	0.2	0.5	0.4
Chlorhexidine	0.1	3.9	0.03

Ninety-five per cent of those reporting avoiding an agent gave at least one reason for doing so (3,725 reasons in total reported). The most common reason was avoidance due to a personal experience of anaphylaxis with the agent specified, accounting for 22% of responses (Figure 2). This and local/colleague experience of anaphylaxis accounted for almost half of all causes of avoidance.

Figure 2. Reasons for avoidance of agents given by responding anaesthetists. Total number of reasons n=3,725. Other includes 'too little evidence in the literature about anaphylaxis risk', 'adherence to departmental or national guidelines', and 'anaesthetist's own allergy'



Reasons for avoidance varied between agents (Figures 3 and 4), but personal and colleague experiences were prominent for all agents.

Figure 3. Reasons for avoidance of neuromuscular blocking agents (n = number of times a reason was mentioned by an anaesthetist)

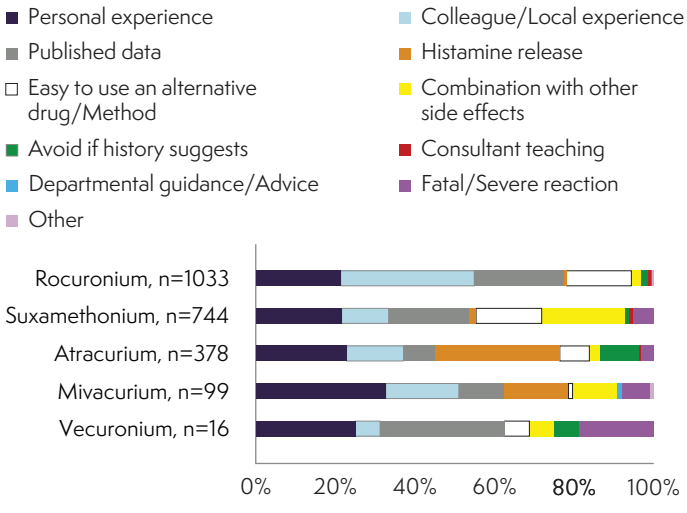
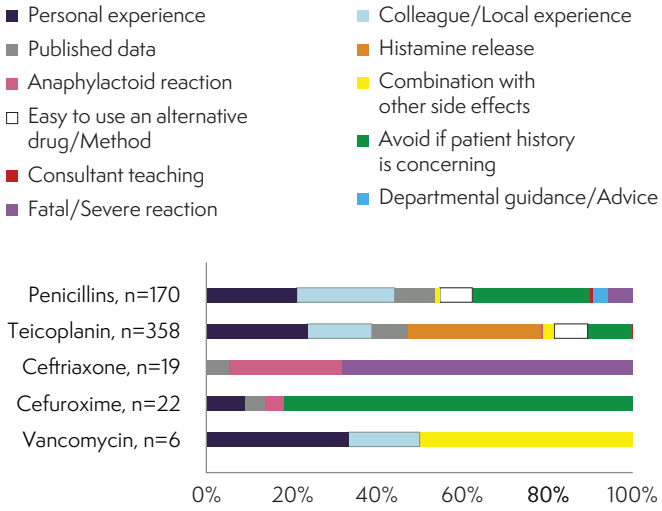


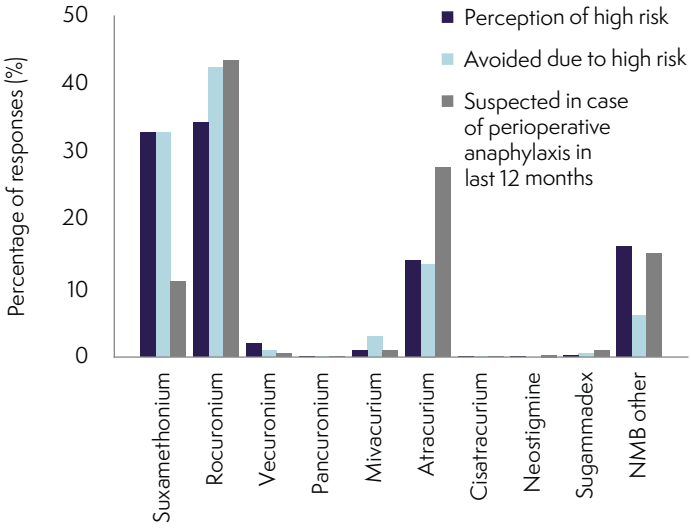
Figure 4. Reasons for avoidance of antibiotics (n = number of times a reason was mentioned by an anaesthetist)



The influence of risk perceptions on avoidance behaviour: neuromuscular blocking agents and antibiotics

The NMBAs and reversal agents were perceived by anaesthetists to be most likely to cause anaphylaxis and the individual drugs avoided by anaesthetists for such reasons are shown in Figure 5. The proportion of anaphylactic events in which each agent was suspected or proven (implicated) is also shown for comparison.

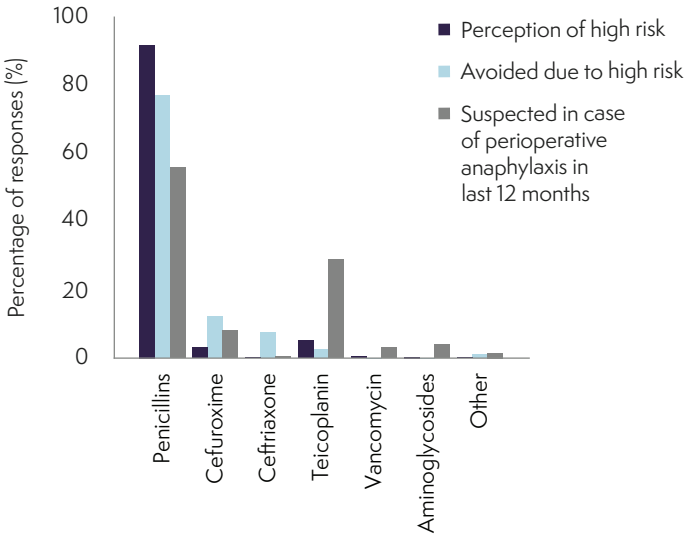
Figure 5. Perceptions surrounding the role of individual neuromuscular blocking (and reversal) agents in causing perioperative anaphylaxis



Rocuronium and suxamethonium were perceived to have the highest risk of causing anaphylaxis and were the NMBAs most commonly avoided by respondents, while in actual events, rocuronium and atracurium were most frequently implicated. Suxamethonium, although perceived as high risk, was not frequently the suspected causative agent in cases reported. The absence of data on the frequency of use of suxamethonium prevents further conclusions.

A similar analysis of antibiotic anaphylaxis is shown in Figure 6. Penicillins were both perceived to be the most likely causative agents and were the ones avoided most often. It is notable that teicoplanin, although prominent amongst suspected responsible agents, was not frequently avoided.

Figure 6. Perceptions surrounding the role of individual antibiotics in causing perioperative anaphylaxis



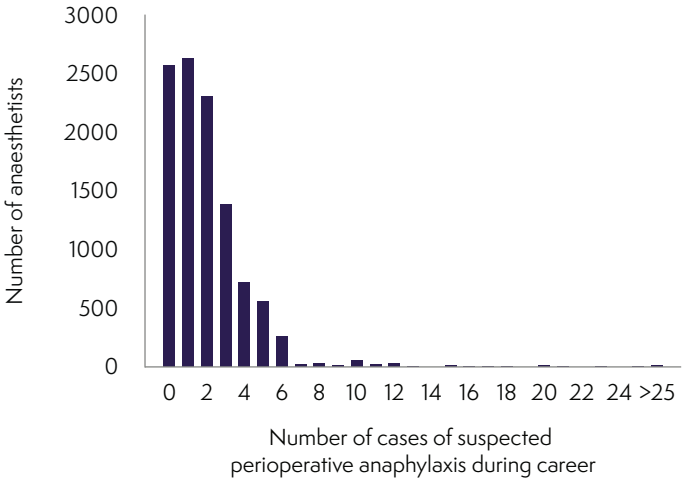
Antibiotic test doses

Nearly one third of anaesthetists (32%) reported routinely using a test dose when administering intravenous antibiotics. Five hundred and twenty-two respondents (4.7%) reported having observed an anaphylactic reaction to a test dose.

Career experience of anaphylaxis

Seventy-six per cent of respondents reported a case of perioperative anaphylaxis during their career. The median number of cases per respondent was 2 (1-3 [0-51]) (Figure 7), which equates to 1 case per 7.25 years of practice (95% confidence interval 1:3-1:14 years). Four per cent of respondents reported a death related to perioperative anaphylaxis in their career, and anaesthetists reported a career prevalence of mortality from anaphylaxis of 498 deaths or 1 death per 311 years of anaesthetic practice (1:277-1:347). This equates to 2.3% of cases of suspected severe anaphylaxis being fatal.

Figure 7. Distribution of cases of suspected perioperative anaphylaxis during the career of the reporting anaesthetists



Discussion

This study is the first UK-wide investigation of anaesthetists' perceptions of perioperative anaphylaxis and adherence to current guidelines for reporting and referral. The response rate of greater than 77% indicates that we surveyed a representative sample of UK anaesthetists. With more than 11,000 respondents it is undoubtedly the largest-ever survey on the topic, and this illustrates the continuing commitment of UK anaesthetists to the National Audit Projects. The survey provided useful information about current practice ahead of two further phases of NAP6: a prospective collection of actual cases of perioperative anaphylaxis in 2015-16, and an Activity Survey recording exposure to potential perioperative allergens.

The survey indicates that an anaesthetist can expect to see a case of anaphylaxis every 7.25 years of practice. While three quarters of respondents had personal experience of anaphylaxis, more than 2,500 (24%) respondents had not seen perioperative anaphylaxis during their career. The survey highlights the fact that the vast majority of cases of perioperative anaphylaxis are not reported to national databases and that not all patients are routinely referred for specialist allergy investigations. Uniquely this survey shows that anaesthetists use avoidance behaviours and perceive certain drugs as high risk. These perceptions may not correlate with actual risk. Unsurprisingly, the agents most frequently perceived to cause anaphylaxis remain neuromuscular blocking agents, with rocuronium being considered the highest risk, together with antibiotics, particularly penicillins.

Several organisations have published guidelines for the immediate management and referral of perioperative anaphylaxis, including the British Society for Allergy and Clinical Immunology (BSACI), the Resuscitation Council UK (Ewan 2009, Soar 2012) and the AAGBI (Harper 2009). It appears that anaphylaxis guidelines are readily available in the clinical setting, with the majority of anaesthetists reporting that they had immediate access to guidelines and a similar number being confident of where to refer a patient if required. The AAGBI guidelines indicate that "the anaesthetist who gave the anaesthetic or the supervising

anaesthetist is responsible for ensuring that the reaction is investigated", and 81% of cases in the previous twelve months appear to have been referred for investigation by an anaesthetist. Regarding clinical incident reporting, only 14% were reported to the MHRA. It is possible that some cases may subsequently be reported to the MHRA by the allergy clinic, as per BSACI guidelines (Ewan 2009). Nevertheless, our data suggest that estimates of rates of anaphylaxis and anaphylaxis-related mortality inferred from MHRA data are likely to be inaccurate and to significantly under-estimate true prevalence.

This survey highlights interesting differences in anaesthetists' perception, avoidance practices, and suspected causative agents of perioperative anaphylaxis. It might be expected that the number of anaesthetists choosing to avoid a particular drug due to a perception of high risk of allergy would reflect the actual risk rate, ie. the number of anaphylactic events expressed as a proportion of the total number of administrations of that particular drug in a large published series. However, this was not consistently observed, with several drugs over- or under-represented. Our results indicate that many factors influence an individual's perception of anaphylaxis risk, and that these vary between agents. Personal and local experience appears to be an important factor in generating risk perception, being responsible for 40% of drug avoidance behaviours.

Teicoplanin and atracurium stand out as being implicated in a greater proportion of anaphylactic reactions than would be expected from the number of anaesthetists who try to avoid these agents due to perceived anaphylaxis risk. Teicoplanin was the suspected trigger in 28% of cases of antibiotic-related anaphylaxis, second only to penicillins (Figure 6). A recent case series of reactions to teicoplanin highlighted teicoplanin anaphylaxis as an emerging problem, with anaesthetic allergy clinics reporting seven definite cases from two UK centres (Savic 2015b). Teicoplanin is used both as first-line prophylactic therapy for some major, particularly orthopaedic procedures, and is often the chosen therapy for those reporting penicillin allergy. The prevalence of teicoplanin-induced perioperative anaphylaxis is therefore of clinical consequence, and it is important that anaesthetists do not consider it a risk-free agent.

Atracurium was suspected in 28% of cases in which an NMBA was implicated as the cause of anaphylaxis, yet only half as many respondents reported trying to avoid this drug, and the commonest reason for avoidance was concerns over non-specific histamine release. Conversely suxamethonium was proportionately more avoided than it was implicated in anaphylactic events, with avoidance based on published literature and the impact of other side effects. Risk perception may be influenced by both risk rate (events per use) and event rate (absolute numbers of events), and the latter will be influenced by the frequency with which a drug is used. The pattern of usage of NMBAs in the UK was not known at the time of his survey: the NAP6 Allergen Survey (Chapter 9) provides this information and enables estimation of the relative incidence of perioperative anaphylaxis with specific agents.

The AAGBI guidelines counsel against the use of 'test doses' when administering intravenous antibiotics. In order to be informative, diagnostic drug challenges require the controlled administration of increasing doses at intervals of 15–30 minutes, typically starting with 1/1000th of the therapeutic dose (Ewan 2009). One third of anaesthetists reported using a test dose, possibly believing that this practice would limit the severity of anaphylaxis.

In 2002, Lieberman (Lieberman 2002) suggested that the second most common causative agent for perioperative anaphylaxis was latex, but this was reported by very few anaesthetists as a cause of concern or a causative agent for reactions in the current survey. Important progress has probably been made in the UK in the use of latex-free gloves and indwelling devices, and in developing preoperative screening for identification of at-risk patients. Many hospitals now provide 'latex-free' theatre environments. Conversely, chlorhexidine-anaphylaxis has become more common and may be a common 'missed diagnosis' (Garvey 2012, Guleri 2012, Toomey 2013, Abdullah 2015). Our survey indicates an increasing awareness of chlorhexidine-induced reactions, and it is notable that chlorhexidine was the suspected or actual cause in 1 in 25 cases in 2014-15 – twice as many as latex.

This survey, while not designed to provide accurate incidence data, indicates an approximate incidence of 1:1,556 (1:481–1:1,635) during 2014–15, which is higher than in other studies (Mertes 2009, Gibbs 2013) which estimated between 1:10,000 and 1:20,000.

The proportion of perioperative anaphylaxis events leading to death is 1 in 41 from the 12-month data and 1 in 43 from the career-experience data, suggesting that an anaesthetist might experience one death relating to perioperative anaphylaxis for every 311 years of anaesthetic practice. Older studies, including cases from the 1970s and 1980s, estimate a mortality of 3.9% (Mitsuhata 1992, Light 2006). However, a 2013 publication reported no deaths from perioperative anaphylaxis over a nine-year period in Western Australia, with a mortality rate based on confidence intervals of <1.4% (Gibbs 2013). The number of UK patients dying as a result of perioperative anaphylaxis is unknown, and may have reduced in recent years as guidelines have been implemented (Harper 2009) and critical care outcomes have improved (Nolan 2016).

Limitations and strengths

First, this is a retrospective study relying on recall, potentially over a number of years, and there are limitations with any such study. It is notable that incidence of awareness in the methodologically similar baseline survey of NAP5 (Jonker 2014) were almost identical to those reported in the prospective phase of that project (Pandit 2014). It is possible that in our survey anaesthetists recalled incidents beyond the previous twelve months, particularly if the anaphylactic event was very severe. It is also possible that more than one anaesthetist reported the same case due to lack of clarity over who was the primary anaesthetist. This study also asked for suspected cases of anaphylaxis, and of those only 49% were reported to have been confirmed. Since many anaesthetists work in both a perioperative and critical care setting, recall may have related to cases treated in critical care rather than being truly perioperative. Despite only asking for reports of severe cases,

milder cases may have been reported due to variations in the interpretation of the diagnostic criteria. For all these reasons, it is quite possible that the incidences we derive from these reports may be inaccurate (overestimated) and that the actual incidence of true anaphylaxis is closer to the historical estimates. As stated above the incidence of events is not the main focus of this paper. Second, the data on suspected and proven causative agents is uncertain because it is not known how many suspected events were actually anaphylaxis and how many suspected causative agents were subsequently shown to have been correctly identified: the next phase of NAP6 will shed light on these matters.

Strengths of the survey include its size and the likely generalisability of the results. The survey includes responses from almost all hospitals in the UK and more than three quarters of all potential respondents. Our denominator for respondents is within <4% of the recent census figure of the RCoA (RCoA 2016). As some 'anaesthetists' will primarily practise in pain clinics and critical care, it is likely that our relevant response rate is higher than we report.

Conclusions

This is the largest-ever survey of anaesthetists' experiences of and practices relating to perioperative anaphylaxis. It provides important data about the drugs that are suspected or proven to be, implicated in such events. It also highlights current practice and preparedness for perioperative anaphylaxis.

The survey has identified gaps in referral for further investigation. and also in reporting to the MHRA, which supports the likely value of the NAP6 project in providing a more accurate registry of such events. The survey highlights a mismatch between drugs implicated in events and anaesthetists' perception of risk and avoidance practices. It is particularly notable that atracurium and teicoplanin are not perceived by anaesthetists to be of major concern, and that they are rarely avoided despite both being important agents in suspected anaphylactic events. Chlorhexidine is implicated in a significant number of recent perioperative anaphylaxis events and appears to be a greater problem than latex.

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Appendix 1:

Copy of online questionnaire distributed to anaesthetists

Personal experience of perioperative anaphylaxis

1. In the last 12 months how many cases of suspected perioperative anaphylaxis have you seen in patients directly under your care, ie, where you anaesthetised or sedated the patient?
2. In the last 12 months how many times have you been called to assist in the urgent management of suspected perioperative anaphylaxis in other patients?
3. Of these cases (those you saw directly PLUS those you assisted with, ie, combining answers to Q1 and Q2): what were the causes of each anaphylactic reaction?
4. How many patients were referred for investigation by:
   a. Yourself?
   b. Another anaesthetist?
   c. Patient's GP?
   d. Other? (please specify who).
5. If patients were not referred, it was because:
   a. Patient died
   b. Reaction not severe enough
   c. Unsure about pathway
   d. Forgot
   e. Other (please specify reason).
6. In how many cases was the diagnosis of anaphylaxis confirmed by subsequent investigation?
7. In how many cases did you contact a specialist allergy/immunology clinic for advice by phone or e-mail?
8. How many patients were transferred to HDU or ICU as a direct result of suspected perioperative anaphylaxis?
9. How many patients died as a consequence of perioperative anaphylaxis?
10. How many cases did you report via the MHRA Yellow Card system?
11. How many cases did you report through your hospital incident-reporting system?
12. In how many of your personal referrals did you complete an AAGBI referral form (link to AAGBI form included)?

Career experience of perioperative anaphylaxis

13. How long have you been an anaesthetist? Please specify the number of years from the time you started your specialist training.
14. How many cases of severe anaphylaxis have you seen in your career?
15. How many patients in your direct care have died as a consequence of perioperative anaphylaxis?

Local arrangements - if your next patient has a suspected anaphylactic reaction during anaesthesia or sedation:

16. Do you have immediate access to anaphylaxis guidelines in your theatre?
17. Do you have a departmental pathway for referring suspected anaphylaxis patients for further investigation?
18. Do you know where to refer the patient for further investigation?
19. Do you have a specific, labelled anaphylaxis pack (distinct from the usual emergency drug box) in your theatre or nearby?
20. Do you have a departmental lead anaesthetist for perioperative anaphylaxis?

Personal attitudes to the risk of perioperative anaphylaxis

21. Do you generally try to avoid any particular drug/substance as a result of perceived high risk of anaphylaxis?
22. If you answered yes to the question above, please explain the reasons why? For example, personal experience, heard of several cases, information published in journals, etc.
    a. Drug/substance
    b. Reason for refusal.
23. In your perception, which current perioperative drug (or other substance) has the highest rate of anaphylaxis associated with it? ie, reactions per 1,000 doses. Please record your top 3 in order, most likely first.
24. Do you routinely administer a test dose of antibiotics?
25. Have any of your patients had a reaction to a test dose of an antibiotic?