

NAP5 Ireland Activity Survey



Wouter R Jonker



Ellen P O'Sullivan



Tim M Cook



Jaideep J Pandit

HEADLINE

29.1 The first phase of NAP5 Ireland consisted of a survey of anaesthetic activity in Ireland. A network of Local Coordinators who organised data collection from the anaesthetic departments of 46 public and 20 independent hospitals over seven days. Data on patient demographics, anaesthesia techniques, staffing, admission and discharge arrangements were collected on all cases for which anaesthesia care (i.e. general, regional, local anaesthesia, sedation or monitored anaesthesia care) was provided. A total of 8,049 cases were reported during the survey, giving an annual estimate of 426,600 cases for which anaesthesia care is provided. General anaesthesia constituted 5,621 (69.8%) of total number of cases, regional anaesthesia 1,404 (17.4%), local anaesthesia 290 (3.6%), sedation 618 (7.6%) and monitored anaesthesia care 116 (1.4%). As data collection included both public and independent hospitals the survey provides a unique comparison of caseload – both in terms of activity and case-mix – in Ireland. This survey provides unique data regarding anaesthesia service in public and independent hospitals in Ireland.

The contents of this chapter have been published as Jonker WR, Hanumanthiah D, Ryan T, Cook TM, Pandit JJ, O'Sullivan EP; the NAP5 Steering Panel. Who operates when, where and on whom? A survey of anaesthetic-surgical activity in Ireland as denominator of NAP5. *Anaesthesia* 2014 doi: 10.1111/anae.12763. [Epub ahead of print]. This chapter should be referenced as such. All figures in this chapter are reproduced with permission, and any portions of text reproduced with permission of the NAP5 Publications and Dissemination Panel, which includes the Editor-In-Chief of *Anaesthesia*.

BACKGROUND

- 29.2 A survey of anaesthetic services (i.e. an Anaesthetic Activity Survey (AAS) was conducted in Ireland to obtain, for the first time, detailed information on anaesthesia services. We contacted all 46 acute public hospitals (Health Service Executive (HSE) and voluntary hospitals) and all 21 acute independent (private) hospitals.
- 29.3 The primary motivation for this survey was to obtain denominator data for NAP5 in Ireland.

METHODS

- 29.4 The NAP5 project in Ireland received approvals as documented in Chapter 28. Additionally, approvals for the AAS in the independent hospitals were received from every individual hospital's Ethics or Medical Advisory Committee. The project

infrastructure in Ireland is as that for the UK, as described in Chapter 5, Methods and Chapter 24 NAP5 in Ireland. A team of volunteer consultant anaesthetists was recruited as Local Co-ordinators (LCs), one in each of the identified public and independent hospitals. Information on the AAS was distributed to all anaesthetists through the LCs in their hospital, as well as at AAGBI meetings prior to the survey. The College of Anaesthetists of Ireland provided advertisement and support for the survey through mailshots and information on their website. Instructions on how to complete the AAS Data Collection form (Fig. 29.1) were provided to anaesthetists through an AAS Advice sheet. Data were prospectively collected on all cases for which anaesthesia care was provided over seven days in 2012. The chosen week (from 8:00 on Monday 26 November 2012 to 7:59 on Monday 3 December 2012) was selected to avoid potential factors that could affect activity, e.g. national holidays and anaesthesia/surgical conferences or meetings.

- 29.5 Anaesthesia care was defined as any procedure or case where an anaesthetist, (consultant or non-consultant hospital doctor (NCHD)) provided general, regional or local anaesthesia, sedation or monitored anaesthesia care for surgery or an interventional procedure. NCHD is a term used for all non-consultant hospital doctors (whether in training or not) in the health system in Ireland, who work under immediate, local or distant consultant supervision. The terms 'surgery' and 'procedure' are used interchangeably to describe any form of intervention for which an anaesthetist provided care, and can cover a range of surgical or obstetric operations or interventional procedures conducted by radiologists or physicians.
- 29.6 Inclusion and exclusion criteria were as for the UK Activity survey (see Chapter 27). We collected similar but not identical data to that collected in the UK. In particular we also collected data on the site of pre-operative assessment and the use of blood transfusion.
- 29.7 If a combination of techniques were used, e.g. general anaesthesia combined with a neuraxial blockade, the respondents were advised to select general anaesthesia as the main or primary type of anaesthesia.
- 29.8 The AAS Data Collection form instructed the anaesthetist to only select one option in each category with the exception of two categories i.e.


'Anaesthesia Agents Used' and 'Type of Regional Anaesthesia' for which more than one option could be selected. This was to accommodate the breadth of procedures and techniques performed during an individual case.

- 29.9 LCs distributed the AAS Data Collection forms throughout their departments and made local arrangements on collection of forms. The LCs correlated the completed AAS Data Collection forms with theatre-, radiology- or delivery suite registers. If the attending anaesthetist did not capture a case, the LCs were asked to complete a data form from the theatre register. An 'Unknown' option was given in each category. The LCs and other anaesthetists could contact the NAP5-Ireland Clinical Lead, National Co-ordinator for further advice prior to and during the survey. At the end of the survey the LCs graded the accuracy of their data on the four-point scale, i.e. Accurate (0-2% error), Close Estimate (2-10% error), Estimate (>10% error) or a Guess (an estimate without data to support it). Any significant theatre closures during the survey were noted. All data collection forms were returned to the National Co-ordinator and digitally scanned (Informa, Dublin, Ireland) using optical character recognition technology. The scanning operator as well as the National Co-ordinator verified the electronic data. Discrepancies in data, such as data scanning errors or illogical data were corrected, where possible, after evaluating the original data collection form. If correction was not possible the 'Unknown' option was selected in that category.
- 29.10 Since there was no hypothesis test, there were no statistical comparisons and only descriptive data are presented.

Figure 29.1. Irish Activity Survey data collection form

Anaesthetic Activity Survey in Ireland

Phase 2 of National Audit Project 5



Please complete this form for all patients where anaesthesia care is provided by an Anaesthetist between 26 November and 3 December 2012.

PLEASE SELECT ONLY ONE IN EACH CATEGORY

Date: / /

Hospital:

Theatre/Location:

TYPE OF ANAESTHESIA

General Anaesthesia

Regional Anaesthesia

Local Anaesthesia

Sedation

Monitoring only

Unknown

AGE OF PATIENT

<1 year

1-5 years

6-15 years

16-25 years

26-35 years

36-45 years

46-55 years

56-65 years

66-75 years

76-85 years

>86 years

Unknown

GENDER OF PATIENT

Male

Female

Unknown

ASA CATEGORY

1 2 3

4 5 6

Unknown

NCEPOD PRIORITY OF SURGERY:

Immediate

Urgent

Expedited

Elective

Unknown

CAESAREAN SECTION CATEGORY:

1 2 3 4

Unknown

Not applicable

BODY HABITUS

Underweight

Normal

Overweight

Obese

Unknown

ADMISSION

Day Case

Same Day

Elective admission on

day(s) prior to procedure

Emergency admission

Other

Unknown

INITIAL ANAESTHESIA PRE-OP ASSESSMENT DONE IN:

Pre-Op Assessment Clinic

On Ward

On arrival to theatre

Unknown

TIME PROCEDURE STARTED


00.01-08.00

08.01-18.00

18.01-24.00

Unknown

PLEASE TURN OVER




5 958310 409172

PLEASE RETURN THIS FORM TO YOUR NAP5 LOCAL COORDINATOR

Figure 29.1. Irish Activity Survey data collection form.

Anaesthetic Activity Survey in Ireland

<p>DAY OF THE WEEK</p> <p><input type="checkbox"/> Week day</p> <p><input type="checkbox"/> Weekend</p> <p><input type="checkbox"/> Bank Holiday</p> <p><input type="checkbox"/> Unknown</p> <p>LOCATION OF ANAESTHETIC CARE</p> <p><input type="checkbox"/> Theatre</p> <p><input type="checkbox"/> Radiology department</p> <p><input type="checkbox"/> Cath-lab</p> <p><input type="checkbox"/> Delivery ward</p> <p><input type="checkbox"/> Other</p> <p><input type="checkbox"/> Unknown</p> <p>ANAESTHESIA AGENTS USED</p> <p><input type="checkbox"/> Volatile agents</p> <p><input type="checkbox"/> Total Intravenous Anaesthesia (TIVA)</p> <p><input type="checkbox"/> Target controlled anaesthesia (TCA)</p> <p><input type="checkbox"/> Nitrous Oxide</p> <p><input type="checkbox"/> Other</p> <p><input type="checkbox"/> Not applicable</p> <p>AIRWAY DEVICE USED DURING MAINTENANCE PHASE</p> <p><input type="checkbox"/> Face Mask</p> <p><input type="checkbox"/> Supraglottic Airway Device</p> <p><input type="checkbox"/> Endotracheal tube</p> <p><input type="checkbox"/> Tracheostomy</p> <p><input type="checkbox"/> Other</p> <p><input type="checkbox"/> None</p> <p><input type="checkbox"/> Unknown</p>	<p>TYPE OF REGIONAL ANAESTHESIA</p> <p><input type="checkbox"/> Epidural</p> <p><input type="checkbox"/> Spinal</p> <p><input type="checkbox"/> Peripheral nerve block</p> <p><input type="checkbox"/> Unknown</p> <p><input type="checkbox"/> None</p> <p>NEUROMUSCULAR BLOCKADE</p> <p><input type="checkbox"/> At induction only</p> <p><input type="checkbox"/> During induction and maintenance</p> <p><input type="checkbox"/> None</p> <p><input type="checkbox"/> Unknown</p> <p>MOST SENIOR ANAESTHETIST PRESENT DURING PROCEDURE</p> <p><input type="checkbox"/> Consultant</p> <p><input type="checkbox"/> Locum Consultant</p> <p><input type="checkbox"/> Post CST Registrar</p> <p><input type="checkbox"/> SPR 4-5</p> <p><input type="checkbox"/> SPR 1-3</p> <p><input type="checkbox"/> Registrar</p> <p><input type="checkbox"/> Senior House Officer</p> <p><input type="checkbox"/> Specialist Anaesthesia Trainee</p> <p><input type="checkbox"/> Other</p> <p><input type="checkbox"/> Unknown</p> <p>SPECIFIC DEPTH OF ANAESTHESIA MONITOR USED</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p><input type="checkbox"/> Unknown</p>	<p>SPECIALITY</p> <p><input type="checkbox"/> Cardiac</p> <p><input type="checkbox"/> Dental</p> <p><input type="checkbox"/> ENT</p> <p><input type="checkbox"/> General surgery</p> <p><input type="checkbox"/> Gynaecology</p> <p><input type="checkbox"/> ICU</p> <p><input type="checkbox"/> Maxillo-facial</p> <p><input type="checkbox"/> Neurosurgery</p> <p><input type="checkbox"/> Obstetrics</p> <p><input type="checkbox"/> Ophthalmology</p> <p><input type="checkbox"/> Orthopaedics</p> <p><input type="checkbox"/> Pain</p> <p><input type="checkbox"/> Plastics</p> <p><input type="checkbox"/> Psychiatry</p> <p><input type="checkbox"/> Radiology</p> <p><input type="checkbox"/> Thoracic</p> <p><input type="checkbox"/> Trauma</p> <p><input type="checkbox"/> Urology</p> <p><input type="checkbox"/> Vascular</p> <p><input type="checkbox"/> Other</p> <p><input type="checkbox"/> Unknown</p> <p>BLOOD TRANSFUSION</p> <p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes</p> <p style="padding-left: 20px;"><input type="checkbox"/> Planned <input type="checkbox"/> Unplanned</p> <p><input type="checkbox"/> Unknown</p> <p>IMMEDIATE POST OP CARE</p> <p><input type="checkbox"/> Day Ward</p> <p><input type="checkbox"/> Ward</p> <p><input type="checkbox"/> High Dependency Unit:</p> <p style="padding-left: 20px;"><input type="checkbox"/> Planned <input type="checkbox"/> Unplanned</p> <p><input type="checkbox"/> Intensive Care Unit:</p> <p style="padding-left: 20px;"><input type="checkbox"/> Planned <input type="checkbox"/> Unplanned</p> <p><input type="checkbox"/> Died</p> <p><input type="checkbox"/> Other</p>
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4 9 5 8 3 1 0 4 0 9 1 7 3

RESULTS

Returns

29.11 All 46 (100%) acute public hospitals and 20 of the 21 (95%) acute independent hospitals in Ireland took part in the survey. A total of 8,058 AAS data collection forms were received. Nine (0.1%) forms were not suitable for scanning because of non-compliance, thus 8,049 AAS data collection forms were included in the analysis. A total of 50 (75.8%) Local Co-ordinators reported their individual hospital's returns to be 'accurate' (<2% error), 15 (22.7%) a 'close estimate' (2-10% error), 1 (1.5%) an 'estimate' (>10% error) and zero (0%) a 'guess' (i.e. an estimate without data to support it). This suggests an overall error rate of ~4%.

29.12 To estimate an annual number of cases, a week-to-year scaling factor was calculated. Using our data collection period (five normal weekdays and two weekend days) we scaled this up to one year of activity (252 normal weekdays, 105 weekend days and nine bank holidays) thereby deriving a week-to-year multiplier of 50.97. This was then multiplied by 1.04 to take the overall average error rate (~4%) into account. A scaling factor of 53 was obtained by this method and is used to calculate annual estimates (expressed to the nearest 100) throughout the report.

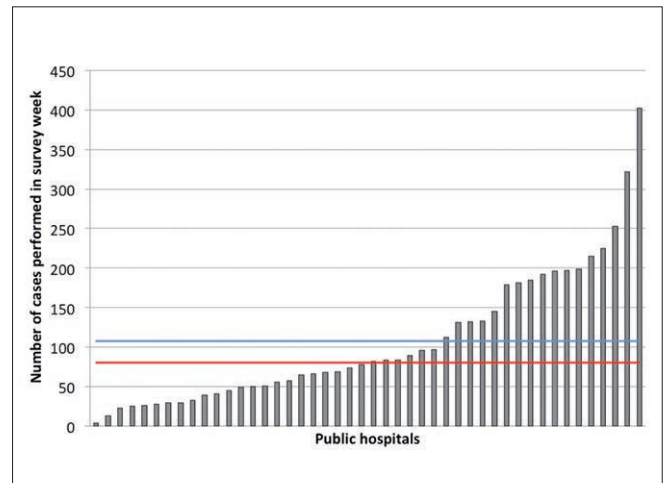
29.13 A total of 4,949 (61%) of cases were performed in public hospitals and 3,100 (39%) in independent hospitals. Using the scaling factor of 53, an annual estimated ~426,600 cases occurred in 2012 in Ireland comprising ~262,300 in public hospitals and ~164,300 in independent hospitals.

29.14 In the main section of this chapter we focus on the results from the public hospitals and present data for the independent hospitals separately, in the Appendix. The discussion highlights differences between public and independent hospital practices. Percentages are expressed as the respective proportion of the total number of cases undertaken in either the public or independent hospitals. Responses marked as 'unknown' are reported in results where relevant.

Distribution of cases by location

29.15 Figure 29.2 shows the distribution of number of cases across the 46 public hospitals. The median number of cases per hospital captured during the survey was 80 (IQR 46-170, Range 4-402). The majority (29, 63%) of hospitals undertook <100 cases, with only 5 (11%) hospitals performing >200 procedures during the one week survey. Nearly a third (14) of the public hospitals were affected by some theatre closure(s) during the survey period.

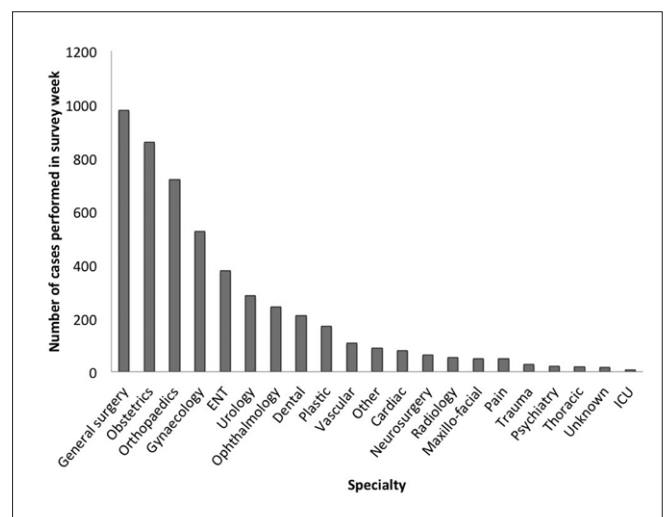
Figure 29.2. Number of cases performed in each of the public hospitals. (Mean=blue, median=red)



Patient characteristics

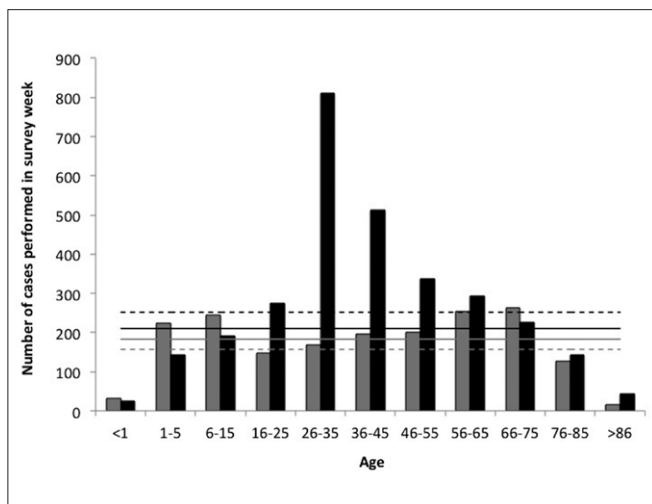
29.16 More than 60% (3,081) of the procedures were in four specialties: general surgery (977, 20%), orthopaedic surgery (720, 15%), obstetric (858, 17%) and gynaecology (526, 11%) (Figure 29.3). The vast majority (98%) of obstetric cases performed nationally occurred in public hospitals. The number of procedures for non-surgical specialties (psychiatry, pain, radiology and others including gastroenterology) was 212 (4.3%).

Figure 29.3. Number of cases performed by specialty in public hospitals. Note that 'ICU' refers to procedures with anaesthetic intervention undertaken in ICU (and not simply patients managed in ICU during survey period)



29.17 Figure 29.4 demonstrates the distribution of cases by age and gender. More women underwent a procedure (3,011, 61%) than men (1,884, 38%; with some unknowns). Obstetric procedures accounted for the majority of procedures performed in younger females: 50% in the age group 16–25 years and 67% in the age group 26–35 years. For men, there was a slight preponderance of elderly patients undergoing procedures (Figure 29.4). The median age of both women and men undergoing procedures in public hospitals was 36–45 years.

Figure 29.4. The number of cases by age and gender in public hospitals. Male (grey) and female (black). Mean number of cases per gender=dashed line, median number of cases per gender = continuous line



29.18 Table 29.1 demonstrates the ASA physical status and NCEPOD classification of cases: 2,990 (60%) were Elective, notably Immediate and Urgent together constituted >25% of the activity. This broadly matches the admission categories (Table 29.2), which shows the majority of admissions are Day-Cases (admissions on day of procedure with a plan to discharge on the same day), Same-Day admissions (admission on the day of the procedure with discharge the following day) and Elective admissions (planned admission on the day(s) before the procedure). Unplanned admissions (i.e. Emergency or Other, including inter-hospital transfer) accounted for one fifth of cases (991, 20%).

Table 29.2. Admission categories in Public hospitals. Values are number (proportion). *to the nearest 100

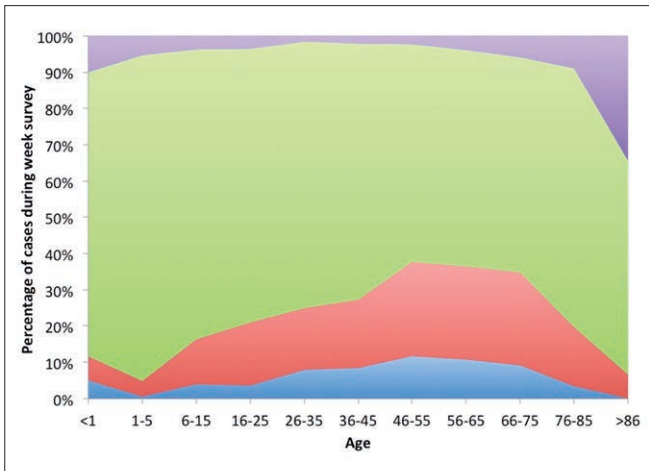
Admission type	Number of cases performed in survey week	Estimated total per annum*
Day Case	1,995 (40.3%)	105,700
Same Day	1,180 (23.8%)	62,500
Elective	752 (15.2%)	39,900
Emergency	839 (17%)	44,500
Other	152 (3.1%)	8,000
Unknown	31 (0.6%)	1,600
Total	4,949	262,300

Table 29.1 Number of cases in each ASA physical status category and NCEPOD classification of priority of surgery collected during the survey in public hospitals. Values are number (percentage). *To the nearest 100

	Immediate	Urgent	Expedited	Elective	Unknown	Total	Estimated total per annum*
ASA 1	91	622	239	1,386	79	2,417 (48.8%)	128,100
ASA 2	50	311	189	1,212	22	1,784 (36%)	94,500
ASA 3	22	134	99	364	7	626 (12.6%)	33,200
ASA 4	12	24	5	4	3	48 (1%)	2,500
ASA 5	5	4	0	0	0	9 (0.2%)	500
ASA 6	1	0	1	0	0	2 (0.04%)	100
ASA Unknown	2	15	7	24	15	63 (1.3%)	3,300
Total	183 (3.7%)	1,110 (22.4%)	540 (10.9%)	2,990 (60.4%)	126 (2.6%)	4,949	262,300
Estimated total per annum*	9,700	58,800	28,600	158,500	6,678	262,300	

29.19 Body habitus was reported in 4,893 (99%) patients. The distribution of body habitus between the different age groups is illustrated in Figure 29.5. More than a quarter of patients were overweight (905, 18.3%) or obese (350, 7.1%). Nearly a third of patients aged 46–75 were classified as being overweight or obese, contrasting with 33.9% of patients aged >86 years who were classified as being underweight. No patient aged >86 years of age was classified as obese.

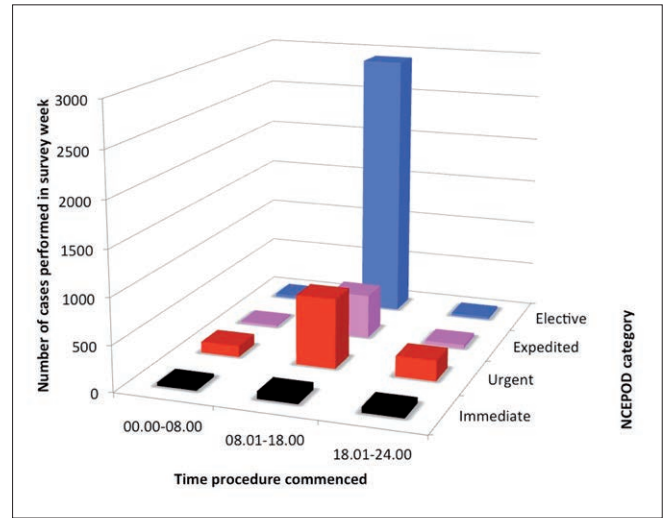
Figure 29.5. Body habitus in each of the age categories for public hospitals. Underweight (purple), normal (green), overweight (red) and obese (blue)



Time of procedure

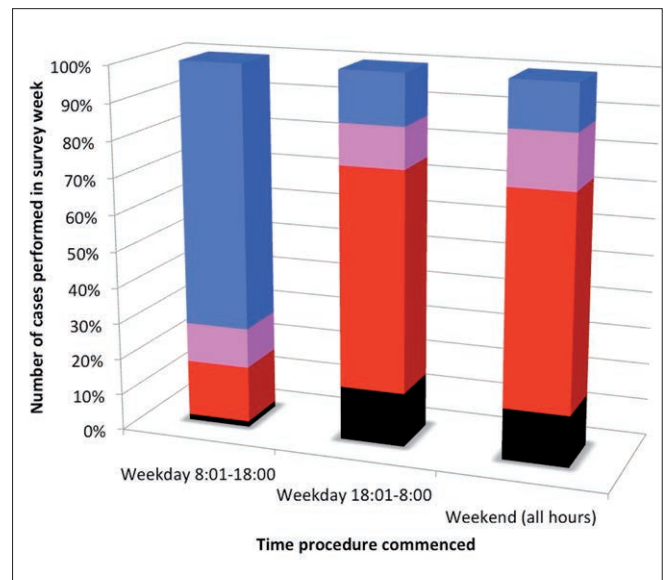
29.20 Almost all (98%) elective procedures commenced during normal working hours of 08:01–18:00 (Figure 29.6). Approximately one in eight (590, 12%) of all the procedures commenced after hours (i.e. between 18:01 and 08:00) consisting of mainly Urgent (343, 58%) and Immediate (100, 17%) NCEPOD category cases.

Figure 29.6. Start time of procedure in Public hospitals by NCEPOD classification of priority of surgery



29.21 Most (4,512, 91%) of cases occurred on a weekday and only 425 (9%) at the weekend. However, 861 (17%) of all cases started during ‘non-routine’ working hours (i.e. Monday to Friday 18:01 to 08:00 and all hours on the weekend). Figure 29.7 illustrates the proportion of NCEPOD categories for the procedures that occurred during routine and non-routine hours.

Figure 29.7 Time of start of procedure vs NCEPOD category. Routine (weekday 8:01–18:00) and non-routine hours (weekday 18:01–8:00 and all hours on weekend) in public hospitals. Immediate (black), Urgent (red), Expedited (pink) and Elective (blue)



Staffing

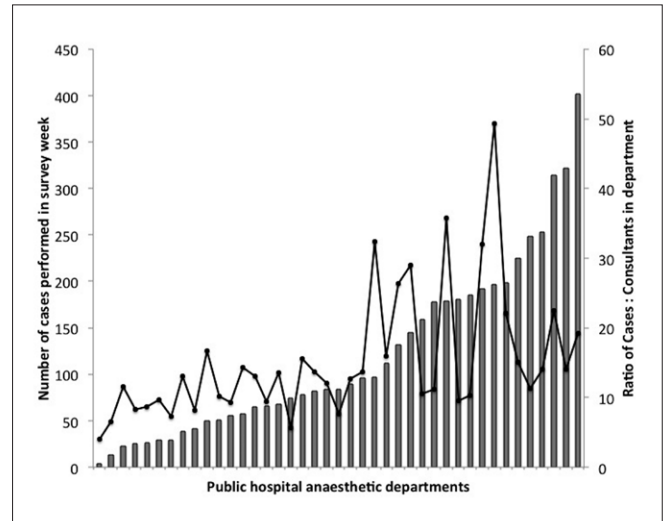
29.22 The most senior anaesthetist present during the procedure was recorded in >99% of cases, and this is presented in Table 29.3. A consultant was the most senior anaesthetist present during the procedure in 3,729 (75.3%) cases: 83.5% (3,390) of procedures that occurred during routine and 38.4% (331) of procedures during non-routine hours. Of the 1,190 (24%) NCHD-led cases, 526 (44.2%) occurred during non-routine hours. Nearly a third (364) involved procedures for labour analgesia on the delivery ward, with this split approximately equally between routine (169, 46.4%) and non-routine (186, 51.1%) hours.

Table 29.3. The most senior anaesthetist present during procedure in Public hospitals. Values are number (%). *To the nearest 100

Staff level		Total during survey	Estimated total per annum*
Consultant	Permanent	3,557 (71.9%)	188,500
	Locum	172 (3.5%)	9,100
NCHD= Non-Consultant Hospital Doctor	Post CST registrar	44 (0.9%)	2,300
	Specialist Registrar Year 4-5	147 (3%)	7,800
	Specialist Registrar Year 1-3	212 (4.3%)	11,200
	Registrar	621 (12.6%)	32,900
	Senior House Officer	156 (3.2%)	8,300
	Specialist Anaesthesia Trainee	10 (0.2%)	500
Other		4 (0.1%)	200
Unknown		26 (0.5%)	1,400
Total		4,949	262,300

29.23 Figure 29.8 illustrates how anaesthetic activity per consultant anaesthetist per week varied widely across anaesthetics departments (median (IQR [range]) = 13 (10 –16) [4 – 49]).

Figure 29.8. The number of cases performed by each of the 43 public hospital anaesthetics departments (x-axis), plotted from smallest to largest value (bars; read from left y-axis), and the corresponding ratio of cases performed during survey per consultant in that department (black line; read from right y-axis)



Anaesthetic conduct

29.24 More than one third (1,847, 37%) of patients had their first pre-operative anaesthetic assessment on arrival in theatre (Figure 29.9), which is disproportionately high when compared to the number of emergency admissions (839, 17%). In contrast, more than half of the 753 (15.2%) patients who had their initial pre-operative anaesthetic assessment through a pre-operative assessment clinic (PAC) underwent day case admission and most were ASA 1-3 (Figure 29.10).

Figure 29.9. Location of initial pre-operative anaesthetic assessment in Public hospitals for the different admission categories

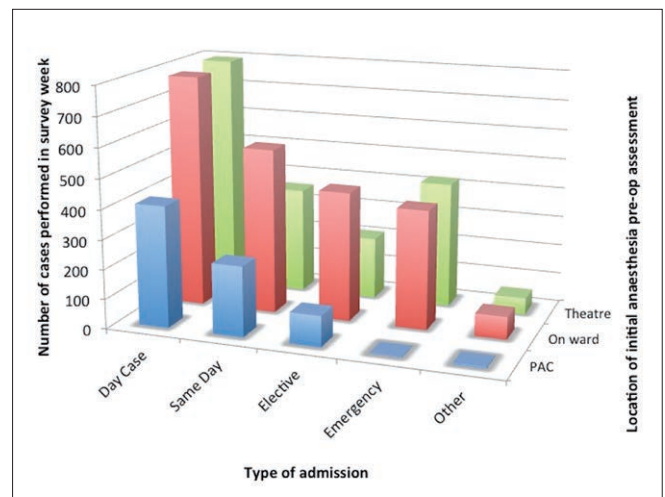
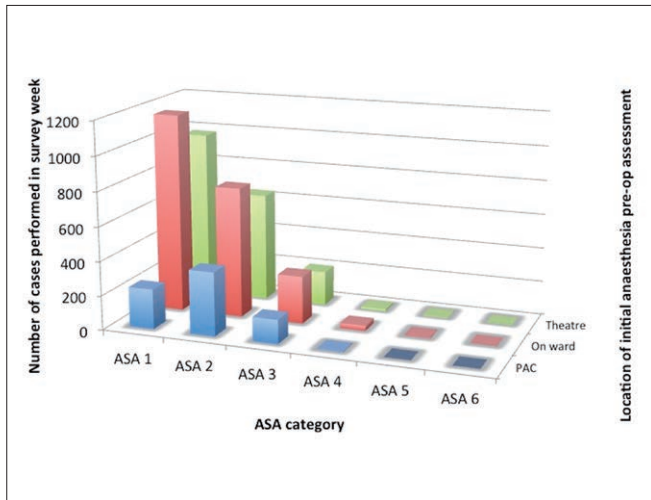


Figure 29.10. Location of pre-operative anaesthetic assessment in Public hospitals for different ASA physical status categories



29.25 Most (4,301, 87%) of the anaesthetic activity occurred in theatre with the remaining activity distributed in the following 'out-of theatre' locations: delivery ward (439, 9%), radiology (71, 1%), cardiology catheterisation lab (17, 0.3%), other (92, 2%) or unknown/undisclosed (29, 0.6%) locations.

29.26 General anaesthesia was administered to 3,527 patients in the public hospitals accounting for 71.3% of anaesthetic activity (annual estimate 187,000). Regional anaesthesia was the primary anaesthetic in 1,143 (23.1%) cases and combined with general anaesthesia in a further 415 (11.8%

of general anaesthesia) cases. Sedation, local anaesthesia and monitored anaesthesia care accounted for 138 (2.8%, annual estimate 7,300), 75 (1.5%, annual estimate 4,000) and 66 (1.3%, annual estimate 3,500) cases respectively.

29.27 Table 29.4 demonstrates the breakdown of the most commonly used airway devices as well as techniques used during general anaesthesia. Including the cases not displayed in 29.4 (i.e. those with less frequently used airway devices), volatile agents were used for 3,388 (96.1%) cases, total intravenous anaesthesia (TIVA) for 88 (2.8%) cases and target controlled infusion (TCI) for 84 (2.4%) cases. Nitrous oxide was administered for 793 (22.5%) cases. In 1,493 (42.3%) cases, a neuromuscular blocking drug (NMB) was administered. Specific DOA monitoring was used in the majority (38, 82.5%) of the public hospitals but in only a minority, 320 (9%) of the patients that received general anaesthesia. DOA monitoring was more prevalent when NMB was employed (~14% of patients with NMB) than when not used (~4% of patients with no NMB), and when TIVA was used: ~24% versus ~9% during volatile anaesthesia. Regional anaesthesia techniques combined with general anaesthesia were: epidural in 101 (2.9%) and peripheral nerve block in 314 (8.9%) cases. Out-of-theatre general anaesthetics comprised 134 (3.8%) cases.

Table 29.4. Most commonly used airway devices and associated techniques during general anaesthesia in public hospitals. Values are number (percentage). †Proportion of general anaesthesia cases. *Estimated total per annum to the nearest 100. Volatile= volatile anaesthetic agent, TIVA= total intravenous anaesthesia, NMB= neuromuscular blocking drug, DOA= depth of anaesthesia monitor

General Anaesthesia											
3,527 (71.3% of all cases) (187,000*)											
Tracheal tube				Supraglottic airway device				Facemask			
1,663 (47.2%†) (88,100*)				1,555 (44.1%†) (82,400*)				240 (6.8%†) (12,700*)			
Volatile		TIVA		Volatile		TIVA		Volatile		TIVA	
1,629		22		1,525		19		186		41	
NMB	No NMB	NMB	No NMB	NMB	No NMB	NMB	No NMB	NMB	No NMB	NMB	No NMB
1,323	256	16	6	79	1,342	2	17	21	157	14	27
DOA	DOA	DOA	DOA	DOA	DOA	DOA	DOA	DOA	DOA	DOA	DOA
181	7	6	0	8	57	2	2	6	4	0	0

29.28 Regional anaesthesia was the primary type of anaesthetic in 1,143 (23.1%) cases. Table 29.5 demonstrates the different regional techniques used. Regional anaesthesia for labour analgesia was provided in 434 (8.8% of all anaesthesia cases and 38% of regional anaesthesia cases) and for surgery in 709 (14.3% of all anaesthesia cases and 62% of regional anaesthesia cases) cases. Epidural and spinal anaesthesia were equally prevalent (each 508, 10.3% of all anaesthesia cases and 44.4% of regional anaesthesia cases), with combined spinal epidural techniques less so (17, 0.3% of all anaesthesia cases and 1.5% of regional anaesthesia cases).

29.29 Blood transfusions were administered to 107 (2.2%) patients while undergoing a procedure; in 39 (36% of transfusions) this was unplanned.

Post-operative care

29.30 The location of post-operative care after discharge from recovery or post-anaesthesia care unit was as follows: day-ward 1,825 (36.9%), ward 2,678, (54.11%), high-dependency unit 139 (2.8%), intensive-care unit 112 (2.3%) and unknown in 192 (3.9%). Two patients died before transfer from the theatre complex (excluding the two cases of organ retrieval). Twenty (0.4%) patients during the survey received post-operative care in a high-dependency or intensive-care unit that was not planned prior to the procedure. Nearly three-quarters (40, 70.2%) of the 57 ASA 4 and ASA 5 patients undergoing surgery were admitted to a high-dependency or intensive-care unit post-operatively.

DISCUSSION

29.31 This is the first comprehensive survey of anaesthetic activity in Ireland. The voluntary participation of all the nation's public hospitals and all but one of the independent hospitals reflects their interest

and commitment to audit and research. The very high response rate is likely due to a user-friendly form designed to collect a minimum essential dataset. A more detailed form might have provided more information but at the likely cost of a lower response rate.

29.32 Activity rates vary widely across the Irish hospitals, both in terms of total caseload (range 4 – 402 cases per week) and caseload per consultant (range 4 – 49 cases a week per consultant in public anaesthetic departments). Notwithstanding case complexity handled by individual hospitals, it seems reasonable that the feasibility of the smaller units is currently under review by the government's hospital reconfiguration plan (Reilly, 2013).

29.33 With an estimated population of 4,588,252 in the 2011 census (Central Statistics Office, 2011), our data suggest an annual incidence of ~9.3 anaesthetic procedures per 100 population and ~6.5 general anaesthetics per 100 population across public and independent hospitals. This is slightly higher than the 5-5.4 general anaesthetics per 100 population estimated during the NAP4 UK snapshot by Woodall and Cook (2011).

29.34 The public hospitals in Ireland use a Hospital In-Patient Enquiry (HIPE) database to collect data regarding hospital attendance. Unfortunately anaesthesia-related information is captured retrospectively by administrative staff and is limited to ASA physical status and type of anaesthetic (labour analgesia, general anaesthesia, regional anaesthesia or sedation). Our methods were more robust as the primary care providers (i.e. anaesthetists) entered data contemporaneously at the point of care. Of note: the total number of general anaesthetics obtained from HIPE dataset for 2012 (175,961) was approximately 10% less than the estimated total from this survey.

29.5 Techniques used where regional anaesthesia was the primary type of anaesthetic in public hospitals (including obstetric epidurals). Values are number (percentage). †Proportion of regional anaesthesia cases. *Annual estimate to the nearest 100

Regional Anaesthesia						
1,143 (23.1% of all cases) (60,600*)						
Epidural	Spinal	Peripheral nerve block (PNB)	Combined Spinal and PNB	Combined spinal epidural	Combined Epidural and PNB	Unknown
508 (44.4%†)	508 (44.4%†)	64 (5.6%†)	30 (2.6%†)	17 (1.5%†)	1 (<0.1%†)	15 (1.3%†)
27,000*	27,000*	3,400*	1,600*	900*	100*	800*

- 29.35 We considered a number of methods for calculating a scaling factor to derive an annual estimate of anaesthetic activity from our weeklong survey. One method was to use the HIPE data for 2012 and divide it by the number of general anaesthesia cases in public hospitals we obtained for the week, taking into account our overall error of ~4%. This gave us: $(175,961 / 3,527) \times 1.04 = 51.89$. This resulted in our lowest multiplication factor, giving an estimated total of $8,049 \times 51.89 = 417,662$ cases nationally. This method was rejected because no comparable national data are available for the independent hospitals. Another method was simply to use the number of days in 2012 and divide by the seven days of survey, i.e. $366 / 7 = 52.29$ then factoring in the ~4% error rate. This resulted in our highest multiplication factor (i.e. $52.29 \times 1.04 = 54.38$) giving an estimated total of $8049 \times 54.38 = 437,704$ cases nationally. However, we also rejected this method as it treats all weeks as identical and makes no adjustment for public/bank holidays. Our method more precisely multiplied the relevant activities by the number of weekdays/weekend days, counting bank holidays as the latter.
- 29.36 More than a third (3,100; 39%) of procedures took place in the independent hospitals (94% of which were for elective surgery), reflecting the greater private sector contribution to elective surgical services in Ireland as compared with other countries such as the UK (where non-NHS surgical activity accounts for just ~10% of the workload (Laing's Healthcare Market Review, 2012–13). The previously unknown anaesthesia workload division between public and independent hospitals made a national survey highly relevant and informative and may assist in future healthcare planning and audit. Difficult economic circumstances have resulted in a decline in private health insurance holders in Ireland from 50.9% to 45.8% in the period 2008 to 2012 (Health Insurance Authority, 2013). This decrease in membership has directly affected the public hospitals with a 9% decline in the number of private patients discharged from public hospitals and a corresponding increase in public patient discharges. The continued increase in health insurance premiums will most likely increase the reliance on public healthcare.
- 29.37 In terms of the delivery of healthcare in the public and independent sectors it is notable that all but 2% of anaesthesia interventions for obstetric care take place in the public sector. The single independent hospital that undertook obstetric cases has since closed. A slight majority of anaesthetic interventions for pain management, ophthalmology, urology and neurosurgery take place in the independent hospitals. Independent hospitals and their patients' are far more likely to be admitted for elective procedures (98% vs 79%), less likely to experience emergency admissions (1.4% vs 17%) and undergo far fewer NCEPOD urgent or emergency procedures. Independent hospitals perform proportionately fewer procedures out of hours (6% vs 12%) of which a larger proportion is elective (79% vs 11%). Although the proportion of patients with ASA1-2 physical status differs very little between locations (both ~85%) the public hospitals do the majority (57, 82%) of patients classified as ASA 4-5 nationally. Independent hospitals, patients undergoing anaesthesia interventions are generally older than those in public hospitals (median ages 46-55 and 36-45 years respectively). General anaesthesia in independent hospitals more often, than in public hospitals, involves use of a supraglottic airway device (57.6% vs 44.1%), and less frequently a tracheal tube (33.1% vs 47.2%). TIVA is used slightly more frequently in Independent hospital anaesthesia (5% vs 2.8%) and NMB slightly less frequently (36% vs 42%). independent hospitals perform a much smaller proportion of cases under regional anaesthesia alone (8.4% vs 23.1%), and regional anaesthesia is used less overall (15.9% vs 34.9%). When regional anaesthesia is used, epidurals and spinals respectively form a smaller and higher proportion of regional anaesthetic techniques performed there. In independent hospitals anaesthetist workload includes sedation and monitored anaesthesia care more often than in public hospitals (15.5% vs 2.8% of cases).
- 29.38 It is of concern that so many patients are seen for the first time by an anaesthetist only after they arrive in theatre (50% in independent hospitals and 37% in public hospitals), despite clear guidance that pre-operative evaluation must be performed earlier (AAGBI, 2010). Although evidence regarding the effect of the timing of the pre-operative anaesthetic assessment on patient outcome is not established, identification of inappropriate surgery, optimization of medical conditions and an environment for informed consent are really only possible before arrival in theatre. Furthermore, evaluation in a pre-operative clinic, days or weeks before surgery, is not a substitute for a pre-operative visit by the anaesthetist on the day of surgery. Specific research is needed to establish why anaesthetic practice in Ireland is deviating so much from established guidelines.

- 29.39 Some other data emerged that may be of interest to anaesthetists as a focus for further research. The overall rate of TIVA seems very low in Ireland, at just ~4% of all general anaesthesia cases (see Chapter 27 for UK). Yet, the highest use of TIVA was reported during facemask anaesthesia (17%). Perhaps this refers to the use of a technique employing intermittent boluses of intravenous agent like propofol, which respondents classed as 'TIVA'. The use of TIVA may have been underestimated, as the question regarding 'Anaesthesia agents used' (i.e. volatile agents, TIVA, TCI, Nitrous oxide and other), was potentially confusing as more than one option could be selected. If the TCI cases without volatile agents is included with TIVA, it only marginally increases TIVA usage to 4.6%.
- 29.40 The finding that specific DOA monitors were available in 82.5% of public hospitals during this survey correlates with the earlier findings from the NAP5-Ireland baseline survey (Chapter 28) that 80% of the public hospitals have access to DOA monitoring. Yet, this monitoring was used in only a minority (9%) of patients. The use of DOA monitors is much lower (4.8%) in the independent hospitals.
- 29.41 In conclusion, we undertook a survey of anaesthetic activity in Ireland. An estimated 187,000 general anaesthetics were performed in the public hospitals in 2012 and this was used to calculate the incidence of accidental awareness during general anaesthesia on completion of NAP5. The survey has provided important numerical information on anaesthetic activity and practices in both public and independent hospitals.

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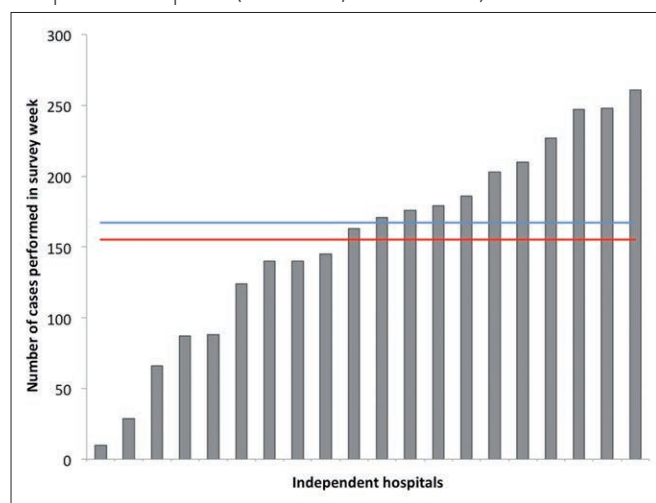
Irish independent hospital activity survey data

29.42 A total of 3,100 procedures took place in the 20 independent hospitals that participated in the anaesthetic activity survey in Ireland. After contacting the single independent hospital that did not take part it was apparent that activity was minimal so this has been approximated to zero.

Distribution of cases by location

29.43 Figure 29.A1 shows the distribution of cases across the 20 independent hospitals. The median number of cases per hospital captured during the survey was 167 (IQR 115–205, Range 10–261). During the one week survey the majority (15, 75%) of hospitals undertook >100 cases, with 6 (30%) hospitals performing >200 procedures. Only 4 (15%) of the Independent hospitals was affected by some theatre closure(s) during the survey period.

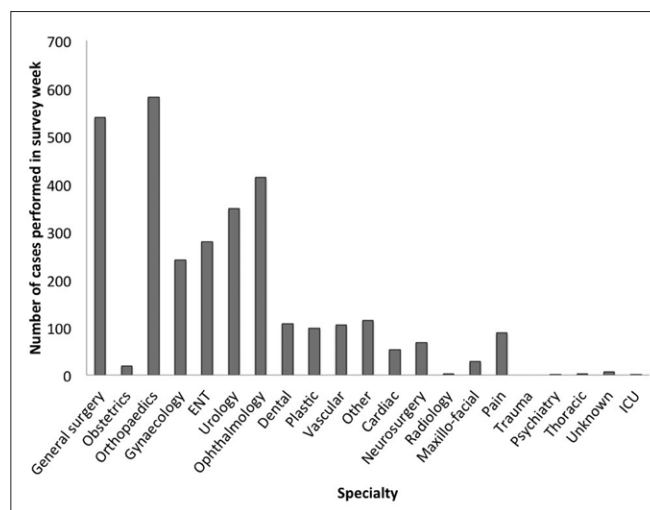
Figure 29.A1. Number of cases performed in each of the Independent hospitals. (Mean=red, median=blue).



Patient characteristics

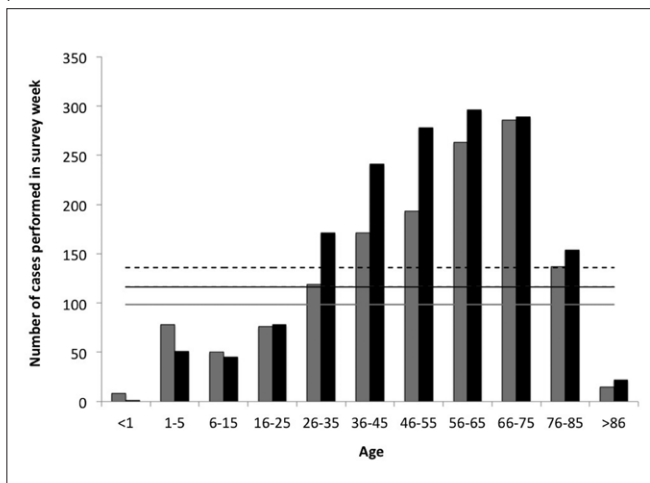
29.44 Figure 29.A2 shows the number of cases in each specialty performed during the AAS in same order as in Figure 29.3. In four specialties the number of procedures exceeded those performed in the public hospitals. These specialties were: Pain, Ophthalmology, Urology and Neurosurgery (64.9%, 63%, 55.1% and 51.5% of national activity respectively). In contrast, only 19 (2.2%) of the obstetric procedures performed nationally during the survey took place in the independent hospitals. The number of procedures for non-surgical specialties (psychiatry, pain, radiology and others including gastroenterology) was 206 (6.6% of independent hospital activity).

Figure 29.A2. Number of cases performed by specialty in independent hospitals. Note that 'ICU' refers to procedures with anaesthetic intervention undertaken in ICU (and not simply patients managed in ICU during survey period). Order on x-axis is same as in Figure 29.3



29.45 Figure 29.A3 demonstrates the distribution of cases by age and gender. More women underwent a procedure (1,634, 52.7%) than men (1,398, 45.1%). There was a slight preponderance of elderly patients undergoing procedures. The median age of women and men undergoing procedures in independent hospitals was 46–55 and 56–65 years respectively.

Figure 29.A3. The number of cases by age and gender in independent hospitals. Male (grey) and female (black). Mean number of cases per gender=dashed line, median number of cases per gender = continuous line



29.46 Table 29.A1 demonstrates the ASA physical status and NCEPOD classification of cases: 2,915 (94%) were Elective, while Immediate and Urgent cases constituted <2.5% of activity. This broadly matches the admission categories (Table 29.A2), which shows the majority of admissions were Day-Cases, Same-Day admissions and Elective admissions. Unplanned admissions (i.e. Emergency or Other, including inter-hospital transfer) were extremely rare (<2%).

Table 29.A2 Admission categories in Independent hospitals. Values are number (proportion). *To the nearest 100

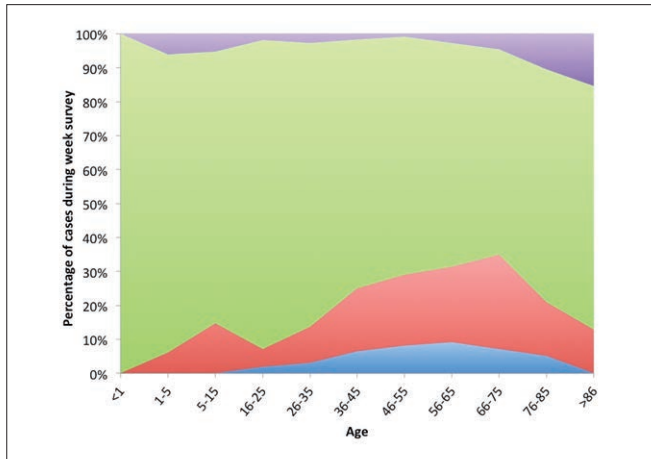
Admission type	Number of cases performed in survey week	Estimated total per annum*
Day-Case	2,093 (67.5%)	111,000
Same-Day	549 (17.7%)	29,100
Elective	390 (12.6%)	20,700
Emergency	44 (1.4%)	2300
Other	18 (0.6%)	1000
Unknown	6 (0.2%)	300
Total	3,100	164,300

Table 29.A1. Number of cases in each ASA physical status category and NCEPOD classification of priority of surgery collected during the survey in independent hospitals. Values are number (percentage). *To the nearest 100

	Immediate	Urgent	Expedited	Elective	Unknown	Total	Estimated total per annum*
ASA 1	3	23	24	1,316	18	1,384 (44.6%)	73,400
ASA 2	1	20	28	1,252	17	1,318 (42.5%)	69,900
ASA 3	0	24	16	303	3	346 (11.3%)	18,300
ASA 4	0	1	2	8	0	11 (0.4%)	600
ASA 5	0	0	0	1	0	1 (<0.1%)	53
ASA Unknown	0	0	1	35	4	40 (1.3%)	2,100
Total	4 (0.1%)	68 (2.2%)	71 (2.3%)	2,915 (94%)	42 (1.4%)	3,100	164,300
Estimated total per annum*	200	3,600	3,800	154,500	2,200	164,300	

29.47 Body habitus was reported in 3,068 (99%) patients. The distribution of body habitus between the different age groups is illustrated in Figure 29.A4. Nearly a quarter of patients were overweight (580, 18.7%) or obese (185, 6%). Nearly a third of patients aged 46–75 were overweight or obese, contrasting with 15.4% of patients aged >86 years who were underweight.

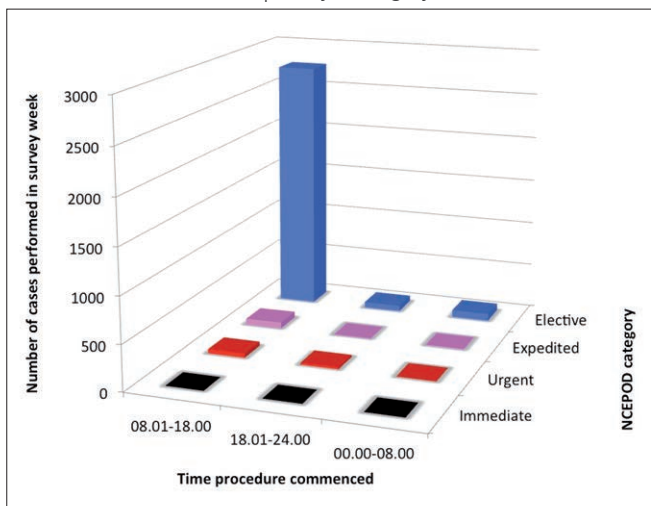
Figure 29.A4. Body habitus in each of the age categories for Independent hospitals. Underweight (purple), normal (green), overweight (red) and obese (blue)



Time of procedure

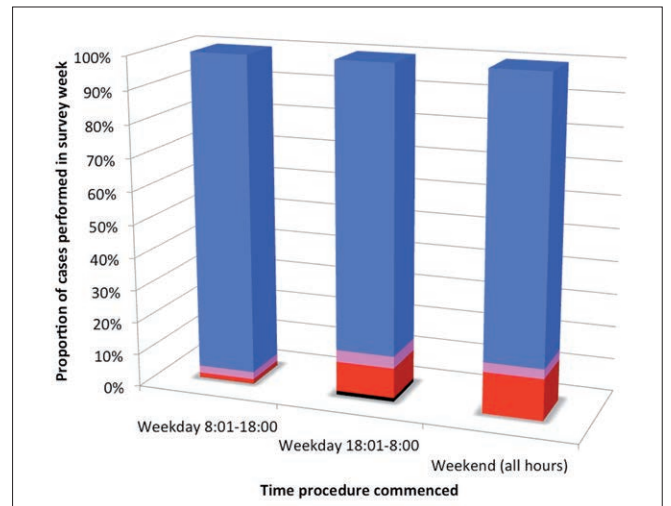
29.48 Almost all (93.8%) elective procedures commenced during normal working hours of 08:01–18:00 (Figure 29.A5). Approximately one in 18 (179, 5.7%) of all the procedures commenced after hours (i.e. between 18:01 and 08:00) consisting of mainly ‘Elective’ (142, 79.3%) NCEPOD category cases. Start time of cases, outside routine hours, was split evenly between 18:01–00:00 and 00:01–08:00 which likely reflects an earlier start and later finish time of routine lists in independent hospitals.

Figure 29.A5. Start time of procedure in Independent hospitals by National Confidential Enquiry into Patient Outcome and Death (NCEPOD) classification of priority of surgery



29.49 Most (2,990, 96.5%) of cases occurred on a weekday and 103 (3.3%) at the weekend. However, 268 (8.6%) of all cases started outside routine working hours (i.e. Monday to Friday 18:01 to 08:00 and all hours on the weekend). Figure 29.A6 illustrates the proportion of NCEPOD categories for the procedures that occurred during routine and non-routine hours.

Figure 29.A6. Time of start of procedure vs NCEPOD category. (weekday 08:01–18:00) and non-routine hours. Routine weekday 18:01–08:00 and all hours at weekend) in independent hospitals. Immediate (black), Urgent (red), Expedited (pink) and Elective (blue)



Staffing

29.50 The most senior anaesthetist present during the procedure was recorded in >99% of cases, and in 99.1% of cases a consultant anaesthetist was present (Table 29.A3). No data was collected regarding number of anaesthetic staff in the independent hospitals.

Table 29.A3. The most senior anaesthetist present during surgery in independent hospitals. Values are number (proportion). *To the nearest 100

Staff level		Total during survey	Estimated total per annum*
Consultant	Permanent	2,975 (96%)	157,700
	Locum	97 (3.1%)	5,100
Non-Consultant Hospital Doctor	Specialist Registrar Year 1–3	1 (<0.1%)	53
Unknown		27 (0.9%)	1,400
Total		3,100	164,300

Anaesthetic conduct

29.51 Half (1,555, 50.2%) of patients had their first pre-operative anaesthetic assessment on arrival in theatre (Figure 29.A7), which is disproportionately high as compared with the number of emergency

admissions (44, 1.4%). Nearly two-thirds of the 379 (12.2%) patients who had their initial pre-operative anaesthetic assessment through a pre-operative assessment clinic (PAC) were ASA 1 and 2 patients undergoing day-case admission (Figure 29.A8).

Figure 29.A7. Location of pre-operative anaesthetic assessment in independent hospitals for different types of admission

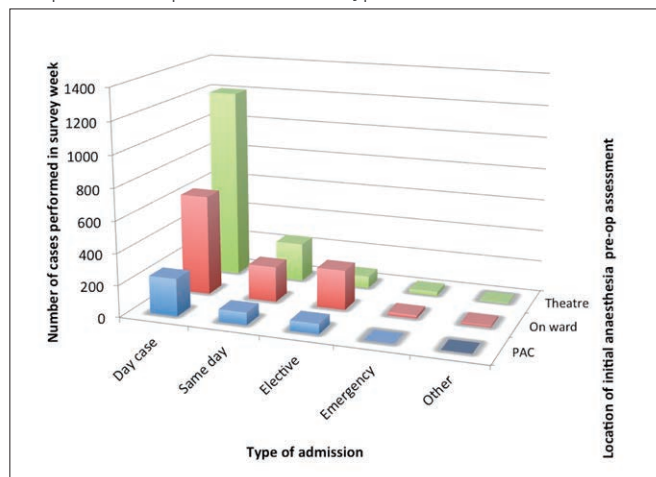
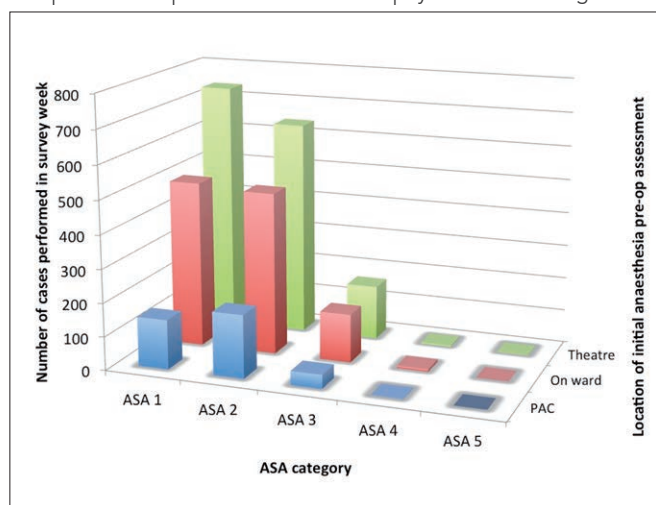


Figure 29.A8. Location of pre-operative anaesthetic assessment in independent hospitals for different ASA physical status categories



29.52 Most (2,801, 90.4%) of the anaesthetic activity occurred in theatre with the remaining activity distributed in the following 'out-of-theatre' locations: delivery ward (9, 0.3%), radiology (5, 0.2%), cardiology catheterisation lab (22, 0.7%), and in other or unknown locations (263, 8.5%).

29.53 General anaesthesia was administered to 2,094 patients in the independent hospitals, accounting for 67.6% of anaesthetic activity (annual estimate 111,000). Regional anaesthesia was the primary anaesthetic in 261 (8.4%) cases, and combined with general anaesthesia in a further 158 (7.5% of general anaesthesia) cases. Sedation, local anaesthesia and monitored anaesthesia care accounted for 480 (15.5%, annual estimate 25,400), 215 (6.9%, annual estimate 11,400) and 50 (1.6%, annual estimate 2,700) cases respectively.

29.54 Table 29.A4 demonstrates the breakdown of the most commonly used airway devices as well as techniques used during general anaesthesia. Including the cases not displayed in Table 29.A4 (i.e. those with less frequently used airway devices), volatile agents were used for 1,925 (92%) cases, total intravenous anaesthesia (TIVA) for 131 (6.3%) cases and target controlled infusion (TCI) for 50 (2.4%) cases (29 of which did not have concomitant use of volatile agents). Nitrous oxide was administered for 744 (35.5%) cases. In 749 (35.8%) cases a neuromuscular blocking drug (NMB) was administered. Specific depth of anaesthesia (DOA) monitoring was used in 9 (45%) of the independent hospitals, but in only a minority, (100 <5%) of the patients who received general anaesthesia. DOA monitoring was more prevalent when NMB was employed (~10% of patients with NMB) than when not used (just ~1% of patients with no NMB), but not when TIVA was used: 5% during volatile anaesthesia and <2% during TIVA. The technique

Table 29.A4. Most commonly used airway devices and associated techniques during general anaesthesia in independent hospitals. Values are number (percentage). †Proportion of general anaesthesia cases. *Estimated total per annum to the nearest 100.

General Anaesthesia 2,094 (67.5% of all cases) (111,000*)											
Tracheal tube 693 (33.1%†) (36,700*)				Supraglottic airway device 1,206 (57.6%†) (63,900*)				Facemask 140 (6.7%†) (7,400*)			
Volatile 688		TIVA 2		Volatile 1,185		TIVA 16		Volatile 44		TIVA 94	
NMB 563	No NMB 114	NMB 2	No NMB 0	NMB 168	No NMB 961	NMB 1	No NMB 15	NMB 7	No NMB 30	NMB 0	No NMB 91
DOA 77	DOA 0	DOA 0	DOA 0	DOA 2	DOA 14	DOA 0	DOA 0	DOA 0	DOA 0	DOA 0	DOA 2

used for regional anaesthesia when combined with general anaesthesia was an epidural in 12 (0.6%), spinal in 17 (0.8%) and peripheral nerve block in 129 (6.2%) cases. Out-of-theatre general anaesthetics comprised 55 (2.6%) cases.

29.55 Regional anaesthesia was the primary type of anaesthetic in 261 (8.4%) cases. Table 29.A5 demonstrates the different regional techniques used. Regional anaesthesia for labour analgesia was provided in 10 (0.3% of all anaesthesia cases and 3.8% of regional anaesthesia cases) and for surgery in 251 (8.1% of all anaesthesia cases and 96.2% of regional anaesthesia cases) cases. Spinal anaesthesia was the most frequently used technique 152 (4.9% of all anaesthesia cases and 58.2% of regional anaesthesia cases).

29.56 Blood transfusions were administered to 31 (1%) patients while undergoing a procedure; in 3 (10% of transfusions) this was unplanned.

Post-operative care

29.57 The location of post-operative care after discharge from recovery or post-anaesthesia care unit was as follows: day ward (2028, 65.4%), ward (957, 30.9%), high-dependency unit (41, 1.3%), intensive care unit (44, 1.4%) and unknown in 30 (1%). Only one patient during the survey received post-operative care in a high-dependency unit that was not planned prior to the procedure. Six (50%) of the 12 ASA 4 and ASA 5 patients undergoing surgery were admitted to an intensive care unit post-operatively.

29.A5. Techniques used where regional anaesthesia was the primary type of anaesthetic in independent hospitals (including obstetric epidurals). Values are number (percentage). †Proportion of regional anaesthesia cases. *Annual estimate to the nearest 100

Regional Anaesthesia						
261 (8.4% of all cases) (13,800*)						
Epidural	Spinal	Peripheral nerve block (PNB)	Combined Spinal and PNB	Combined spinal epidural	Combined Epidural and PNB	Unknown
21 (8%†)	152 (58.2%†)	62 (23.8%†)	7 (2.7%†)	2 (0.8%†)	0 (0%†)	17 (6.5%†)
1,100*	8,100*	3,300*	400*	100*	0*	900*