Anaesthesia

National Clinical Programme for Anaesthesia

AUDIT WORK STREAM

Can H.I.P.E. be used as an Audit Tool for Anaesthesia?

CAI
SALUS DUM VIGILAMUS
College of Anaesthetists of Ireland

HSE
Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

May 2015

Anaesthesia

National Clinical Programme for Anaesthesia

AUDIT WORK STREAM

Can H.I.P.E. be used as an Audit Tool for Anaesthesia?

CAI
SALUS DUM VIGILAMUS
College of Anaesthetists of Ireland

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

May 2015

Summary

1. Currently there is no national audit of anaesthesia activity in Ireland.

2. The National Clinical Programme for Anaesthesia (NCPA) and the Healthcare Pricing Office (HPO) have developed a set of search criteria to retrieve information from the Hospital Inpatient Enquiry (HIPE) for patients who have had General anaesthesia, Neuraxial block or Regional block, describing their age, gender, ASA status, type of anaesthetic, urgency of the procedure and the surgical specialty.

3. Data retrieved from HIPE using these search criteria were then compared with data collected during the conduct of the National Audit Project 5 (NAP5).

4. The results of this comparative study show a very close relationship between HIPE data and NAP5 data for total number of procedures, gender, age and number of general anaesthetics given. Major differences occurred with regards to ASA status and the emergency or elective nature of the procedure. Comparison by surgical specialty proved unsatisfactory because HIPE and NAP5 use different methods to assign surgical specialty.

5 We believe that the discrepancies between HIPE data and NAP5 data are largely due to poor completion of anaesthetic record sheets which are the primary source for HIPE coders, rather than a failure of the HIPE system. This however offers an excellent opportunity for auditing the standards of anaesthetic record keeping.

6. A national report on anaesthetic activity for 2013 is being prepared using the new search criteria. Future Annual reports are planned but feedback from clinicians and engagement with proposed audit projects is essential.

7. For the immediate future, Annual Reports will not include information on local anaesthesia or sedation as this requires the use of HIPE consultant anaesthetist's code numbers to distinguish anaesthetist from non-anaesthetist administered local anaesthesia or sedation.

8. NCPA considers that audit of Pain Medicine activity is best conducted by the Faculty of Pain Medicine.

From January 1st 2014 the National Casemix Programme and the Health Research and Information division of the ESRI became part of the Healthcare Pricing Office (HPO). For more information see www.HPO.ie

Evaluation of HIPE as an audit tool for Anaesthesia - an NCPA Audit Work Stream Project

Introduction & Background

Currently there is no national audit of anaesthesia activity in Ireland. There is however an established data collection organisation in every hospital in the Country, namely the Hospital In patient Enquiry (HIPE), which is fully staffed and is supported by the Healthcare Pricing Office (HPO) since January 2014 and by the Economic and Social Research Institute (ESRI) prior to this date. The quality of the data produced by HIPE has been questioned by clinicians[1, 2] but clinicians have always been reluctant to engage with HIPE in a meaningful way[3]. The assertion that HIPE data is unreliable may be largely a self fulfilling prophesy. While the NCPA is convinced that the HIPE system has considerable potential for generating valuable data on anaesthesia activity and for conducting audits, we realise that the system must be examined and validated before it can be considered as a credible audit tool.

The principal and long term objective of the NCPA Audit Work Stream is to examine the HIPE system to see if reliable and credible data describing anaesthesia activity could be retrieved so as to produce Annual National Reports and to facilitate various audit projects. However, the NCPA faced two immediate problems. Firstly the lack of a "gold standard" to which HIPE data could be compared, and secondly the understandable scepticism within the Specialty that has little experience of HIPE and therefore remained to be convinced of its potential.

A possible solution to both of these problems appeared when the National Audit Project 5[4] (NAP5) was extended to Ireland[5]. NAP5 examined the incidence of accidental awareness during general anaesthesia in Ireland and Great Britain. As part of the project an Anaesthetic Activity Survey[6] (AAS) was carried out in Ireland during the week of November 26th to December 2nd, 2012. NAP5 in Ireland was organised and run by the College of Anaesthetists of Ireland and the Association of Anaesthetists of Great Britain & Ireland. Anaesthetic departments in every public hospital in the Country took part in the project and contributed data, making it the first ever assessment of anaesthetic activity at National level in Ireland. Given the impressive level of support for the NAP5 exercise, NCPA felt that the results of the Anaesthetic Activity Survey could reasonably be considered to be a gold standard or suitable yard stick to which HIPE data for the same period could be compared as part of the validation process. For the same reasons such a comparative exercise would also generate interest within the specialty and would help to focus attention on the NCPA Audit Project.

The NCPA set out four specific phases for the Audit work stream following discussions with the Health Intelligence Unit of the HSE, the coordinators of the NAP5 project in Ireland and the Healthcare Pricing Office (HPO).

Phase 1.	Identify a set of data fields common to HIPE, the Anaesthetic Activity Survey data collection sheet and anaesthetic record sheets in clinical use.
Phase 2.	Develop and refine a set of search criteria that would ensure accurate and consistent retrieval of data from HIPE.
Phase 3.	Compare the data from the NAP5 Anaesthetic Activity Survey with data retrieved from HIPE and publicise the results.
Phase 4.	Produce a report describing anaesthetic activity for a full year (2013) at National level based on the common data fields referred to above.

PHASE 1:
Identify a set of data fields common to HIPE, the Anaesthetic Activity Survey data collection sheet and anaesthetic record sheets in clinical use.

The work of finding a common set of data fields included a review of anaesthetic data contained in the HIPE system, a survey of all anaesthetic departments in the Country to gain an understanding of what is routinely recorded on the anaesthetic record sheet and an examination of the data collection sheet used in the AAS. Six common data fields were quickly identified – Age, Gender, ASA Status, Type of Anaesthetic, Urgency of the Procedure and a description of the Procedure. The first three are described identically in HIPE, on the AAS data collection sheet and on anaesthetic record sheets but there is some variation in the way in which the last three pieces of data are described. For example, HIPE combines spinal and epidural anaesthesia under the single description Neuraxial, the AAS project alone used the expanded NCEPOD format for describing the urgency of the procedure and not all anaesthetic records sheets indicate the gender of the patient. Nevertheless we are satisfied that there is adequate overlap between the three data sources for these six data fields to generate useful information in relation to anaesthetic activity and for a comparative study of HIPE and the AAS.

Examination of how the HIPE system describes the type of anaesthetic administered, uncovered an interesting technical challenge. While general anaesthesia, neuraxial blocks and regional blocks are administered (almost) exclusively by anaesthetists, local anaesthesia and sedation are probably more commonly administered by non anaesthetists. Identifying procedures carried out by anaesthetists under local anaesthesia or sedation requires the use of the consultant code number which is contained in HIPE. This exercise of sub dividing all such procedures into “anaesthetist administered” and “non anaesthetist administered” can be done only at individual hospital level as the HPO does not have access to consultant code numbers. Conducting such an exercise however would introduce a level of complexity and a resource requirement which NCPA considers to be outside the capacity of this particular project and therefore decided not to attempt to retrieve data on procedures carried out under local anaesthesia or sedation. Such data can and should be the subject of future NCPA Audit projects and the College of Anaesthetists may have a pivotal role to play in collating the data from individual anaesthetic departments and compiling the results.

A similar challenge arose in relation to data on Pain procedures. Pain Medicine is a sub specialty of Anaesthesia and has its own Faculty within the College of Anaesthetists. Some Pain procedures are carried out by non anaesthetists and many procedures do not require hospital admission and therefore are not captured by HIPE. The NCPA therefore decided that an audit of Pain Medicine activity would best be conducted by the Faculty of Pain Medicine and will therefore not include it in NCPA audits.

A summary of the work of Phase 1 is given in appendix A

Phase 2:
Develop and refine a set of search criteria that would ensure accurate and consistent retrieval of data from HIPE.

Some preliminary work carried out at the Mercy University Hospital identified the need for the development of a standard set of search criteria which would retrieve data from the HIPE system in a consistent and reliable manner and which could be used in any HIPE office in the Country. Our experience showed that queries submitted to the HIPE system generated reports which contained a large number of false negatives and false positives, i.e. data which had been captured in HIPE was not included in the reports and data which had not been (intentionally) sought was included.

The work of Phase 2 therefore involved searching the HIPE system for anaesthesia data, comparing the output with data from a second source (theatre database), identifying and explaining discrepancies between the two sets of data, and progressively modifying and refining the search criteria.

HIPE data on anaesthesia activity in three hospitals, (Mercy University Hospital, Tallaght Hospital and Kerry General Hospital, Tralee), for the week of November 26th to December 2nd 2012 was examined and compared with data retrieved from the theatre databases in these hospitals for the same period. Patient medical record numbers (MRN) were used as unique identifiers and a match for every case in the theatre databases was sought in the HIPE data. The initial match rate was just over 75%, i.e., 75% of cases that appeared in the theatre databases also appeared in the HIPE system but 25% were unaccounted for and unmatched. The unmatched cases were investigated individually by re-examining the HIPE system as well as patient case notes and hard copy theatre ledgers when necessary. This proved an interesting but time consuming exercise and revealed a large number of "technical errors" which accounted for the apparently missing cases. These technical errors included failures and inadequacies in the search criteria used to interrogate HIPE, single digit MRN errors, patients with more than one MRN, differences in time and, or dates of admission or of procedures , multiple entry of the same case, and unintended inclusion of cases carried out under local or sedation.

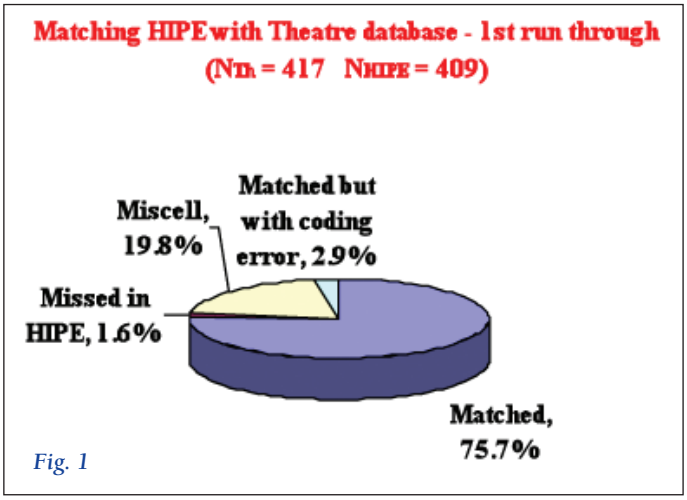

Fig. 1

Eventually all of the unmatched cases were identified and the reason for their omission or unintended inclusion found. At this point 98% of theatre cases were matched in HIPE. 2% of cases were completely missed by HIPE due to a systems failure whereby the HIPE office had not been informed of these patients admission. Within the 98% of cases captured by HIPE, 3% were incorrectly coded as local anaesthesia, sedation or no anaesthesia rather than general anaesthesia, neuraxial or regional block. This means of course that these cases would not be picked up by search criteria which exclude local anaesthesia and sedation. These episodes of incorrect coding arose because of inadequately completed anaesthetic record sheets which meant that coders could only use a "best estimate" or a default option of sedation to code the type of anaesthetic. This is a disappointing finding but has an important redeeming feature in that it's solution lies entirely in the hands of clinicians because, by simply diligently and accurately completing all anaesthetic record sheets these error can be abolished.

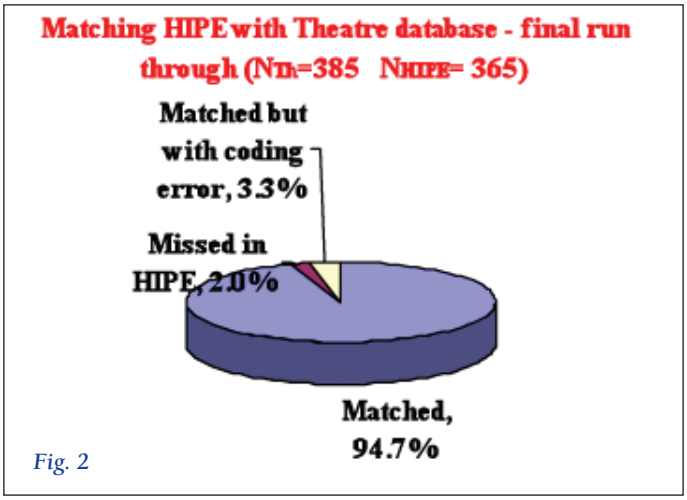

Fig. 2

Currently the HPO is preparing the new refined search criteria as a small programme which will be made available to all HIPE offices so that individual anaesthetic departments can audit their own activity.

Phase 3:
Compare the results of the Anaesthetic Activity Survey with data retrieved from the HIPE.

In order to complete Phase 3, the authors of the AAS provided a sub set of their data. This sub set described the total numbers of general anaesthetics, neuraxial blocks and regional blocks along with a breakdown of age, gender, ASA status, urgency in the simple format and the surgical specialties. These data were then set out alongside data retrieved from HIPE by the HPO using the refined set of search criteria. The results of this comparative study are shown in appendix B and the six elements are discussed individually here.

*NOTE: For reasons of confidentiality HIPE does not display figures of 5 or less. Where this occurs HIPE suppresses the figure in the cell and replaces it with the sign ~. Where further suppression is necessary to ensure that cells with 5 or less are not disclosed, it may be necessary to suppress a cell with the next lowest number, these cells will have been replaced with **

Totals numbers and Gender

GENDER			
	NAP5	HIPE	% Capture
Male	1773	1807	101.9%
Female	2844	2839	99.8%
Unknown	53	0	
Total	4670	4646	99.5%

The total number of GA's, Neuraxial blocks or Regional blocks identified by the NAP 5 AAS was 4,670 while HIPE identified 4,646 cases for the same week. If the NAP 5 AAS data are taken as the reference point, the degree to which HIPE data coincides is indicated by the figure in the % Capture column. The difference between the totals is very small indeed, 0.5%. On it's own this might not mean very much, as demonstrated in Phase 2, (N_{Th} = 417 N_{HIPE} = 409) but taken in conjunction with the work done on refining the search criteria we believe that this is a significant and meaningful result and that the two systems are looking at the same group of patients and this confers credibility on the figures for the rest of the study.

ASA Status

ASA STATUS			
	NAP5	HIPE	% Capture
ASA 1	2342	1457	62.2%
ASA 2	1654	1136	68.7%
ASA 3	558	360	
ASA 4	47	27	
ASA 5	8	*	
ASA 6	2	~	
Unknown	59	1663	
	4670	4646	

There are large differences in the distribution of the patient ASA status between the two sources. This is undoubtedly due the very large number of "unknowns" in the HIPE data which means that the anaesthetic record sheet did not indicate the patient ASA status. This is an entirely correctable error and at the same time provides an opportunity for a simple audit project on the completeness of anaesthetic record sheets.

HIPE does not record ASA 6. These are patients with a diagnosis of Brain Stem Death and who are the subjects of organ retrieval. The time of death for these patients is given as the time of completion of the second set of Brain Stem Tests which is equivalent to Time of Discharge in the HIPE system. NCPA considers this to be very important data and is currently discussing the possibility of capturing all ASA 6 entries with our colleagues in HIPE.

Urgency of the Procedure

URGENCY			
	NAP5	HIPE	% Capture
Emergency	1791	454	25.3%
Elective	2753	4192	152.3%
Unknown	126	0	0.0%
	4670	4646	

For the purpose of the comparative study the AAS categories "Immediate", "Urgent" and "Expedited" have been combined as "Emergency". There is no correlation between AAS and HIPE figures for elective versus emergency status with HIPE capturing just 25% of emergencies recorded in the AAS. The explanation for this discrepancy lies in the fact that the Australian Classification of Health Interventions (ACHI)[7] used for coding anaesthesia in HIPE only specifically records the urgency of a procedure when it is an "Emergency". If not designated as "emergency" on the anaesthetic record sheet, or if the anaesthetic record sheet fails to record any grade of urgency, ACHI codes the procedure as "elective". Therefore HIPE "elective" actually means "elective **OR** "unknown". In 35% of the HIPE cases the ASA status was "unknown" (see above). At the same time "elective" cases exceed the AAS figure by 33%. In clinical practice it is common to combine ASA status and urgency on the anaesthetic record sheet thus, ***ASA 3^{E}***, so it is highly likely that the differences between AAS and HIPE regarding ASA status and Urgency of Procedure occurred for the same reason, i.e. incomplete anaesthetic record sheets. This offers another ideal opportunity for a simple audit project to examine standards of anaesthetic record keeping. Also, NCPA and the HPO are currently examining ways of improving the recording of the urgency of procedures for HIPE.

Age

AGE			
	NAP5	HIPE	% Capture
<1yr	61	55	90%
1 -5yrs	371	349	94%
6 - 15yrs	431	412	
16 - 25yrs	411	420	
26 - 35yrs	951	899	
36 - 45yrs	683	704	
46 - 55yrs	504	519	
56 - 65yrs	520	531	
66 - 75yrs	446	450	
76 - 85yrs	221	247	112%
> 85yrs	50	60	120%
Unknown	21	0	
	4670	4646	

The distribution according to age category is broadly similar between NAP5 and HIPE with 7 of the 11 age bands for HIPE within 5% of the NAP5 figure. There are no "unknowns" in HIPE. The manner in which age is calculated could also be significant. For the NAP5 survey, patient's age and age band was most likely calculated manually by the clinician during the surgical procedure. For HIPE these figures are calculated electronically automatically from the date of birth and the date of the admission. The chance of an error in HIPE may therefore be lower than for manual calculations made during the procedure.

Type of Anaesthesia

TYPE OF ANAESTHESIA			
	NAP5	HIPE	% Capture
GA	3527	3511	99.5%
Neuraxial	1079	994	92.1%
Regional	64	141	
Unknown	0	0	
TOTAL	4670	4646	

The figures for general anaesthesia are almost identical but there is an interesting divergence in the figures for neuraxial and regional blocks. There is no clear explanation for this at present but one possibility is the practice of categorising the type of anaesthesia firstly as "General", "Regional", "Local", "Sedation" etc and subsequently sub dividing "Regional" into Epidural, Spinal, Peripheral nerve block etc. This format was used on the data collection sheet of the AAS and may well be common practice on anaesthetic record sheets generally. HIPE coders might be encouraged to examine anaesthetic record sheets thoroughly to see if the type of anaesthetic is described in this fashion.

It is worth noting that the number of anaesthetics exceeds the number of patients as a small number of patients (143) had more than one anaesthetic during the observation period.

Surgical Specialty

SURGICAL SPECIALITY			
	NAP5	HIPE	% Capture
Cardiac	78	62	
Dental	211	113	
ENT	375	377	100.5%
Gen Surgery	926	1008	
Gynaecology	497	405	**
ICU	6	0	
Max-Facial	48	57	
Neurosurgery	64	70	
Obstetrics	850	931	**
Ophthalmology	135	153	
Orthopaedics	709	761	
Pain	19	~	
Plastics	164	163	99.4%
Psychiatry	21	~	
Radiology	53	~	
Thoracic	19	0	
Trauma	28	0	
Urology	277	237	
Vascular	94	89	94.7%
Other	79	208	
Unknown	17	0	
	4670	4646	

The attempt to compare NAP5 and HIPE according to Surgical Specialty proved difficult and in the end was considered unsatisfactory. The reason for this lies in the quite different way in which the two systems decide on the surgical specialty of the procedure. For NAP5, the determining factor is the specialty of the operating surgeon. For HIPE[8], it is the specialty of the principle diagnosis consultant. NAP5 has 20 specialty categories, HIPE has 48 for the same group of patients including a large number of medical specialties. The 48 HIPE categories were reduced to 20 by combining compatible specialties and putting many of the medical specialties into the category "Other". There was a very close correlation for the specialties of ENT, Plastics, Vascular surgery and for Obstetrics and Gynaecology when these latter two are combined. Otherwise the correlation is poor. The full HIPE list is given in Appendix C.

The results of the Comparative study conducted in Phase 3 can now be publicised within the larger anaesthetic community to encourage discussion and to generate interest in the potential of the HIPE system. The potential for auditing the standards of anaesthetic record keeping should also be emphasised and there should be a formal audit exercise, urging clinicians to pay particular attention to completing the patient ASA Status and the urgency of the procedure on their anaesthetic record sheets and these two elements can then be re-audited again in say, six months time, to complete the audit cycle and publicise the results.

The NCPA has already commenced discussions with the HPO to see if ASA 6 patient status can be recorded by HIPE coders in the future and also to examine ways of specifically identifying "elective" procedures in the HIPE data base.

Phase 4:
Produce a report describing anaesthetic activity for a full year (2013) at National level based on the six simple data fields and using the refined search criteria developed in Phase 2.

Work on compiling the National report for 2013 has already begun and the report should be available for publication before the end of the first quarter of 2015. The format of this report will be similar to that of the Comparative study except for the manner in which the surgical categories are described. Future reports will use the HIPE **ACHI Interventions Chapters** (Appendix C) to describe surgical categories. When HIPE returns for the year 2014 (3rd quarter 2015) have been completed, work on the report for 2014 will begin and it is anticipated that this pattern of annual reporting will continue into the future.

While we are confident that the work of Phase 2 has refined the search criteria to a considerable degree we are convinced that this exercise must continue. Individual anaesthetic departments that are willing and able to submit data for periods of up to one month will be invited to engage with the NCPA and the HPO so that the work of testing and validating the search criteria can continue. This exercise will be an integral part of the audit process and it is anticipated that minor adjustments to the search criteria will be made from time to time. Data from specialist departments, e.g. paediatrics, obstetrics or orthopaedics could be particularly informative.

National figures based on the six simple data fields identified in Phase 1 will form the basis of the Annual Reports but other related information contained in the HIPE system will also be retrieved and presented. Figures for day case anaesthesia, day of surgery admissions, length of stay, combined anaesthetic techniques, multiple anaesthetics during the same admission etc can be presented as supplementary reports to the Annual report. The format of the full National report may also be applied to certain sub groups of patients for example paediatric patients, elderly patients or patients having emergency procedures.

Capturing data describing local anaesthesia or sedation given by anaesthetists remains an important objective of the NCPA but our immediate objective is to establish the practice of publishing annual reports and supplementary reports, starting simple audit projects and encouraging feedback from clinical practice. Nevertheless, in the near future we hope to start discussions with the College of Anaesthetists and individual anaesthetic departments regarding the possible use of consultant anaesthetists HIPE code numbers to identify procedures carried out under local anaesthesia or sedation.

Appendix A

Minimum Common dataset required for comparison of H.I.P.E., Anaesthetic Activity Survey and Anaesthetic Record sheet

Age	Recorded in all three or can be calculated by using DOB and date of procedure.
Gender	Recorded in HIPE and AAS. Not all anaesthetic records include patient gender.
ASA Status	Present in all three. Note: HIPE does not record ASA 6.
Name of Procedure	Present in HIPE & Anaesthetic Record but not AAS. Surgical Specialty an alternative.
Urgency of Procedure	(Elective or Emergency) Present in Anaesthetic record and AAS as simple or expanded (NCEPOD) version. The Australian Classification of Health Interventions used in HIPE specifically records emergency procedures but not elective as part of the anaesthetic code. Where emergency is not specifically stated, HIPE interprets this as "Elective" OR "Unknown".
Type of Anaesthetic	GA, Neuraxial, Regional } Present in HIPE & AAS & Anaesthetic record sheet. Local & Sedation } Most sedation and Local anaesthesia probably given non anaesthetists } Both can be identified for anaesthesia by using consultant code Pain Medicine Procedures. Faculty of Pain Medicine

Appendix B

Anaesthesia

National Clinical Programme of Anaesthesia

CAI College of Anaesthetists of Ireland

HSE Feidhmeannacht na Seirbhíse Sláinte Health Service Executive

A comparison of NAP 5 data with HIPE data for the period November 21st to 28th 2012

The total number of cases identified by the NAPs 5 Snapshot project was 24.357 while HIPE identified 23,300 cases for the isame week. The figures for individual data sets are set out below with commentary. If the NAP 5 data are taken as the reference point, the degree to which HIPE data coinsides is indicated by the % Capture column.

GENDER

	NAP5	HIPE	% Capture
Male	1773	1807	101.9%
Female	2844	2839	99.8%
Unknown	53	0	
Total	4670	4646	99.5%

TYPE OF ANAESTHESIA

	NAP5	HIPE	% Capture
GA	3527	3511	99.5%
Neuraxial	1079	994	92.1%
Regional	64	141	
Unknown	0	0	
TOTAL	4670	4646	

URGENCY

	NAP5	HIPE	% Capture
Emergency	1791	454	25.3%
Elective	2753	4192	152.3%
Unknown	126	0	0.0%
	4670	4646	

Acklowlegements
1. Economic & Social Research Institute HIPE
2. College of Anaesthetists of Ireland
3. NAPS
4. AAGB & I

ASA STATUS

	NAP5	HIPE	% Capture
ASA 1	2342	1457	62.2%
ASA 2	1654	1136	68.7%
ASA 3	558	360	
ASA 4	47	27	
ASA 5	8	*	
ASA 6	2	~	
Unknown	59	1663	
	4670	4646	

AGE

	NAP5	HIPE	% Capture
<1yr	61	55	90%
1 -5yrs	371	349	94%
6 - 15yrs	431	412	
16 - 25yrs	411	420	
26 - 35yrs	951	899	
36 - 45yrs	683	704	
46 - 55yrs	504	519	
56 - 65yrs	520	531	
66 - 75yrs	446	450	
76 - 85yrs	221	247	112%
> 85yrs	50	60	120%
Unknown	21	0	
	4670	4646	

SURGICAL SPECIALITY

	NAP5	HIPE	% Capture
Cardiac	78	62	
Dental	211	113	
ENT	375	377	100.5%
Gen Surgery	926	1008	
Gynaecology	497	405	**
ICU	6	0	
Max-Facial	48	57	
Neurosurgery	64	70	
Obstetrics	850	931	**
Ophthalmology	135	153	
Orthopaedics	709	761	
Pain	19	~	
Plastics	164	163	99.4%
Psychiatry	21	~	
Radiology	53	~	
Thoracic	19	0	
Trauma	28	0	
Urology	277	237	
Vascular	94	89	94.7%
Other	79	208	
Unknown	17	0	
	4670	4646	

Appendix C

Category by Principal Diagnosis Consultant

cardio thoracic surgery 62	cardiology 23	paediatric oncology 6
dental surgery 111	endocrinology . . . . . .~	neonatology . . . . . .~
oral surgery . . . . . .~	gastro enterology 9	paediatric gastro entero 24
general surgery 874	geriatric medicine . . . . . .~	paediatric haematology 21
gastro intestinal surgery . . .45	neurology 6	paediatric nephrology . . . . . .~
hepatobiliary surgery . . . . . .~	oncology 9	paediatric respiratory m 8
breast surgery 15	nephrology 15	otolaryngology 364
paediatric surgery 69	respiratory medicine . . . . . .~	paediatric ENT 13
gynaecology 405	rheumatology . . . . . .~	pain relief 6
maxillo-facial 57	infectious diseases . . . . . .~	plastic surgery 163
neurosurgery 67	general medicine 22	psychiatry . . . . . .~
paediatric neurosurgery . . . . .~	palliative medicine . . . . . .~	radiology . . . . . .~
obstetrics/gynaecology . . .180	radiotherapy . . . . . .~	neuroradiology . . . . . .~
obstetrics 751	other . . . . . .~	urology 237
ophthalmology 153	paediatric neurology . . . . . .~	vascular surgery 89
orthopaedics 744	paediatrics 22	
paediatric orthopaedics 17	paediatric cardiology 14	**Total** 4646

Category by Australian Classification of Health Interventions

ACHI Interventions Chapters	Total[a]
1 Procedures on nervous system	108
2 Procedures on endocrine system	33
3 Procedures on eye and adnexa	155
4 Procedures on ear and mastoid process	89
5 Procedures on nose, mouth and pharynx	201
6 Dental services	131
7 Procedures on respiratory system	79
8 Procedures on cardiovascular system	171
9 Procedures on blood and blood-forming organs	28
10 Procedures on digestive system	721
11 Procedures on urinary system	203
12 Procedures on male genital organs	192
13 Gynaecological procedures	537
14 Obstetric procedures	752
15 Procedures on musculoskeletal system	806
16 Dermatological and plastic procedures	243
17 Procedures on breast	97
18 & 19: Radiation oncology procedures & Noninvasive, cognitive and other interventions not elsewhere classified	64
20 Imaging services	36
Total	4646

Acknowledgements

The NCPA would like to acknowledge the advice, expertise and support of the following people and their organisations.

Ms. Jacqui Curley
Ms. Deirdre Murphy
Ms. Laura Metcalfe
Mr. Shane McDermott
} Economic & Social Research Institute to end of 2013
Health Care Pricing Office from start 2014

Mr. Paul Haughton, HIPE coding Manager, Tallaght Hospital, Dublin
Ms. Jackie Naughton, HIPE coding Manager, Mercy University Hospital, Cork
Ms. Janice McHugh, HIPE Coding Manager, Kerry General Hospital Tralee, Co. Kerry

Dr. Gerry Fitzpatrick, Consultant anaesthetist, Tallaght Hospital, Dublin
Dr. Jennifer Whyte, Consultant anaesthetist, Mercy University Hospital, Cork
Dr. Klaus Pollmann-Daamen, Consultant anaesthetist, Kerry General Hospital, Co Kerry

Dr. Ellen O'Sullivan, President, College of Anaesthetists of Ireland
Dr. Wouter Jonker, Consultant anaesthetist, Sligo General Hospital, Sligo.

Members of the NCPA Working Group

References

1. O'Callaghan A, Colgan MP, McGuigan C, Smyth F, Haider N, O'Neill S, Moore D, Madhavan P. A Critical Evaluation of HIPE Data. Ir Med J. 2012; 105: 21-3.
2. Udoh G, Afif M, MacHale S. The additional impact of Liaison Psychiatry on the future funding of general hospital services. Ir Med J. 2012; 105: 331-2.
3. Wiley MM, Using HIPE data for Research and Audit: Critical Factors for Success. Irish Medical Journal Vol 106, No 5, May 2013
4. Pandit JJ, Andrade J, Bogod DG, et al. The 5th National Audit Project (NAP5) on accidental awareness during general anaesthesia: protocol, methods and analysis of data. *Anaesthesia* 2014; 69: 1078–88.
5. Jonker WR, Hanumanthiah D, O'Sullivan EP, Cook TM, Pandit JJ, and the 5th National Audit Project (NAP5) of the Royal College of Anaesthetists and the Association of Anaesthetists of Great Britain and Ireland, and the College of Anaesthetists of Ireland. A national survey (NAP5-Ireland baseline) to estimate an annual incidence of accidental awareness during general anaesthesia in Ireland. *Anaesthesia* 2014; 69: 969–76.
6. Jonker WR, Hanumanthiah D, Ryan T, Cook TM, Pandit JJ, O'Sullivan EP. Who operates when, where and on whom? A survey of anaesthetic-surgical activity in Ireland as denominator of NAP5. Anaesthesia 2014; 69: 961–8.
7. The Australian Classification of Health Interventions (ACHI). Tabular List of Interventions Published by the National centre for Classification Centre, University of Sydney. Sixth edition, 2008
8. HIPE Data Directory available at www.HPO.ie