First Year Specialist Anaesthesia Training in Ireland: A Logbook Analysis

SM O'Shaughnessy[1], CJ Skerritt[1], CW Fitzgerald[2], R Irwin[1] & F Walsh[1]

[1] Department of Anaesthesia, Cork University Hospital, Cork, Ireland

[2] Royal College of Surgeons, Ireland

Correspondence: Sinead O'Shaughnessy, MB, Department of Anaesthesia, Cork University Hospital, Cork, Ireland

Received: October 2, 2017 Accepted: November 24, 2017 Online Published: November 30, 2017

doi:10.5430/ijhe.v6n6p106 URL: https://doi.org/10.5430/ijhe.v6n6p106

Abstract

Objective:

Acquisition of a new range of skills occurs during first year anaesthesia training. The first twelve months of specialist anaesthesia training represent the steepest part of the learning curve, and thus large differences in performance should be apparent between the first and last quarters of this period.

At present, no published quantitative logbook data exist for the Irish anaesthesia trainee. The aim of this study was to quantify the number of practical procedures performed and supervision required during first year anaesthesia training, in order to better understand the changes in skills occurring in trainees over this defining period.

Methods:

A retrospective analysis of prospectively maintained logbooks of three first year anaesthesia trainees was performed.

Results:

In the first three months, mean numbers of cases were 224, endotracheal tube (ETT) 64, laryngeal mask airway (LMA) 55, spinal anaesthetic 12, arterial lines 9.5, central lines 0.5, peripheral nerve blockade (PNB) 2, epidurals 0. There was 91.5% direct supervision and 8.5% indirect supervision.

In the final three months, mean numbers of cases were 205.5, ETT 28, LMA 35, spinals 50, arterial line insertions 4.5, central line insertions 1.5, PNB 3.5, epidurals 80. There was 68.5% direct supervision and 31.5% indirect supervision.

Conclusions:

The use of logbooks to chart progress through training has many advantages. However, the number of procedures or cases logged should not be read in isolation, or compared with hard targets of "proficiency". Rather, logbooks need to be read with reference to the performance of peers in training. This snapshot of training provides a useful flavour of the experience of novice anaesthesia trainees, and their progress within their first year, and could be used as a benchmark for future logbook based assessments.

Keywords: Anaesthesia, Trainees, Logbook, Training, Competence

1. Introduction

A steep learning curve exists in early anaesthesia training. Prior to starting an anesthesia training program, a novice anaesthesia trainee may have limited or no previous exposure to anaesthesia procedures. Given the practical nature of the specialty, competency in a new range of skills must be developed. The use of electronic logbooks to record clinical experience is well-established, both in anaesthesia and other procedure-based specialties (Watt JM, Watt WM, 1998) (Lonergan PE, Mulsow J, Tanner WA, Traynor O, Tierney S, 2011). Specific logbook targets have been developed in other jurisdictions, but do not currently exist for early anaesthesia trainees in Ireland.

Assessing competency in anaesthesia is difficult. It has been described by the Royal College of Anaesthetists (UK) as a 'trinity of knowledge, skills and attitude' (Anon, 1990). Traditionally, competency assessment consisted of formal college examinations in addition to subjective workplace observation and logbook analysis. Novel techniques of assessing competence such as a medical competence assessment procedure (MedCAP) have been suggested

(Breen D, Shorten G, Aboulafia A, Zhang D, Hockemeyer C, Albert D, 2014). Logbooks have a number of limitations (Nixon M, 2000). When used in the correct manner, however, they can form an integral part of a multi-faceted assessment of competence.

The College of Anaesthetists (CAI) is the governing body for anaesthesia training in Ireland. The current training pathway was streamlined in 2012 to consist of six years, Specialty Anaesthesia Training (SAT) 1-6 (College of Anaesthetists of Ireland, 2001). All trainees are required to maintain a prospective, electronic logbook recording their clinical experience.

The aim of this study is to understand the early experience of anaesthesia trainees by quantifying the clinical procedures performed on patients, as well as the level of supervision received at intervals during the first year of basic specialist training in anaesthesia in a large university teaching hospital. Furthermore, this study aims to contribute towards the development of more defined training parameters, which may enhance trainee development.

A brief review of the literature on this topic suggests to us a number of things. Firstly, defined volume based targets to achieve competency do not exist; the trainee body is a heterogeneous group with different rates of acquisition of technical skills and different psychosocial attributes which can partly dictate their level of supervision. We can use ETT insertion as a bench mark for technical skill acquisition. "Proficiency" in endotracheal intubation, can be achieved after approximately 50 successful attempts (Kopacz DJ, 1996), and it might seem justified that this be an arbitrary target for trainees to achieve in their first months of training. However, it has been noted by others (Hickson M, 2011) that completing a certain number of tasks or cases probably does not prepare the trainee for the more infrequent challenges, be it a difficult intubation, or a rare reaction. For example, malignant hyperthermia may only occur up to once in every 250 000 general anaesthetics (Rosenberg, Henry et al, 2017), meaning that most anaesthetists will never encounter a case. Will a target based training programme prepare them for this eventuality?

Secondly, in the absence of firm training targets, what can be done to ensure our trainees are performing adequately? We usually compare ourselves to our colleagues in the UK and overseas. Looking at some of the data coming from UK trainees (Hickson M, 2011) (Burrows, L et al, 2011), we can see that the annual caseload for trainees is somewhere between 280 and 525 cases per year. The same study also referred to the level of supervision across basic and higher specialist training. With respect to ETT insertion alone, an Australian study suggested a mean number of procedures of 157 per annum (Clarke, R. C., & A. I. Gardner, 2008).

Using an electronic logbook to record progress has advantages in the form of its usability across many devices, decreased memory bias, and accountability of both trainee and training body (Barbieri, Alberto, et al, 2015). However, compliance can be poor, and data loss has been reported to be as high as 51%. Alternatives to logbook interrogation include contemporaneous observation and assessment of skills, but these, too, have their downsides, being time-consuming and of questionable reliability (Chuan, A., et al, 2016).

Further difficulties in adopting logbook based assessment is that it can be difficult to assess how much data the logbook is actually capturing; in other words, the "denominator" in logbook studies is often difficult or impossible to measure (Barbieri, Alberto, et al, 2015). As noted above, there have been some publications on the nature of caseload and technical skills acquired over the course of training, or a part thereof, but nothing on the pivotal first 3 months. This paper provides a starting point for analysis of this most crucial period.

2. Methods

A retrospective analysis of prospectively maintained electronic logbooks of the three SAT 1 anaesthesia trainees at Cork University Hospital (CUH) was performed. Cork University Hospital is a large tertiary referral centre where approximately 30,000 anaesthetics are performed per annum. The three study participants were titled as T1, T2, T3. The number of procedures completed and the level of supervision received was compared during the first three months and final three months of SAT 1. For the first three months of SAT 1 the electronic logbooks of T1 and T2 were analysed, while in the final three months the logbooks of T1 and T3 were analysed. This was due to a differing overlap of training periods; T1 had a twelve-month rotation at CUH, whereas T2 and T3 each had six month rotations at the hospital.

Seven common clinical anaesthesia procedures were compared. These were:

1) endotracheal tube (ETT) insertion 2) laryngeal mask airway (LMA) insertion 3) spinal anaesthesia 4) arterial line insertion 5) central line insertion 6) peripheral nerve blocks 7) epidural anaesthesia. The level of supervision received during each case was recorded by the three trainees either as 'direct' or 'indirect'. All three trainees interpreted direct supervision to encompass consultant presence in the key aspects of a case, namely induction and emergence. Furthermore, if a consultant was present for a large part of the maintenance of anaesthesia, this was also regarded as

direct supervision. All other forms of supervision were regarded as indirect, where consultant assistance could be immediately available if requested. Data was collated and analysed. Basic descriptive statistics and Fisher exact test were performed using Stata v9.0.

3. Results

A total of 857 cases were recorded by the three SAT 1 trainees over the two three month periods; 449 in the first three months of year 1 training and 408 in the final three months of year 1 training. For each of the clinical procedures performed, total numbers were as follows: ETT 184, LMA 180, spinal 124, arterial line 28, central line 4, peripheral nerve blockade 11 and epidural 160. In relation to the level of supervision required, the three trainees received more direct than indirect supervision during year 1 training. Direct supervision occurred 61.5% of the total time, with indirect supervision 38.5% of the total time. Looking at the trend of supervision over time, levels of direct supervision fell during both the first and final three months of training corresponding with a rise in indirect supervision.

First three months of SAT1 training

A mean number of 224 (T1: 232, T2: 217) cases were performed by T1 and T2 during the first three months of anaesthesia training. The number of each clinical procedure performed is summarised in Table 1.

Table 1. Procedure results for the first three months of year 1 training (T1, T2)

	Cases	ETT*	LMA*	Spinal	ART*	CVC*	PNB*	Epidural	Total
T1	232	70	60	12	11	0	4	0	157
T2	217	58	50	12	8	1	0	0	129

* ETT = endotracheal tube, LMA = laryngeal mask airway, ART = arterial line, CVC = central venous catheter, PNB = peripheral nerve block.

Both T1 and T2 experienced greater levels of direct supervision compared with indirect supervision during their first three months of training. T1 received 93% direct supervision and 7% indirect supervision while T2 received 90% direct supervision and 10% indirect supervision [Table 2].

Table 2. Supervision levels for the first three months of year 1 training (T1, T2)

	Direct	Indirect
T1	93%	7%
T2	90%	10%

Final three months of SAT1 training

A mean number of 205.5 (T1: 235, T3: 176) cases were performed during the final three months training. The number of each clinical procedure performed during this training period is documented in Table 3.

Table 3. Results for final three months of year 1 training (T1, T3)

	Cases	ETT	LMA	Spinal	ART	CVC	PNB	Epidural	Total
T1	235	36	52	66	6	3	4	62	229
T3	176	20	18	34	3	0	3	98	176

Regarding supervision, T1 received 47% direct supervision and 53% indirect supervision while T3 received 16% and 84% respectively [Table 4].

Table 4. Supervision levels for the final three months of year 1 training (T1, T3)

	Direct	Indirect
T1	47%	53%
T3	16%	84%

4. Discussion

In this study, we have detailed the early exposure to practical clinical procedures gained by first year anaesthesia trainees through their electronic logbook records. We have described the number of cases and types of procedures trainees completed during two time periods, the first and final three months of first year training. Variations in the

number of procedures performed and supervision levels are noted, however, between the two training periods and between the trainees themselves. Within each three-month training period, both trainees performed a similar number of procedures which may suggest similar levels of clinical exposure and trainee development. However, when comparing the initial three months and final three months of first year training, the number and complexity of procedures performed increased. This finding suggests trainee progression along the training pathway, with participation in specialist training modules such as obstetrics during the final three months of year 1 training.

In terms of supervision, trainees received more direct supervision in the first three months which is not unexpected given their inexperience. There was a notable change in supervision levels between the start and end of year one training and a significant difference between the supervision required by T1 and T3 in the final three months. This may point towards differences in trainee proficiency or competence. Alternatively, variations in case-mix could lead to differences in supervision as, for example, GAs or spinals in a theatre setting may be more amenable to supervision than epidurals on the labour ward during obstetric anaesthesia training.

A key aspect of the practice of anaesthesia is the ability to perform practical procedures competently and safely. The role of the logbook as a surrogate marker of competence is controversial (Bould M, Crabtree N, Naik V, 2009). It has been argued that logbooks are more useful for designing training programs rather than for trainee assessment (Bould M, Crabtree N, 2008). Logbooks are unable to give us insight into a number of key facets of competence, such as proficiency at each individual procedure or interpersonal, management and leadership skills. In addition, traditional logbooks only document exposure to a procedure, which may or may not have been completed successfully.

Despite these drawbacks, logbook records still remain an important part of global trainee assessment. Although medical education is evolving to embrace a more qualitative approach to competency assessment, the quantitative information provided by a logbook remains important (ten Cate, O., & Scheele, F, 2007). This can be seen in the positive volume-outcome relationships established across a number of procedure-based specialities (Schrag D, Panageas K, Riedel E, Cramer L, Guillem J, Bach P et al, 2002) (Halm E, 2002) (Auroy Y, Ecoffey C, Messiah, Rouvier B, 1997). Furthermore, studies using cumulative sum analysis to assess proficiency at anaesthetic procedures can provide guidance when evaluating and interpreting the number of procedures recorded in trainee logbooks (de Oliveira Filho G, 2002). Electronic logbook records also allow monitoring of training programme evolution, as we have seen following, for example, European Working Time Directive implementation (Sim D, Wrigley S, Harris S, 2004) (Fernandez E, Williams D, 2009).

For the Irish anaesthetic trainee, a detailed logbook is required as evidence of clinical skills development. However, there are no guidelines or specific volume-based logbook targets for trainees for commonly performed procedures. Currently, the College of Anaesthetists of Ireland is in the process of defining training competencies, which will include minimum numbers in relation to anaesthetic procedures performed and subspecialty caseload. These targets have been developed in other jurisdictions to provide specific and transparent objectives for both trainees and supervisors (Konrad C, Schupfer G, Wietlisbach M, Gerber H, 1998) (Australian and New Zealand College of Anaesthetists, 2012).

There are several limitations of this study. The data in this study pertains to only three first year anaesthesia trainees from one institution. Trainees were selected from a single institution to facilitate a close comparison of training experience and to account for the possible variations in sub-specialty exposure between centres. The comparison of all three trainees over a twelve-month period was not possible due to six monthly placements, which rotated trainees in and out of the hospital. Logbook data is reviewed by both the college tutor in each training hospital every six months and the College of Anaesthetists of Ireland at two defined intervals within the six-year training programme. Definition of logbook terms, while agreed by participants in this study, are not provided as standard by either the logbook software developers or the College of Anaesthetists of Ireland. This can lead to inaccuracies in how data is recorded by trainees, which has been found to be up to 10% of logbooks in some of the reported literature. In addition, the logbook only documents complete cases and procedures and no facility currently exists to record partial completion of a procedure or case by a trainee. This may lead to certain degree of ambiguity and difficulty interpreting logbook data.

A marked degree of variation has been reported in learning anaesthetic practical skills between different types of procedures (Achuthan R, Grover, K, MacFie J, 2006). We recommend the development of a real-time “anaesthesia logbook dashboard” whereby all trainee logbook cases are uploaded to a secure, anonymised database, allowing trainees to view their progress compared to their peers. These could also allow standardisation of training and facilitate comparisons between trainees and between different training hospitals. Clear definition of logbook terms, particularly in relation to levels of supervision is also required. Furthermore, the concept of establishing and

measuring acceptable failure rates for the common practical procedures should be strongly considered (in I, 1995). This would inevitably require a more developed and integrated system of log keeping to enhance the training experience.

5. Conclusion

Anaesthesia trainees in Ireland gain significant early exposure to clinical procedures. Electronic logbook data provides valuable information regarding trainee experience and training programme performance. Our logbook data suggests that our trainees perform a comparable or higher number of cases and procedures when compared to those of our overseas peers. The development of targets from these data may assist trainees and trainers in monitoring early progression and performance.

References

Achuthan R, Grover, K, MacFie J. (2006). A critical evaluation of the electronic surgical logbook. *BMC Medical Education, 6*(1), 15. https://doi.org/10.1186/1472-6920-6-15

Anon. (1990). *A Guide to Training*. London: College of Anaesthetists.

Auroy Y, Ecoffey C, Messiah, Rouvier B. (1997). Relationship between complications of pediatric anesthesia and volume of pediatric anesthetics. *Anesthetic Analgesia, 84*(1), 234-5. https://doi.org/10.1213/00000539-199701000-00060

Australian and New Zealand College of Anaesthetists. (2012). Anaesthesia training programme curriculum. Melbourne, Australia: Australian and New Zealand College of Anaesthetists. www.anzca.edu.au/training/2013-training-program/pdfs/anaesthesia -training-program-curriculum.pdf. [Accessed Aug 4th 2015].

Barbieri, Alberto, et al. (2015). Education in anesthesia: three years of online logbook implementation in an Italian school. *BMC medical education, 15*(1), 14. https://doi.org/10.1186/s12909-015-0298-1

Bould M, Crabtree N, Naik V. (2009). Assessment of procedural skills in anaesthesia. *British Journal of Anaesthesia, 103*(4), 472-83. https://doi.org/10.1093/bja/aep241

Bould M, Crabtree N. Are logbooks of training in anaesthesia a valuable exercise?. *Br J Hosp Med, 69*(4), 236. https://doi.org/10.1093/bja/aep241

Breen D, Shorten G, Aboulafia A, Zhang D, Hockemeyer C, Albert D. (2014). Defining a competency map for a practical skill. *The Clinical Teacher, 11*(7), 531-536. https://doi.org/10.1111/tct.12194

Burrows, L et al. (2011). Basic training in anaesthesia: the effect of a run-through programme in one school of anaesthesia. Anaesthesia, 66, 225. https://doi.org/10.1111/j.1365-2044.2011.06634.x

Chuan, A., et al. (2016). Reliability of the Direct Observation of Procedural Skills assessment tool for ultrasound-guided regional anaesthesia. *Anaesthesia & Intensive Care, 44*(2).

Clarke, R. C., & A. I. Gardner. (2008). Anaesthesia trainees' exposure to airway management in an Australian tertiary adult teaching hospital. *Anaesthesia and intensive care, 36*(4), 513.

College of Anaesthetists of Ireland. (2001). Available at http://www.anaesthesia.ie [Accessed May 13th 2015].

de Oliveira Filho G. (2002). The construction of learning curves for basic skills in anesthetic procedures: an application for the cumulative sum method. *Anesthesia & Analgesia, 95*(2), 411-416. https://doi.org/10.4097/kjae.2017.70.2.196

Fernandez E, Williams D. (2009). Training and the European Working Time Directive: a 7-year review of paediatric anaesthetic trainee caseload data. *British Journal of Anaesthesia, 103*(4), 566-9. https://doi.org/10.1093/bja/aep170

Halm E. (2002). Is volume related to outcome in health care? A systematic review and methodologic critique of the literature. *Annals of Internal Medicine, 137*(6), 511-20. https://doi.org/10.7326/0003-4819-137-6-200209170-00012

Hickson M. (2011). Should experience count? BJA 2011, Dec, 107. https://doi.org/10.1093/bja/el_6930

Kestin I. (1995). A statistical approach to measuring the competence of anaesthetic trainees at practical procedures. *British Journal of Anaesthesia, 75*(6), 805-809. https://doi.org/10.1093/bja/75.6.805

Konrad C, Schupfer G, Wietlisbach M, Gerber H. (1998). Learning Manual Skills in Anesthesiology: Is There a Recommended Number of Cases for Anesthetic Procedures? *Anesthesia and Analgesia, 86*(3), 635-639. https://doi.org/10.1213/00000539-199803000-00037

Kopacz DJ. (1996). The regional anesthesia "learning curve". What is the minimum number of epidural and spinal blocks to reach consistency? *Reg Anesth, 1996 May-Jun, 21*(3), 182-90

Lonergan PE, Mulsow J, Tanner WA, Traynor O, Tierney S. (2011). Analysing the operative experience of basic surgical trainees in Ireland using a web-based logbook. *BMC Medical Education, 11*(1), 70. https://doi.org/10.1186/1472-6920-11-70

Nixon M. (2000). The anaesthetic logbook – a survey. *Anaesthesia, 55*, 1076-1080. https://doi.org/10.1046/j.1365-2044.2000.01616.x

Rosenberg, Henry et al. (2017). Malignant Hyperthermia: A Review. *Orphanet Journal of Rare Diseases, 10*, 93. PMC. Web. 24 Nov. 2017. https://doi.org/10.1186/s13023-015-0310-1

Royal College of Anaesthetists Bulletin number 46, November 2007; www.rcoa.ac.uk/system/files/CSQ-Bulletin46.pdf#page=12

Schrag D, Panageas K, Riedel E, Cramer L, Guillem J, Bach P et al. (2002). Hospital and surgeon procedure volume as predictors of outcome following rectal cancer resection. *Annals of Surgery, 236*(5), 583-92. https://doi.org/10.1097/00000658-200211000-00008

Sim D, Wrigley S, Harris S. (2004). Effects of the European Working Time Directive on anaesthetic training in the United Kingdom. *Anaesthesia, 59*(8), 781–784. https://doi.org/10.1111/j.1365-2044.2004.03808.x

ten Cate, O., & Scheele, F. (2007). Viewpoint: competency-based postgraduate training: can we bridge the gap between theory and clinical practice?. *Academic Medicine, 82*(6), 542-547. https://doi.org/10.1097/ACM.0b013e31805559c7

The CCT in Anaesthetics IV: Competency Based Higher and Advanced Level (Specialty Training (ST) Years 5, 6 & 7), Training and Assessment, A Manual for Trainees and Trainers. 2008. London: The Royal College of Anaesthetists.

Watt JM, Watt WM. (1998). Assessing trainees using the computerised logbook. *Current Anaesthesia and Critical Care*, *9*(4), 193–6. https://doi.org/10.1016/S0953-7112(98)80054-9