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Quality assurance in day case surgery: closing the audit loop

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Following recommendations made after a quality assurance initiative at Addenbrooke's Day Surgery Unit, Cambridge, a further audit was undertaken some months later. Many improvements were noted but certain areas gave cause for concern, e.g. an increase in the number of cancellations and little improvement in the adoption of better day case anaesthetic techniques. Re-audit is regarded as an essential exercise although care should be taken not to collect too much data. In future small audit projects will be undertaken and an education programme established to ensure that positive changes are indeed made as a result of audit findings.

Key words: Ambulatory surgery, quality assurance, clinical audit

Introduction

A large scale audit of many aspects of the work of Addenbrooke's Day Surgery Unit (DSU) was performed during 1993. This project was part of a quality assurance initiative by Hitchcock and Ogg[1] and as a result, recommendations for change in the practices within the unit were made (see Appendix 1). The work of the DSU was re-audited in June 1994 and this paper sets out the results of closing the audit loop. These results are interpreted with reference to the changes implemented following the original work and the future of audit within the Addenbrooke's DSU is discussed. Hopefully by highlighting the successes and failures of the audit, this project will serve as a guide to other day units wishing to establish a quality assurance programme.

Methods

The standards set for the re-audit exercise were unchanged from those of the original study[1]. The collection of data for the original study had been done by our DSU nursing staff and the completion of the additional paperwork was both time consuming and tedious. The original intention in designing the optically mark-read Formic forms used for this re-audit project was that the forms could be used both to collect audit data and, when retained in the patient's notes, could also act as a permanent record of the nursing and anaesthetic details of the patient's DSU stay. In this case, the newly designed forms could then replace rather than add to the routine unit paperwork thereby allowing continuous audit of unit activity. However, it was thought that while the new Formic data collection forms were still being piloted, they should be completed in addition to and not instead of the old nursing and anaesthetic records. A quality assurance nurse was therefore employed on a full-time basis for 2 months to organize the data collection and check the accuracy of forms completed by other staff. In this way, it was hoped that the data collected would be both accurate and complete.

This study was conducted over a 2 month period, to include data from 75 operating sessions. All patients booked on these sessions were included in the audit regardless of whether they attended, their age, type of anaesthesia or surgical procedure. Completed forms were delivered to the Addenbrooke's NHS Trust Clinical Audit Office where data was entered into D base 4 software via the optical mark reader.

Results and discussion

Three hundred and ninety patients were included in the analysis. This sample of patients was similar in case-mix and age distribution to the sample audited for the original work (see Appendix 2). The aim of closing the audit loop was to measure changes in outcome following implementation of the recommendations arising from the original work. The results presented below are

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Table 1. Non-attenders and cancellations

Criteria	*Standard set*	*Outcome 1993*	*Outcome 1994*
Number of patients not attending should be small	Less than 1% of cases booked should not attend	4.4% of booked cases did not attend	6.4% of booked cases did not attend
Number of cases cancelled should be small	Less than 1% of cases booked should be cancelled	2.5% of booked cases were cancelled	2.6% of booked cases were cancelled

therefore limited to those which reflect on the success or otherwise of these changes in practice.

There were five areas of audited practice in which results will be presented. These are:

1. non-attenders and cancellations
2. conduct of theatre lists
3. day case anaesthesia
4. postoperative pain, nausea and vomiting
5. admissions

Non-attenders and cancellations (see Table 1)

Did Not Attend (DNA) rates

The proportion of booked cases failing to arrive on the day of surgery rose from 4.4% in 1993 to 6.4% in the most recent audit. The reasons for this were not clear, although place of booking appeared to be one factor involved (see below). The other factor emerging from the 1994 audit is that the average waiting time for non-attenders (8.4 months) was substantially longer than the average waiting time for attenders (5.4 months). Waiting times for surgery have already been identified as a measure of quality in health care. In the case of Addenbrooke's DSU, some 'long waiters' were cases which had been languishing on the inpatient waiting list and were transferred to the DSU list in an effort to reduce the length of any further wait. Of course, this practice may lead to unscreened and unsuitable patients arriving for day surgery. Consideration should be given to making telephone contact with booked patients a day or two prior to their admission to ensure that they intend to keep their appointment.

DNA rates and place of booking (pooled results from 1993 and 1994 audits)

Of those patients booked at Addenbrooke's, 5.2% failed to attend on the day of surgery. Of those patients booked elsewhere and therefore not screened until the day of surgery, 7.2% failed to attend on the day of surgery.

Although the DNA rate following the 1993 audit was much higher than the standard set, no specific recommendations were made concerning how this situation might be improved. It has only become apparent with the analysis of the 1994 audit data that place of booking may be an important factor in determining the number of patients who DNA. Addressing this issue will involve further education of clinic staff at other booking centres (the local district general hospitals). These staff must be able to identity and assess the suitability of their potential day surgery patients. They ought to be familiar with the running of the Addenbrooke's DSU so that they can give advice to patients about, for example, preoperative starvation and what to expect on the day. Further staff education will therefore be essential.

Cancellations on the day of surgery

The results of the re-audit indicated that 10 patients were cancelled on the day of surgery, five by the anaesthetist and five by the surgeon.

Of those cancelled by the anaesthetist, two had not been previously screened for their suitability for day surgery. Of the remaining three, one had eaten on the morning of surgery, another had moderately severe asthma treated with steroids and was Cushingoid and the third was on a mixture of psycho-active drugs and was considered unsuitable because of her mental state on the day of surgery.

Of those patients cancelled by the surgeon, four had conditions which were considered by the surgeon to be no longer in need of surgical intervention. The average waiting time for those patients in whom surgery was no longer needed was 4 months, whilst the average waiting time for all audited patients was 5.4 months.

How may cancellations on the day of surgery be minimized? Ideally all patients should be assessed by trained day surgery staff before they are booked for a day unit list. At Addenbrooke's as in many other units, this assessment is done by experienced DSU nurses. Although guidelines for patient selection are available to all day unit users, there is inevitably some disagreement, particularly among consultant anaesthetists, about whether some patients are suitable candidates or not. It would appear that individual surgeons and anaesthestists have widely differing criteria for preoperative patient assessment and selection. Again, an educational programme ought to be established to rectify this anomaly.

Conduct of theatre lists (see Table 2)

An improvement was seen in the number of medical staff arriving on time and the proportion of DSU work performed by senior medical staff has remained high. A

Table 2. Conduct of theatre lists

Criteria	*Standard set*	*Outcome 1993*	*Outcome 1994*
Surgeons should not be late	95% of surgeons should be present in the DSU 20 min before the list starts	61.2% of surgeons were present 20 min before list start time	69.7% of surgeons were present 20 min before list start time
Anaesthetists should not be late	95% of anaesthetists should be present in the DSU 20 min before the list starts	87.5% of anaesthetists were present 20 min before list start time	92.4% of anaesthetists were present 20 min before list start time
Senior anaesthetists should work in the DSU	90% should be consultants or senior registrars	83% were consultants or senior registrars	83% were consultants or senior registrars
Senior surgeons should work in the DSU	90% should be consultants or senior registrars	91% were consultants or senior registrars	94% were consultants or senior registrars
Lists should start on time	95% should start within 5 min of the official start time	59% started at least 5 min after the official start	56% started at least 5 min after the official start
Lists should finish on time	95% should finish within 5 min of the official finish time	59% finished at least 5 min after the official finish time	7% finished at least 5 min after the official finish time
The start of a GA should not be near to the official finish time of the list	0% of GAs should be started within 15 min of the official finish time of the list	42.5% of GAs were started less than 15 min before the official finish time of the list	22.9% of GAs were started less than 15 min before the official finish time of the list
Numbers of junior staff being taught in theatre should be small	100% of lists should not have more than one junior member of staff in theatre	100% of lists had not more than one junior member of staff in theatre	87% of lists had not more than one junior member of staff in theatre
Numbers of medical students being taught in theatre should be small	100% of lists should have no more than one medical student in theatre	6.3% of lists did have more than one medical student in theatre	5.7% of lists did have more than one medical student in theatre

GA, general anaesthesia.

striking improvement in the number of lists overrunning was seen when day unit staff were given the freedom to cancel cases if a list was running late (see Appendix 1, specific recommendation no. 6). In fact, few cases were cancelled and the results were achieved largely by booking fewer cases in the unit diary, especially for those surgeons who had previously been guilty of regularly overrunning. Inevitably, as a result of trying to prevent overrunning, some lists were seriously underused especially if some patients either failed to attend or were cancelled and this change in practice has meant that the DSU throughput of patients has been reduced compared to the same time period in 1993.

As day surgery expands, surgical and anaesthetic consultants should be responsible for teaching junior staff about the special needs of this group of patients. The Royal College of Anaesthetists has recommended that trainees in anaesthesia should spend 8 weeks in day surgery as part of their training programme[2]. However, how can we keep staff numbers in day unit theatres small whilst at the same time training new staff in what is, after all, an excellent teaching environment? The education of nursing and medical staff is an important challenge for all those who work in day surgery and the DSU at Addenbrooke's is developing a range of teaching aids, e.g. slide shows with recorded lectures, videos and an audiovisual link between the theatres and a seminar room in an effort to provide a quality service to all its trainees. The success or otherwise of these methods will be the subject of further educational evaluation studies.

Day case anaesthesia audit (see Table 3)

Little improvement was seen in the area of day case anaesthetic techniques. It has been difficult to implement the programme of education as recommended (Appendix 1). Currently, junior anaesthetists are attached to the DSU for a period of 1 or 2 months during which time they are frequently removed from the unit for other duties in the hospital because of anaesthetic staff illness, holidays and emergencies. In addition, some anaesthetists working in the DSU do not see the requirements of day surgery anaesthesia as different from those of inpatient anaesthesia and therefore have little to offer trainees placed with them in terms of

Table 3. Day case anaesthesia audit

Criteria	*Standard set*	*Outcome 1993*	*Outcome 1994*
Most DSU procedures should be performed under GA	80% or more of DSU procedures should be performed under GA	79% of DSU procedures were performed under GA	86% of DSU procedures were performed under GA
Propofol is the induction agent of choice	90% of inductions should be with propofol	95.4% of inductions were with propofol	97% of inductions were with propofol
Propofol is the maintenance agent of choice	75% of GAs should be maintained using propofol (TIVA)	36.4% of GAs were maintained using propofol (TIVA)	32% of GAs were maintained using propofol (TIVA)
Opioid analgesics are required in DSU patients undergoing GA	90% of DSU patients receiving GA should receive opioid analgesics	87.2% of DSU patients receiving GA received opioid analgesics	83.3% of DSU patients receiving GA received opioid analgesics
NSAI analgesics are required in DSU patients undergoing GA	50% of patients should be given NSAI analgesics during procedures under GA	41% of patients receiving GA were given NSAI analgesics	26% of patients receiving GA were given NSAI analgesics
Pre-emptive use of local anaesthetics is important in patients undergoing procedures under GA	90% of patients receiving LA during procedures under GA should do so pre-emptively	38% of patients receiving LA during procedures under GA did so pre-emptively	46% of patients receiving LA during procedures under GA did so pre-emptively

GA, general anaesthesia; LA, local anaesthesia; TIVA, total intravenous anaesthesia.

teaching suitable approaches to patient selection, choice of anaesthetic technique, pain relief, etc. The reduced use of non-steroidal anti-inflammatory (NSAI) analgesia seen in the results above is partly due to the change in recommended initial dosage of ketorolac which led to some anaesthetics discontinuing its use altogether.

These results serve to illustrate just how difficult it is to change when that process of change requires the cooperation of members of staff who have limited commitment to the success of the DSU. However, audit should only be performed where change in practice as a result is feasible.

Postoperative pain, nausea and vomiting (See Table 4)

One of the recommendations made following the initial audit was that all patients should be accompanied home on discharge from the DSU and though there has been an improvement here, the standard set still has not been achieved.

Postoperative pain was a greater problem than postoperative nausea and vomiting (PONV). The DSU is now conducting a detailed audit focusing on pain for a period of 5 days following wisdom tooth extraction and is also involved in research into the optimum analgesic regimen for this important group of patients. Again, education of all DSU staff in the management of both pain and PONV is essential. There is already a great deal of published work in both of these fields and encouraging staff to adopt the techniques of proven benefit would undoubtedly improve the results of future audits.

Admissions

Admission rates during audit periods

In 1993, 1.8% of the patients included in the audit period were admitted to the inpatient wards. During the re-audit period this value had risen to 2.9%. The major cause for each admission is listed in Table 5.

Admissions for PONV

The four patients in whom the primary cause for admission was PONV had undergone the surgical procedures shown in Table 6.

Admissions for pain

The five patients in whom the primary cause for admission was pain had undergone the surgical procedures shown in Table 7.

Admissions for persistent postoperative bleeding (See Table 8)

The first three patients on this list had all received intraoperative ketorolac for postoperative analgesia.

The admission rate from a day surgery unit is often considered to be a useful measure of the success of that unit. The interpretation of the audit data above is not easy because the numbers involved were small. The Addenbrooke's DSU produces an annual workload report in which admission rates and reasons for admission are listed. The results above are consistent with the latest (1983–94) workload report, indicating that the

Table 4. Postoperative pain, nausea and vomiting

Criteria	*Standard set*	*Outcome 1993*	*Outcome 1994*
DSU patients should be accompanied home	100% of DSU patients should be accompanied home	1.9% of DSU patients were NOT accompanied home	1% of DSU patients were NOT accompanied home
DSU patients should not suffer from nausea	95% of DSU patients should have no nausea in the recovery area	96.6% of DSU patients had no nausea in the recovery area	81% of DSU patients had no nausea in the recovery area
DSU patients should not suffer from nausea	95% of DSU patients should have no nausea in the ward area	93% of DSU patients had no nausea in the ward area	93% of DSU patients had no nausea in the ward area
DSU patients should not be in pain postoperatively	95% of patients should have mild or no pain in the recovery area	88.1% had mild or no pain in the recovery area	68% had mild or no pain in the recovery area
DSU patients should not be in pain postoperatively	No more than 4% of patients should have moderate pain in the recovery area	9.8% had moderate pain in the recovery area	14% had moderate pain in the recovery area
DSU patients should not be in pain postoperatively	No more than 1% of patients should have severe pain in the recovery area	2.1% had severe pain in the recovery area	0.2% had severe pain in the recovery area
DSU patients should notbe in pain postoperatively	98% of patients should have mild or no pain in the ward area	84.4% had mild or no pain in the ward area	63% had mild or no pain in the ward area
DSU patients should not be in pain postoperatively	No more than 2% of patients should have moderate pain in the ward area	13.3% had moderate pain the ward area	33% had moderate pain in the ward area
DSU patients should not be in pain postoperatively	No patient should have severe pain in the ward area	1.7% had severe pain in the ward area	1.1% had severe pain in the ward area

Table 5. Reasons for admission

	No. of patients admitted	
	1993	*1994*
PONV	2	2
Pain	3	2
'Slow to wake'	1	0
Aspiration	1	0
Bleeding	1	3
Extended surgery	1	0
Social/late finish	0	1
Anaesthetic drug reaction	0	2
Total	9	10

major anaesthetic causes for admission are postoperative pain and postoperative nausea and vomiting and as has already been mentioned, these areas are currently the focus of more detailed audit work.

Conclusions

The easiest conclusion to draw from the results of this audit project is that even in a dedicated, forward looking day surgery unit such as that at Addenbrooke's NHS Trust, it was a difficult task to make significant changes to systems of care in response to the findings of clinical audit. Also of concern was the question of whether any successful change could be maintained; only by repeating the audit again will this question be answered.

A fundamental rule of audit is to avoid collecting too much information at any one time. It would appear that

Table 6. Admissions for PONV

	No. of patients	*Anaesthetic drugs used*
Groin exploration	2	Morphine, enflurane, nitrous oxide
VTOP	1	Alfentanil, enflurane, nitrous oxide
Bilateral varicose vein surgery	1	Fentanyl, enflurane, nitrous oxide

VTOP, vaginal termination of pregnancy.

Table 7. Admission for pain

	No. of patients
Varicose vein surgery	1
Revision of breast scars	1
Inguinal hernia repair	1
Removal 3 widom teeth	1
Laparoscopic sterilization	1

Table 8. Admissions for postoperative bleeding

	No. of patients
Excision of a palatal lesion	1
Anal sphincterotomy	1
Marsupialization of Bartholin's cyst	1
VTOP	1

VTOP, vaginal termination of pregnancy.

in addition to collecting too much information, the recommendations made following the initial audit period were rather overambitious; indeed many have not been fully implemented as was originally envisaged. For example, despite the fact that clinical audit was seen by the NHS Management Executive as a priority, the resources for carrying out this work are scarce[3]. At Addenbrooke's, the re-audit project described in this paper was only possible because of the dedication of one staff nurse, funded for a 2 month period solely to conduct this audit. Without funding such individuals, we believe that all but the very simplest of audit work may be of limited value because data is unlikely to be accurately collected. Nursing and medical staff are unlikely to see the completion of audit forms as a priority because they see no immediate benefit to staff or patients in doing so. A major role of dedicated audit staff must therefore be to feed back to clinical staff the results of their efforts as quickly as possible.

The future of audit in the Addenbrooke's DSU currently relies on the willing participation of all clinical staff in the collection of audit data. We intend to abandon the original idea of using our audit forms simultaneously as patient record forms to be scanned and returned to the patients' hospital notes. We see as more practical the division of the original audit forms into six smaller audit projects. These projects will be conducted one at a time for a limited period of 2 months each on a regular basis. The aim will be to produce fewer recommendations following each audit and to allow time for these recommendations to be implemented in such a way that the change is accepted by the DSU staff and therefore is likely to endure. Above all there is a need to educate all grades of medical and nursing staff in the merits or otherwise of audit activity. It is acknowledged that audit takes considerable time and effort but any efficient day unit ought to monitor its activities and identify areas for further research effort.

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Appendix 1

Summary of the recommendations for change based on the results of the initial audit, 1993

All day surgery users were informed in writing of the recommended changes and of the intention to re-audit.

General

1. The Day Surgery Unit Operational Policy should be followed by everyone involved with day case management.
2. All surgical colleagues will have to be informed about the late starting and finishing of lists.
3. Consideration will be given to the employment of a Community Liaison Sister to encourage community nurse training in the Day Surgery Unit.
4. Consideration will be given to the employment of a Quality Assurance Nurse to continue to oversee the system of clinical audit already established.
5. There is an urgent need for the design and implementation of a Day Surgery Educational Policy for medical staff, nursing staff and managers.
6. There is a specific need to educate anaesthetists working in the Unit regarding the use of total intravenous anaesthesia.

Specific

1. Specific audit projects are needed to investigate:
   Postoperative pain,
   Postoperative nausea and vomiting,
   Postoperative desaturation.
2. Patient selection guidelines will be altered so that it will be Unit policy to accept patients with a body mass index of up to 36 (or 34 if scheduled for gynaecological laparoscopy).
3. In order to reduce wastage of propofol, the practices of drawing up this drug will be altered. For anaesthestists who only use propofol for induction, induction doses for half the patients on the list will be drawn up before the list starts. For anaesthetists who also use propofol for main-

tenance, only 50 ml syringes will be used to draw up propofol, so that induction and maintenance doses will come from the same syringe.

4. It will be Unit policy that pre-emptive local anaesthesia will be used whenever it can be expected to provide some benefit.
5. A programme of seminars will be arranged for general practitioners. The research fellow will also prepare a handbook for GPs outlining the selection criteria, workload figures and outcome measures used in the Unit.
6. To ensure that lists finish on time, the Unit director, manager or senior sister will routinely review the progress of the list half an hour before the time the last GA should commence. The authority and support of the Day Surgery Theatre Users Committee will allow the cancellations of patients to avoid the overrunning of lists if necessary.
7. The manager will arrange for the front desk to be manned from 7.50 am onwards, so that all patients will be greeted on arrival.
8. All patients will be accompanied home, even those undergoing local anaesthesia.
9. Consideration will be given to staggering the admission of patients for all lists.
10. The Unit discharge criteria will be altered to exclude the ability to void urine except where this is especially important (caudal analgesia, circumcision etc.).

Appendix 2

Case-mix during audit periods

Surgical speciality	*% of audited cases*	
	1993	*1994*
Gynaecology	30	29
Orthopaedics	16	12
Maxillofacial	17	16
ENT	9	12
General surgery	13	14
Urology	7	8
Paediatric urology	3	4
Plastics	5	5
	100	100

Age of audited patients

Age group	*% of audited cases*	
	1993	*1994*
<13 yr	14	16
14–64 yr	83	80
>65 yr	3	4
	100	100